Homeownership Gains During the 1990's:
Composition Effects and Rate Effects

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Executive Summary

Introduction

Homeownership rates are like income – both the level and the distribution matter.

Inequalities persist in homeownership rates. The rate for Non-Hispanic Whites exceeds the rates for non-Hispanic Blacks, Hispanics, and non-Hispanic Other, by 15 to 30 percentage points. The likelihood of being a homeowner increases directly with income so that very high income households are 10 to 45 percentage points more likely to be homeowners than households in other income classes. Central city households have a homeownership rate that lags behind households living outside central cities by more than 20 percentage points.

Out of concern about these "gaps", the Department of Housing and Urban Development (HUD) has sponsored a series of research studies. This paper is one of these studies; its goal is to determine whether the progress made during the 1990's represents a real improvement in homeownership rates or is only the manifestation of expected demographic trends. The policy reason for looking at the effects of demographics on the national homeownership rate is to determine whether the prospects of a household in 2000 for becoming a homeowner are better than those of a similarly defined household in 1990.

Using data from the 1990 and 2000 decennial censuses, the paper distinguishes between changes in homeownership rates that result from changes in the composition of the population from changes that result from improved homeownership opportunities. The analysis concludes that the growth in the national homeownership rate between 1990 and 2000 was predominately due to widespread increases in homeownership rates throughout the various components of the population. In general, the prospects of a household in 2000 for becoming a homeowner were better than those of a similarly defined household in 1990.

The Demographics of Homeownership

As noted above, homeownership rates vary greatly among demographic groups. Since the national homeownership rate is a weighted average of the homeownership rates of the different components of population, increases or decreases in the size of different components can change the national homeownership rate. This study confirms that during the 1990's:

- Homeownership rates generally increase with age and there was a shift in the population toward age groups with higher homeownership rates.

- Homeownership rates increase with real income and real income increased.

- Homeownership rates are higher outside of central cities and a slightly larger proportion of households now live outside central cities.

- Minorities have lower homeownership rates and the minority share of the population increased.

- Married couple households have higher homeownership rates and the percentage of married couple households declined.

Thus demographic trends over the decade both favored and hindered growth in homeownership rates. This paper studies the net effect of these diverging trends on both the national homeownership rate and the homeownership rates of important components of the population.

Decomposing Changes in the National Homeownership Rate

The paper uses the public use microdata samples (PUMS) from the 1990 and 2000 censuses, about one million households from each census. It divides the households in each sample into 1,750 separate groups defined by the age of the householder (7 age brackets), household type (5 types), the race and ethnicity of the householder (5 race and ethnicity combinations), real household income (5 classes) and the location of the household (inside or outside of central cities). This division allows us to look at changes in both the homeownership rates of these 1,750 groups and in the distribution of the population across the groups.

- In particular, the analysis calculates what the change in homeownership rates would be if one froze the distribution of the population across groups at the 2000 profile but allowed group-specific homeownership rates to move from their 1990 to 2000 levels. The analysis calls this change the *rate effect*.

- The analysis also calculates what the change in homeownership rates would be if one froze the group-specific homeownership rates at their 1990 levels but allowed the distribution of the population to change from its 1990 profile to its 2000 profile. The analysis calls this change the *composition effect*.

It turns out that mathematically the sum of the rate effect and the composition effect equals the actual change in homeownership rates.

Between 1990 and 2000, the national homeownership rate rose from 64.23 percent to 66.18 percent, an increase, after rounding, of 1.96 percentage points. Analysis of the changes in the homeownership rates and in the relative size of the 1,750 different groups provides strong evidence that this increase represents real progress in increasing homeownership opportunities throughout the population.

- More than half the groups experienced an increase in their homeownership rates and the groups with increases account for approximately three-fourths of all households in 2000.[1]

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[1]   It is possible to compare homeownership rates in 1990 and 2000 for only 1,363 groups. In 2000, 350 groups are defined to include householders who are non-Hispanic and who claim to be members of more than one race. The 1990 census did not contain this classification so these 350 cells are empty in the 1990 PUMS. Another 37 cells were empty in either 1990 or 2000 because they are rare combinations of the

- Using all 1,750 groups, the analysis found that changes in group homeownership rates (the rate effect) accounted for 1.54 percentage points of the 1.96 percentage point increase. This is 79 percent of the growth in the national homeownership rate over the decade. (A positive rate effect means that changes in the homeownership rates of the different components of the population combine to produce an increase in the national homeownership rate. A negative effect would have the opposite connotation.)

- The composition effect contributed 0.42 percentage points to the rise in the national homeownership rate. This contribution combines the effects of an aging population (a positive effect), the decline in married couple households (a negative effect), a rising minority share of the population (a negative effect), growing real income (a positive effect), and a small movement from inside central cities to outside central cities (a positive effect). Subsequent analysis indicates that the net effect of these trends was positive primarily because of the impact of rising real income. (A positive *composition effect* means that changes in the composition of the population combine to produce an increase in the national homeownership rate. A negative value would have the opposite connotation.)

- A second analysis divided all households into 175 groups defined by age of householder, household type, and race and ethnicity of household. In this analysis, the composition effect focuses only on changes in the age, household type, and race and ethnicity structure of the population. (Now the effects of growth in real income and movement out of central cities show up in the rate effect.) In this framework, changes in the composition of the population appear to have worked against improvement in the national homeownership rate. The composition effect was a negative 0.86 percentage points. The national homeownership rate would have declined had it not been for a very positive rate effect of 2.82 percentage points.

Decomposing Changes in Other Homeownership Rates

Changes in the homeownership rates of subgroups were also major contributors to changes in other important homeownership rates.

- Over the decade the homeownership rates of Hispanics, non-Hispanic Whites, non-Hispanic Blacks, and non-Hispanic Other all increased. The homeownership rates of all income classes except the very low income class increased. The central city homeownership rate also increased.

- The rate effect was primarily responsible for the gains in the homeownership rates of the low income, moderate income, high income, and very high income families. It was an important contributor to the increase in homeownership rates for Hispanics, non-Hispanic Whites, and central city residents.

different factors that define the groups. Of the 1,363 non-empty groups, 793 (58 percent) had higher homeownership rates in 2000.

- Changes in the rate structure were not uniformly positive for all the disadvantaged groups. The rate effect was a minor contributor to the gain for non-Hispanic Blacks. Homeownership rates among subgroups of the non-Hispanic Other race and very low income household groups actually declined over the decade.

- Changes in the composition of the population also helped increase the homeownership rates of all the race and ethnicity groups. Growth in real income appears to have been the most important shift in the composition of these groups. For example, when the analysis limits composition changes to age and household type, the composition effect is negative for non-Hispanic Blacks. Only non-Hispanic Other have a substantial composition effect after eliminating the influence of changes in real income.

This paper also studied how homeownership rates changed when both income and race are held constant. This analysis is important because the racial and ethnic gaps have persisted even when income differences are not a factor. The results indicate that most but not all groups defined both by income and by race and ethnicity improved their homeownership rates over the decade. Among Hispanic households, homeownership rates increased for all income classes except the very high income group. Among non-Hispanic Blacks households, homeownership rates increased for moderate income, high income, and very high income households but decreased for very low income and low income households.

Despite widespread increases in the homeownership rates of disadvantaged groups, there was only modest progress, as measured by the PUMS surveys, in closing gaps between 1990 and 2000. The homeownership rates of non-Hispanic Whites, very high income households, and household living outside of central cities – the norms against which the gaps are measured – also increased during this time so that changes in gaps were smaller than the changes in homeownership rates. Three important gaps actually increased – those for non-Hispanic Blacks, non-Hispanic Other, and very low income households.

- Homeownership rates for the various components of non-Hispanic Blacks population failed to improve as much as their non-Hispanic Whites counterparts. This difference offset favorable shifts in distribution of the non-Hispanic Blacks population across the various subgroups and produced a widening of the gap.

- Homeownership rates for the various components of non-Hispanic Other population fell on average over the decade while their non-Hispanic Whites counterparts experienced gains. This difference produced a widening of the gap since non-Hispanic Whites and non-Hispanic Other had composition effects of nearly equal magnitude.

- Homeownership rates for the various components of the very low income population fell on average over the decade while their very high income counterparts experienced gains. This difference was the predominant reason that this gap widened although unfavorable shifts in distribution of the very low income population across the various subgroups also contributed.

- Increases in homeownership rates across subgroups were the sole explanation of the small narrowing in the gaps for Hispanics and very low income families. Relative

improvement in the rate structure explained the majority of the narrowing in the gaps for moderate income and high income households and explained almost half of the narrowing for households living in central cities.

One disturbing finding is the failure of Hispanics and non-Hispanic Blacks to close the gaps in three of the four cases in which one would have thought it easiest to make progress, that is, among high income and very high income households. As noted, only high income non-Hispanic Blacks narrowed the gap. In the three cases in which the gaps widened, the composition effect showed that the disadvantaged group experienced changes in the population that acted to widen the gap. However, these compositional changes are not solely responsible. In the three cases, the rate effect also worked against a narrowing of the gap.

Chapter One
Goals, Data, and Methodology

Background

"Homeownership is part of the American dream" is more than a cliché. Pundits and analysts have long included the homeownership rate among the measures they use to track social progress, both for the nation as a whole and for classes within the population defined by race, income, or other characteristics. Throughout the twentieth century, public policy promoted homeownership in a variety of ways, the most important being favorable tax treatment and numerous capital market interventions intended to make mortgage financing more affordable and more widely available.

At the beginning of the 1990's, policy makers and social observers expressed concern about stagnation in the overall homeownership rate and persistent differentials in homeownership rates between certain classes within the population. Between the 1980 and 1990 decennial censuses, the national ownership rate actually declined from 64.4 percent to 64.2 percent. This downward trend contrasted sharply with the upward growth recorded from 1940 though 1980. In addition, the homeownership rates of non-Hispanic Whites continued to far exceed those of Hispanics and non-Hispanic Blacks; sizeable differences remained among homeownership rates across income groups; and homeownership rates in central cities lagged far behind those in suburbs and non-metropolitan areas. These "gaps" in homeownership rates particularly troubled policy makers. The Department of Housing and Urban Development commissioned a series of research studies to learn what causes gaps and how gaps can be closed. This paper is one of the HUD-sponsored studies.

Goals

During the 1990's, homeownership rates began to rise once again and almost all groups within the population ended the decade with higher homeownership rates. On the surface, these trends appear to represent social progress. Yet questions persisted about whether the observed increases represented true growth in homeownership rates or were just the result of favorable trends in the composition of the population. For example, the 1990 population contained a higher percentage of households whose householders[2] were under 30 years old, an age bracket that historically has had very low homeownership rates. One would have expected the homeownership rate to have increased between 1990 and 2000 for no other reason than the aging of the population.

This report resolves this issue by answering three questions:

- To what extent was the growth between 1990 and 2000 in the national homeownership rate the result of favorable shifts in the demographic composition of the population and to

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[2]   "Householder" is the term used by the Census Bureau for the person within a household whose age, race, and ethnicity characteristics are used to categorize the household.

what extent was it the result of a general upward shift in homeownership rates throughout the population?

- To what extent was the growth between 1990 and 2000 in the homeownership rates of particular groups within the population the result of favorable shifts in the demographic composition of the groups and to what extent was it the result of a general upward shift in homeownership rates across the various components of the groups?

- As gaps in homeownership rates narrowed or widened over the decade, what was the relative importance for these changes of shifts in demographic composition and shifts in homeownership rates across components of the groups being compared?

Data

This report uses the public use microdata samples (PUMS) from the 1990 and 2000 decennial censuses. The Census Bureau releases census data in a variety of forms. The typical format is a collection of tables constructed from either the entire census or from the special long-form census.[3] From past experience, the Census Bureau knows which tables are most useful to the majority of users. Generally, these tables are available at different levels of geography, ranging from the nation to specific census tracts. However, the Census Bureau cannot anticipate all the tables that might be useful; and, therefore, it provides analysts with a sample of data on individual households which they can sort in ways designed to answer specific questions. These data are contained in a file called the public use microdata sample or PUMS.

PUMS data have characteristics that make them very valuable in answering the three questions. The PUMS is a very large sample; it includes one percent of all households, approximately one million households in both 1990 and 2000. The PUMS file contains data from the long form and, therefore, includes all the information relevant to the goals of the report. For each household, it indicates whether the household is an owner-occupant or a renter and it includes the age, race, and ethnicity of the householder. It identifies the type of household, e.g., married couple without children or other families with children, and reports household income.

Generally, this report is interested in patterns at the national level and not at lower levels of geography. The one exception is the distinction between whether a household lives in a central city of a metropolitan area or outside all central cities. Changes between the 1990 and 2000 censuses in the procedures used by the Census Bureau to protect the confidentiality of households in the sample make it difficult to ensure consistent classification of household across PUMS as to their residence within or outside of central cities. The Appendix discusses this problem and other issues involved in using the 1990 and 2000 PUMS. Despite some limitations, the PUMS surveys are the best data available to answer the questions posed in this chapter.

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3   In recent censuses, the Census Bureau has gathered more extensive demographic and housing data from a sample of approximately one-in-six households who receive a longer questioner.

Methodology

The core analytical tool used in this report is a simple mathematical manipulation.

Assume that the population can be broken into k classes defined by characteristics such as age, race, and income, so that every household belongs to one but only one such class. For example, all married couples with children who live in central cities and have income in the top income quintile and whose householder is a non-Hispanic Black between 45 and 54 years of age could form one such class. Five characteristics define this class, household type, location, income, race and ethnicity, and age. A difference in any one characteristic, such as income, would put a household into a different class.

For each class one can compute the following information from PUMS data:

- r_{90} = homeownership rate in 1990
- r_{00} = homeownership rate in 2000
- w_{90} = proportion of all households in 1990 who belong to that class
- w_{00} = proportion of all households in 2000 who belong to that class

By definition, the national homeownership rate in 1990 (R_{90}) is $\Sigma w_{90} r_{90}$, the summation across all k classes of the product of the homeownership rate of a class and its share of the population.[4] The national homeownership rate in 2000 (R_{00}) is similarly defined as $\Sigma w_{00} r_{00}$. Therefore, the change in national homeownership rate between 1990 and 2000 can be written as:

$$R_{00} - R_{90} \equiv \Sigma w_{00} r_{00} - \Sigma w_{90} r_{90}{}^{[5]}$$

This validity of this identity is unchanged if one simultaneously subtracts and adds the same term ($\Sigma w_{00} r_{90}$) to the right hand side of the identity.

$$R_{00} - R_{90} \equiv \Sigma w_{00} r_{00} - \Sigma w_{00} r_{90} + \Sigma w_{00} r_{90} - \Sigma w_{90} r_{90}$$

The terms on the right side can now be regrouped and simplified in a manner that facilitates answering the three questions posed above.

$$R_{00} - R_{90} \equiv \Sigma w_{00} (r_{00} - r_{90}) + \Sigma (w_{00} - w_{90}) r_{90}$$

The first term ($\Sigma w_{00} (r_{00} - r_{90})$) measures the contribution of changes in the homeownership rates of the various groups that form the population. It calculates the difference between the actual 2000 national homeownership rate ($\Sigma w_{00} r_{00}$) and a hypothetical 2000 national homeownership in which each group within the population has its year 2000 share of the population but its year 1990 homeownership rate ($\Sigma w_{00} r_{90}$). The composition of the population is held constant as it is in 2000 but the homeownership

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[4]   The national homeownership rate is a weighted average of the homeownership rates of the individual classes.

[5]   This mathematical statement is an identity not an equation and therefore uses the symbol $\equiv$. An identity is a statement that is always true.

rates are allowed to change. The analysis will call this measure the "rate effect" because it measures the effect of changes in only the homeownership rates of the individual classes.

The second term ($\Sigma(w_{00} - w_{90})\ r_{90}$) measures the difference between a hypothetical 2000 national homeownership rate in which each group within the population has its year 2000 share of the population but its year 1990 homeownership rate ($\Sigma w_{00}r_{90}$) and the actual 1990 national homeownership rate ($\Sigma w_{90}r_{90}$). The homeownership rate for each class is held constant at its 1990 level but the composition of the population is allowed to change. The analysis will call this measure the "composition effect" because it measures the effect of changes in just the relative size of the individual classes.

The rate effect and the composition effect sum to the overall change in the homeownership rate. In other words, the change in the homeownership rate can be explained simply as a combination of a rate effect and a composition effect. The report will call this "decomposing" the change in the homeownership rate into its rate effect and composition effect components.[6]

This technique recognizes that the national homeownership rate is simply a weighted average of the homeownership rates of the various components of the population. It explains changes in the national homeownership rate in terms of changes in the weights and rates of the component groups.

The preceding paragraphs explained this technique in terms of the national homeownership rate. The same technique can be used to explain any group-specific homeownership rate such as the homeownership rate for non-Hispanic Blacks. The population of non-Hispanic Blacks can be broken down into classes such as married couples with children who live in central cities and have income in the top income quartile and whose householder is between 45 and 54 years of age. In other words, the non-Hispanic Blacks homeownership rate is itself a weighted average of the homeownership rates of component groups. Then the same equations can be used to decompose the change in the homeownership rate of non-Hispanic Blacks.

In addition, the technique works regardless of how one chooses to break the population down into classes. The examples used in the preceding paragraphs disaggregate the population along several dimensions, such as age, race and ethnicity, and household type, simultaneously. One could also separate the population along a single dimension such as age. Chapter 2 employs the decomposition technique in this way.

The report will use the decomposition technique repeatedly to explain the 1.96 percentage point change in the national homeownership. In each case, how the analysis chooses to divide the population will determine the magnitude and sign of both the rate effect and the composition effect for that particular analysis. There will be multiple answers – one for each decomposition – because there are multiple questions. One decomposition will explain how differences in the distribution of the population across age brackets and changes in homeownership rates over the decade for the different age brackets explain the 1.96 percentage point change. Another decomposition will explain how differences in the distribution of the population across racial and the ethnic groups and changes

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[6]   Implementing the decomposition technique involves many steps; for this reason, the Appendix contains a more thorough discussion of the technique.

in homeownership rates over the decade for the different groups account for the 1.96 percentage point change. The report will take care to interpret the results in terms of the question being posed by a particular decomposition.

Organization

The report contains six chapters and an appendix. This chapter explains why HUD commissioned this study, discusses the data and methodology that the report will use, and introduces the decomposition terminology. The second chapter looks at how the population changed between 1990 and 2000 with respect to five important characteristics, such as age, and examines how these changes individually affected the national homeownership rate. The third chapter looks at changes in the composition of the population along several dimensions simultaneously and analyzes how these combined changes affected the national homeownership rate. The fourth chapter goes back to the individual dimensions and applies the same techniques to examine the most important of the homeownership rate gaps, the gap between non-Hispanic Whites and other racial and ethnic groups, the gap between very high income households and other households, and the gap between the residents of central cities and other households. The fifth chapter applies the decomposition technique to other questions, such as how and why have the homeownership proclivities of families with children changed. The sixth chapter summarizes and interprets the results.

The report is unavoidably a compilation of many numbers. To make the text less tedious, the report will confine the written discussion to qualitative directions and implications and keep most of the numbers in the tables.

Cautions

Analysis of PUMS data provides the best possible answer to the three questions posed in this chapter. However, there are limitations to the PUMS analysis that readers should be aware of. The appendix discusses limitations in greater detail.

- In the context of changes in homeownership rates, the decomposition technique must work with small numbers. To prevent rounding from obscuring the different forces at work, the report measures homeownership rates in percentages with two decimal places, e.g., 66.18 percent. The Census Bureau reports homeownership rates to only one decimal place.

- The PUMS samples report a smaller change in national homeownership rate than does the Current Population Survey (CPS). This further decreases the size of the change that the technique will be trying to decompose.[7]

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[7] Chapter 3 relates the difference between the decennial censuses and the CPS to additional population found in the 2000 census.

- Despite having approximately a million households in each PUMS sample, there are classes defined by multiple characteristics that contain few or no households. For example, neither the 1990 nor the 2000 PUMS contain a single household that belongs to the class of households that are other families with children with high incomes living in central cities and with householders who are Hispanic and 75 years old or older. The combined weight of the classes with few or no households is very small.

- The report does not apply statistical tests to the measured rate and composition effects.

- The results from decomposition depend upon the categories used to disaggregate the population into separate classes. The report applies two different approaches and provides results from both approaches when appropriate.

- Whenever possible, we report the same homeownership rates and gaps using decennial census and CPS data. There are importance differences in the direction and magnitude of changes in gaps as measured by the PUMS and by the CPS.

- The Census Bureau changed its confidentiality rules between the 1990 and 2000 censuses. As a result, the Census Bureau reports location with respect to metropolitan and central city status differently in the 1990 and 2000 PUMS. This lack of consistency may have affected the results for the location analysis.

- In the 2000 census, the Census Bureau allowed respondents to classify themselves as belonging to more than one race. Only 1.4 percent of all persons elected this option but the existence of a group labeled non-Hispanic of two or more races in one PUMS and not the other may have had some effect on the results of the decomposition by race and ethnicity.

Chapter Two
Trends in Relevant Population Characteristics and Their Impact on the National Homeownership Rate

Historically, homeownership rates have varied substantially within the population by age, household type, race and ethnicity, income, and location. This Chapter examines the variation of homeownership rates among the segments of each of these five dimensions, tracks how these homeownership rates changed between 1990 and 2000, studies how the distribution of the population across the segments of each dimension changed over the same period, and analyzes how the rate and composition changes within each dimension affected the national homeownership rate.

For these inquiries, the decomposition technique has both strengths and weaknesses. For each of the population characteristics mentioned in the preceding paragraph, the Chapter seeks to answer the following question:

> *How much would the national homeownership rate have changed from 1990 to 2000 **if** homeownership rates had remained at their 1990 level while the composition of the population changed with respect to that one characteristic?*

The composition effect provides a direct answer to that question. However, the decomposition technique envisions the population being subdivided into many separate classes defined by several characteristics. Repeatedly this Chapter will divide the population into a few classes defined by a single characteristic. In this context one must exercise care in interpreting the results.

As an example, consider separating the population into five classes based on income, ranging from very low income to very high income. Using the PUMS data we can calculate what proportion of the households belonged to each income class in 1990 and in 2000. We can also calculate a homeownership rate for each class in 1990 and in 2000. This is all the information we need to apply the decomposition analysis and calculate a rate effect and a composition effect. The composition effect will answer the hypothetical question posed in the italized paragraph.

It is important to remember that the question is hypothetical. The mathematics implicitly assume that each income class is homogenous and that only the size of the classes and the class homeownership rates change over time. However, the income classes are not homogenous. All moderate income households are not the same. There are a group of moderate income households who are other than family households, who live in central cities, and whose householder is non-Hispanic Whites and between 30 and 34 years old. There are also a group of moderate income households who are married couples with children, who live outside of central cities, and whose householders are non-Hispanic Blacks and between 45 and 54 years old. Since we know that homeownership rates vary by type of household, location, race and ethnicity, and age, we would expect these groups to have different homeownership rates even though they are both moderate income. In fact, the homeownership rate for moderate income households is an average of the homeownership rates for all the groups that belong to the class of moderate income household.

With this in mind, we realize that three things may have changed between 1990 and 2000 – the size of each of the income classes, the composition of each class in terms of subgroups, and the homeownership rates of the various subgroups in each class. A change in the size of a class will show up in the composition effect. Changes in the makeup of the class and the homeownership rates of the various subgroups show up in the rate effect. So, in this context, the interpretation of the rate effect is ambiguous. A positive rate effect represents some combination of an increase in the homeownership rates of the various subgroups and a change in the distribution of the population within each class among the subgroups.[8]

With this understanding, we will apply the decomposition technique repeatedly to explore how changes in the distribution of the population with respect to a single characteristic affected the national homeownership rate. As measured by the 1990 and 2000 PUMS, the national homeownership rate increased by 1.96 percentage points from 1990 (64.23 percent) to 2000 (66.18 percent).[9]

Homeownership Patterns by Age

For this study, we divided the PUMS samples into seven groups by age. The groups were:

- Households with householders younger than 30 years old
- Households with householders between 30 and 34 years old
- Households with householders between 35 and 44 years old
- Households with householders between 45 and 54 years old
- Households with householders between 55 and 64 years old
- Households with householders between 65 and 74 years old
- Households with householders 75 years old or older

Table 1 shows the distribution of the 1990 and 2000 PUMS samples across these age brackets and reports the 1990 and 2000 homeownership rates for the different brackets.

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[8]   See discussion in Appendix of the impact of disaggregation choices on the decomposition analysis.

[9]   1.96 percentage points is the rounded difference between the 1990 and 2000 homeownership rates.

Table 1

Share of the Population and Homeownership Rates by Age Bracket: 1990-2000

Age of Householder	Share of Population in 1990	Share of Population in 2000	Change in Share	Homeownership Rate in 1990	Homeownership Rate in 2000	Change in Rate
<30	14.9%	12.8%	-2.1	28.90%	28.55%	-0.36
30-34	11.6%	9.4%	-2.2	52.61%	52.96%	0.34
35-44	22.0%	22.6%	0.6	66.08%	66.31%	0.23
45-54	15.6%	20.2%	4.7	75.30%	74.89%	-0.41
55-64	13.6%	13.5%	0.0	79.67%	79.68%	0.00
65-74	12.8%	11.0%	-1.8	78.50%	80.67%	2.17
75+	9.5%	10.4%	1.0	70.13%	74.25%	4.11

Sources: 1990 and 2000 PUMS

Generally, homeownership increases with the age of the householder. In 1990, this pattern holds until the two oldest brackets when the homeownership rates begin to decline. In 2000, the pattern holds until the 75 or older bracket. Homeownership rates increase dramatically between the under 30 years old bracket and the between 30 and 34 bracket. There is also a large increase between the 30 to 34 bracket and the 35 to 44 brackets. Between 1990 and 2000, the two youngest categories decreased in relative size while all the five oldest categories, except the 65 to74 bracket, increased in size. These patterns suggest that the aging of the population between 1990 and 2000 probably helped increase the homeownership rate. The decomposition analysis confirms this.

Taking age as the only dimension along which to disaggregate the population, we find that the composition effect was twice as important as the rate effect. (See Table 2.)

Table 2

Decomposition of the National Homeownership Rate Using Only Age Categories
(Effects in Percentage Points)

	Rate Effect	Composition Effect	Combined Effect
National Homeownership Rate	0.62	1.33	1.96

The effects do not add due to rounding.

Table 1 shows that, over the decade, there were small fluctuations – both positive and negative – in the measured homeownership rates of the various age brackets. The only sizeable changes were the increases in the two oldest brackets. The strong increases in the two oldest brackets were sufficient to produce a positive rate effect, which accounts for approximately one-third of the growth in the homeownership rate. As explained in the beginning of this Chapter, each age bracket can be broken

into subgroups based on other characteristics such as household type and race and ethnicity. In this context, the homeownership rate for any given bracket is just a weighted average of the homeownership rates of its subgroups. The next two sections will show there were important demographic changes with respect to household type and race and ethnicity; changes that should have lowered homeownership rates. The stability of homeownership rates over the decade for the five youngest age brackets suggests that the existence of offsetting trends in rates and composition within each bracket.

Table 2 shows that the aging of the population was an important contributor to the increase of the homeownership rate between 1990 and 2000. If the population had undergone no other compositional changes, then this factor would have been the major explanation of growth. However, the remaining sections of this Chapter will show that the population was undergoing other structural changes that tended to offset or reinforce the positive effects of aging.

Homeownership Patterns by Household Type

We divided the PUMS samples into five household types

- Married families with children
- Married families without children
- Other families with children
- Other families without children
- Other household types

Homeownership rates vary greatly across the different household types. (See Table 3.) Married couples – with and without children – have homeownership rates substantially higher than the national homeownership rate. The rate for "other families without children" is approximately equal to the national rate. "Other household types" have a homeownership rate substantially lower than the national rate and the rate for "other families with children" is by far the lowest rate.

Table 3

Share of the Population and Homeownership Rates by Household Type: 1990-2000

Household Type	Share of Population in 1990	Share of Population in 2000	Change in Share	Homeownership Rate in 1990	Homeownership Rate in 2000	Change in Rate
Married with children	26.2%	24.4%	-1.9	72.74%	76.15%	3.41
Married without children	30.6%	29.5%	-1.2	81.36%	83.22%	1.86
Other families with children	7.5%	8.6%	1.1	33.12%	39.56%	6.44
Other families without children	6.7%	6.7%	0.0	63.75%	64.36%	0.61
Other household types	28.9%	30.8%	1.9	46.56%	49.87%	3.31

Sources: 1990 and 2000 PUMS

During the 1990s, the proportion of all households belonging to the two household types with the highest homeownership rates declined while the proportion belonging to the two types with the lowest homeownership rates increased. These distributional shifts put downward pressure on the growth in the national homeownership rate. The decomposition analysis reported in Table 4 shows that these changes produced a negative composition effect. Without offsetting changes in the rate structure, the national homeownership rate would have declined by over one percentage point because of the decline in married couple households relative to other household types.

Table 4

Decomposition of the National Homeownership Rate Using Only Household Type Categories
(Effects in Percentage Points)

	Rate Effect	Composition Effect	Combined Effect
National Homeownership Rate	3.00	-1.04	1.96

Table 3 shows that, during the 1990s, homeownership rates rose across all household types. In fact, other families with children, married couples with children, and other household types made substantial gains in homeownership rates. The increased homeownership rates reflect both increases in the underlying homeownership rates and the effects of other demographic changes such as the aging of the population. These factors result in a very positive rate effect when the national homeownership rate is decomposed by household type alone.

Homeownership Patterns by Race and Ethnicity

For this study, we separated households into five classes based on a combination of race and ethnicity:

- Hispanics
- Non-Hispanic Whites
- Non-Hispanic Blacks
- Non-Hispanic Other
- Non-Hispanic More Than One Race[10]

Non-Hispanic Whites have a homeownership rate higher than the national rate while Hispanics, non-Hispanic Blacks, and non-Hispanic Other have rates that are substantially lower than the national homeownership rate. During the 1990, growth in the minority population reduced the share of the non-Hispanic Whites by over 5 percentage points.

Table 5

Share of the Population and Homeownership Rates by Race and Ethnicity: 1990-2000

Household Type	Share of Population in 1990	Share of Population in 2000	Change in Share	Homeownership Rate in 1990	Homeownership Rate in 2000	Change in Rate
Hispanics	6.3%	8.7%	2.4	42.14%	45.63%	3.50
Non-Hispanic Whites	80.3%	75.0%	-5.4	69.06%	72.45%	3.39
Non-Hispanic Blacks	10.6%	11.2%	0.6	43.86%	46.60%	2.74
Non-Hispanic Other	2.8%	3.8%	1.0	52.33%	53.56%	1.23
Non-Hispanic More Than One Race	NA	1.4%	1.4	NA	48.73%	NA

Sources: 1990 and 2000 PUMS

The growth of the minority population would have, by itself, reduced the national homeownership rate. The decomposition analysis in Table 6 confirms this. The composition effect is a negative 1.28 percentage points.

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[10]   The 2000 decennial census was the first census to allow respondents to claim more than one race. There are no records of householders of "more than one race" in the 1990 PUMS. This inconsistency in classification had little impact on the analysis because only 1.4 percent of householders chose this option in 2000. The appendix explains the steps taken to further minimize the effect of this difference in classification. In short, we assumed that these households had the weighted average homeownership rate of non-Hispanic Blacks and non-Hispanic Other in 1990. Using the average spreads the impact of these new cells between the rate effect and the composition effect. The appendix derives an estimate of the impact.

Table 6

Decomposition of the National Homeownership Rate Using Only Race/Ethnicity Categories[11]
(Effects in Percentage Points)

	Rate Effect	Composition Effect	Combined Effect
National Homeownership Rate	3.24	-1.28	1.96

Over the decade, homeownership rates for all the race/ethnicity categories increased with Hispanics, non-Hispanic Whites, and non-Hispanic Blacks experiencing substantial gains. The increased homeownership rates reflect both increases in the underlying homeownership rates and the effects of other demographic changes such as rising real incomes. These factors result in a very positive rate effect when the national homeownership rate is decomposed by race/ethnicity categories alone.

Homeownership Patterns by Income Class

We divided the PUMS samples into five income classes based on real income. We divided the 1990 PUMS households into income quintiles and then used the consumer price index to update the boundaries between the various classes before sorting households in the 2000 PUMS.[12]

- Very low income
  - 1990: income <$12,026
  - 2000: income <$16,158

- Low income
  - 1990: $12,026 ≤ income < $23,400
  - 2000: $16,158 ≤ income < $31,439

- Moderate income
  - 1990: $23,400 ≤ income < $36,000
  - 2000: $31,439 ≤ income < $48,368

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[11] The decomposition analysis assumes that the 1990 homeownership rate for those non-Hispanics who would have claimed "more than one race" was 45.62 percent, the weighted average for non-Hispanic Blacks and non-Hispanic Other, and that its share of the population was zero.

[12] A quintile contains 20 percent of all households. The first quintile contains the 20 percent of all households that have the lowest incomes; the second quintile contains the next 20 percent of all households with the lowest incomes; and the fifth quintile contains the 20 percent of all households who have the highest incomes.

- High income
  - 1990: $36,000 \leq$ income $< $54,436
  - 2000: $48,368 \leq$ income $< $73,137

- Very high income
  - 1990: $54,436 \leq$ income
  - 2000: $73,137 \leq$ income

Table 7 shows that homeownership rates rise sharply with income. Very low income and low income households have homeownership rates substantially below the national rate while high income and very high income households have rates substantially higher than the national rate. Moderate income households have rates that are slightly lower than the national rate.

Table 7

Share of the Population and Homeownership Rates by Real Income Class: 1990-2000

Household Type	Share of Population in 1990	Share of Population in 2000	Change in Share	Homeownership Rate in 1990	Homeownership Rate in 2000	Change in Rate
Very low income	20.0%	17.7%	-2.3	43.46%	42.00%	-1.46
Low income	20.0%	19.9%	-0.1	54.44%	55.24%	0.80
Moderate income	19.9%	19.3%	-0.6	62.93%	65.45%	2.52
High income	20.1%	19.7%	-0.4	74.33%	75.92%	1.58
Very high income	20.0%	23.5%	3.5	85.91%	86.14%	0.23

Sources: 1990 and 2000 PUMS

The 1990's was a period of real income gains. As a result of this upward movement, the proportion of all households classified as very high income rose while the share of all other income classes fell. The share of the very low income households fell by more than 2 percentage points. By themselves these changes should have pushed the national homeownership rate up. The decomposition analysis in Table 8 shows a very positive composition effect.

Table 8

Decomposition of the National Homeownership Rate Using Only Income Classes
(Effects in Percentage Points)

	Rate Effect	Composition Effect	Combined Effect
National Homeownership Rate	0.75	1.21	1.96

During this period, homeownership rates rose for all but the very low income group. Moderate income households experienced a sizeable gain. The increased homeownership rates reflect both increases in the underlying homeownership rates and the effects of other demographic changes such as the growing minority population. The combined effect of these factors is a positive rate effect when the national homeownership rate is decomposed by race/ethnicity categories alone.

Homeownership Patterns by Location

We would have liked to divide the PUMS samples into three groups based on location – those living in central cities, those living in suburbs, and those living outside metropolitan areas. Unfortunately, changes in the practices used by the Census Bureau to report data between the 1990 and 2000 censuses made it difficult to develop a classification system that would be consistent across censuses.[13] Therefore, we classified the PUMS households based on two locations:[14]

- Inside central cities
- Outside central cities

The Appendix explains how we classified households into these categories for each PUMS. Because of changes in the coding and the interpretation of specific codes, there may be some inconsistency in classification between PUMS. In comparison with the data from the 1990 and 2000 censuses, it appears that the areas that we identify as "inside central cities" have more households and a higher homeownership rate than central cities as identified by the Census Bureau.[15] This suggests that we have included some neighboring suburban areas in our "inside central cities" cells.

The homeownership rate in central cities is substantially lower than the rate outside central cities. (In both 1990 and 2000, the homeownership rate was higher in non-metropolitan areas than in suburbs but the difference between these two rates was small relative to the differences between either rate and the central city homeownership rate.)

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[13] Between 1990 and 2000, the Census Bureau changed its confidentially requirements. For the 1990 census, PUMS data were organized into areas of 100,000 or more people called PUMA's. For the 2000 census, PUMS data are organized into areas of 400,000 or more people called Super PUMA's. For both samples, the Census Bureau created a detailed set of codes to identify the metropolitan status of the areas, such as, "contains only metropolitan territory outside central city (MSA part of fully-identified MSA)." We were unable to match the codes for the two PUMS to produce a consistent central city, suburb, outside metropolitan area breakdown. We were able to obtain a reasonably consistent central city and outside central city split across the PUMS. (See the Appendix for more information.)

[14] The codes we use to identify "inside central cities" pick up some neighboring suburban areas and the codes we use to identify "outside central cities" pick up some small central cities. (See the Appendix for a complete listing of the codes.)

[15] According to HUD's State of the Cities Data System, 32.5% of households lived in central cities in 1990 and 31.0% in 2000. Our PUMS estimates are 37.6% and 35.9% respectively. The State of the Cities Data System reports a central city homeownership rate of 49.0% in 1990 and 50.5% in 2000, compared to PUMS estimates of 54.17% and 57.65%.

Table 9

Share of the Population and Homeownership Rates by Location: 1990-2000

Household Type	Share of Population in 1990	Share of Population in 2000	Change in Share	Homeownership Rate in 1990	Homeownership Rate in 2000	Change in Rate
Inside central cities	37.6%	35.9%	-1.7	54.17%	57.65%	3.48
Outside central cities	62.4%	64.1%	1.7	70.28%	70.96%	0.68

Sources: 1990 and 2000 PUMS

To the extent that we were able to identify "inside central cities' consistently across the two PUMS, there appeared to be a slight decline in the proportion of households who live in central cities during the 1990's. The decomposition analysis based only on location shows that this shift had a small positive effect on homeownership rates. The composition effect accounts for only 14 percent of the 1.96 percentage point change.

Table 10

Decomposition of the National Homeownership Rate Using Only Location
(Effects in Percentage Points)

	Rate Effect	Composition Effect	Combined Effect
National Homeownership Rate	1.69	0.27	1.96

Over the decade, homeownership rates increased both inside and outside central cities; the increase inside central cities was substantial. Taken together, these increases produced a strong rate effect. As note in the preceding sections, the change in homeownership rates measured along a single dimension combines both shifts in the composition of the population along other dimensions as well as changes in the underlying homeownership rates. In this case, two additional factors may be at work. First, central cities are very diverse. The small decline in central city population reported in Table 9 may conceal large shifts among central cities. In particular, smaller central cities may have grown while larger central cities may have declined. Change of this nature could explain the sharp increase in the central city homeownership rate. Second, inconsistencies in our identification of "inside central cities" between the 1990 and 2000 PUMS could have contributed to the increase.

Conclusions

Between 1900 and 2000, the national homeownership rate increased by 1.96 percentage points. This Chapter uses the decomposition technique to show how changes in each of five characteristics of the population individually influenced the change in homeownership rate. The analysis showed:

- The decline in the share of the households with householders 34 years of age or younger and the increase in the share of older households, particularly those in the 45-54 age bracket had a strong positive effect on the national homeownership rate.

- The decline in the share of married couple households had a strong negative effect on the national homeownership rate.

- The growth in the share of households with minority householders had a strong negative effect on the national homeownership rate.

- The rise in real household incomes had a strong positive effect on the national homeownership rate.

- The slight shift of the population away from central cities had a small positive effect on the national homeownership rate.

Of course, none of these changes took place by themselves. Chapter 3 examines how the combination of these five trends affected the national homeownership rate.

Chapter Three
Decomposition of Changes in the National Homeownership Rate

Change in the National Homeownership Rate 1990-2000

The PUMS data show that the homeownership rate increased from 64.23 percent in 1990 to 66.18 percent in 2000. This change is consistent with the trends derived from the full decennial census data and from the Current Population Survey (CPS). The PUMS estimate, as one might expect, is identical to one decimal point to the estimate derived from comparing the full decennial censuses. However, as Table 11 shows, the PUMS estimates produce a smaller percentage point change than do the CPS estimates. Analysis after the 2000 census revealed that the Census Bureau had underestimated immigration during the 1990's and as a result the CPS estimates were based on the assumption that the population was older and less Hispanic. Because younger households and Hispanic-headed households have lower homeownership rates, the homeownership rate derived from the 2000 census is lower than the CPS estimate.[16]

Table 11

Decade Changes in the National Homeownership Rate as Reported by Different Sources

Source	1990 Rate	2000 Rate	1999-2000 Change in Homeownership Rates
Current Population Survey	63.9%	67.4%	3.5 percentage points
Decennial Censuses	64.2%	66.2%	2.0 percentage points
PUMS	64.23%	66.18%	1.96 percentage points

CPS rates based on Table 27 in U. S. Housing Market Conditions, first quarter, 2003. The decennial census rates based on American FactFinder for the 100 percent samples.

The PUMS difference does not add due to rounding.

This Chapter explains the change in homeownership rates over the decade using the decomposition methodology based on two different disaggregations of the population. But first we present a simple count of changes.

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[16] Michael Carliner, "Census 2000: Lifting the Veil," *Housing Economics*, May 2001, pages 8-11.

Tally of Homeownership Rate Changes by Household Category

Chapter 2 showed that homeownership rates vary considerably with changes in the age of the householder, household type, the race and ethnicity of the householder, real household income, and the location of the household. To study how homeownerships rates changed between 1990 and 2000, we divide the population into a large number of groups defined by differences in each of these characteristics. A group (or cell) would consist of all households of one household type, living either inside or outside a central city, having a certain level of income, and having a householder of a particular age and a particular race and ethnicity.

The first step is to decide how many splits to make along each of the five dimensions. The knowledge that in this Chapter we would be combining the splits in a multiplicative way influenced the decisions that we made in Chapter 2 about how to separate the population along each dimension. We were conscious of two considerations: what are the most policy relevant distinctions and how do these decisions affect the accuracy of the analysis? From a policy perspective, it would be useful to include as much detail as possible about race and ethnicity. From a practical perspective, it would not be useful to separately identify racial categories that are relatively small, such as American Indian and Native Alaskan, because the PUMS sample would contain few households from these categories. Breaking the population into small categories is particularly problematic when multiple dimensions are used. The scarcity of American Indian and Native Alaskan households in a PUMS survey becomes a real limitation when we further subdivide each race and ethnicity group by age, household type, income, and location. [17]

To construct the cells, we use the same disaggregations for each of the five dimensions that we used in Chapter 2. There were 7 age brackets, 5 household types, 5 race/ethnicity categories, 5 real income classes, and 2 locations. This categorization produces 1,750 groups or cells (7*5*5*5*2).

Of the 1750 cells, 350 include households whose householder characterized himself or herself in the 2000 census as a non-Hispanic member of two or more races. There are no counterparts to these households in the 1990 PUMS so we cannot determine whether the homeownership rates of these cells increased or decreased over the decade. An additional 37 cells could not be used because the cells were empty in one or both of the PUMS. Of the remaining 1,363 cells, 793 had higher homeownership rates in 2000 than in 1990, 23 had the same homeownership rate in 2000 as in 1990,[18] and 547 had lower homeownership rates in 2000 than in 1990. The 793 cells with higher homeownership rates represent 58 percent of the 1,363 cells and 74 percent of all households in 2000.

This tally shows that the rise in homeownership rates was widespread within the population. It does not rule out the possibility that changes in the structure of the population between 1990 and 2000 were more important than these increases in group homeownership rates in producing the 1.96

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[17]   The 1990 PUMS contains 918,782 households. The number of distinct groups being analyzed is the product of the number of divisions used for each characteristic. Even relatively compact breakdowns for each characteristic can quickly lead to a large number of cells, many of which will contain few observations and some of which may be empty. See the Appendix for information on the number and importance of cells with few observations or no observations.

[18]   The "no changes" are measured to two decimal places, i.e., to one hundredth of one percent.

percentage point increase in the national homeownership rate. To resolve that issue, we turn to the decomposition technique.

Decomposition 1: Age, Household Type, Race/Ethnicity, Income, and Location

This report is concerned primarily with gaps in homeownership rates among different classes within the population. The first decomposition disaggregates the population along five dimensions in which gaps have been observed for years: age, household type, race and ethnicity, income, and location.

This first decomposition uses all five dimensions which, as noted, produces 1750 separate cells. Of 1750 cells, 52 were empty in 2000, i.e., contained no households. Excluding the 350 cells corresponding to the "two or more racial groups", only 18 of 1400 cells were empty in 1990. An example of cells that were empty in both years is: other families with children with high incomes living in central cities and with householders who are Hispanic and 75 years old or older.[19] The Appendix shows how empty cells can affect the decomposition analysis. As explained in the Appendix, the analysis assigns the national homeownership rate to the empty cells to minimize any potential impact.

This disaggregation of the population shows that changes in the structure of the population and changes in the homeownership rates for various components of the populations were both important in improving the nation homeownership rate over the decade. Table 12 shows that the rate effect was dominant.

Table 12

Decomposition of the National Homeownership Rate Using 5 Categories
(Effects in Percentage Points)

Decomposition One	Rate Effect	Composition Effect	Combined Effect
National Homeownership Rate	1.54	0.42	1.96

Of the 1.96 percentage point gain from 1990 to 2000, 79 percent was due to changes in the underlying level of homeownership rates; only 21 percent was due to changes in the composition of the population.

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[19] See the Appendix for a further discussion of cells that contain few or no households and how we handled these cells in the decomposition analysis.

There results compare favorably to a similar analysis of changes in the national homeownership rate from 1991 to 1997 using American Housing Survey (AHS) data.[20] The AHS measured a 1.62 percentage point change in the national homeownership rate over this period. The Vandenbroucke-Eggers analysis ascribed 85 percent of this change to changes in the underlying level of homeownership rates.

Decomposition 2: Age, Household Type, and Race/Ethnicity

The first decomposition analysis is subject to two objections. First, a household's decision to live inside or outside a central city is connected to its decision to own or rent its dwelling. Renter households who decide to purchase a home may simultaneously decide to move from a central city to its suburbs. Under the first decomposition, any increase in the homeownership rate attributable to these households would be tallied as part of the composition effect. Arguably, these households should be tallied as part of the rate effect.

The second objection relates to the interpretation of shifts among income classes. The income categories represent constant real income. Real income grew between 1990 and 2000; and, therefore, there were relatively more households in the higher income classes in 2000 than in 1990. (See Table 13.) The first decomposition ascribes the growth in real income to the composition effect. This characterization may not be useful for our purposes. One basic rationale for decomposition analysis is to separate changes in homeownership rates that result from demographic phenomena that are generally outside of public control, such as the aging of the population or changes in the racial or ethnic character of the population, from changes that are subject to public policy interventions, such as lowering mortgage interest rates. Real income growth is a major goal of public policy. To the extent that increases in the national homeownership rate are due to changes to real income growth, perhaps they should be attributable to the rate effect

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Table 13

Distribution of the PUMS Sample by Income Class

Income Class	1990 Share	2000 Share
Very low income households	20.0%	17.7%
Low income households	20.0%	19.9%
Moderate income households	19.9%	19.3%
High income households	20.1%	19.7%
Very high income households	20.0%	23.5%

The 1990 distribution is not even because of how the Census Bureau rounds household income.

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[20]   David A. Vandenbrouke and Frederick J. Eggers, *Is the Increase in House Ownership Really News?*, American Real Estate and Urban Economics Mid-Year Meeting, Washington DC, May 2000.

With these concerns in mind, we decomposed the increase in the national homeownership rate using only three categories: age, type of household, and race and ethnicity. The three categories were defined in the same way as they were in decomposition one. This disaggregation produced 175 cells (7*5*5).[21]

Decomposition two tells a much different story. Now the rate effect is much larger and the composition effect is actually negative. (See Table 14.) This result means that the cumulative effect of changes in the age, household type, and race and ethnicity character of the population from 1990 and 2000 tended to lower the national homeownership rate. As we will see in Chapter 4, the favorable effect of the aging of the population was more than overset by shifts in the population toward racial and ethnic groups and household types with lower homeownership rates. In decomposition two, the rate effect is large, 2.82 percentage points. If the 2000 population had the same age, household type, and race and ethnicity structure it had in 1990, then the change in the underlying homeownership rates would have raised the national homeownership to 67.05 percent (64.23 +2.82) instead of the 66.18 percent actually attained. The composition effect lowered the 2000 national rate to 66.18 (67.05 - 0.86, after rounding).

Table 14

Decomposition of the National Homeownership Rate Using 3 Categories
(Effects in Percentage Points)

Decomposition Two	Rate Effect	Composition Effect	Combined Effect
National Homeownership Rate	2.82	-0.86	1.96

Conclusions

This Chapter studied how simultaneous changes in the population along several dimensions affected the increase in the national homeownership rate over the 1990's. Comparing the results of the decompositions presented in this Chapter with the single dimension decompositions in Chapter 2 shows that looking at one dimension at a time, such as the age structure of the population, cannot answer the question of whether the observed increase was a demographic phenomenon or the result of a rise in homeownership rates throughout the various components of the population. This Chapter uses two different categorizations of the population to answer this question.

Decomposition 1 focuses on the five dimensions that traditionally have revealed gaps in the homeownership rates of groupings within that dimension. The five dimensions are age, household type, race and ethnicity, income, and location. This categorization separates the households in the PUMS samples into 1,750 distinct grouping. Decomposition 1 finds that 79 percent of the 1.96 percentage points increase in the national homeownership rate is attributable to net improvements among the homeownership rates of these 1,750 groupings. Only 21 percent is attributable to

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[21] See the discussion in the Appendix of the impact of disaggregation choices on the decomposition analysis.

favorable change in the composition of the populations. The conclusion is that on net the 1990's was a period of rising homeownership rates across most components of the population. Chapter 4 will evaluate how the gaps changed over this period.

Decomposition 2 provides a different perspective. It distinguishes between those characteristics of the population that public policy, in general, cannot influenced from those that public policy can affect, either directly or indirectly. Public policy has little influence over the age structure of the population, the pattern of household formation, and the racial and ethnic composition of the population.[22] On the other hand, public policy has promoted growth in real incomes. (Location is dropped from the analysis because households often make their choice of tenure type and location simultaneously.)

Decomposition 2 divides the households in the PUMS samples into 175 distinct groupings determined by age, household type, and race/ethnicity. This decomposition finds that the composition effect is actually negative, that is, the combined impact of shifts during the 1990's in the distribution of household across age brackets, household types, and racial and ethnic categories was detrimental to increases in the national homeownership rate. In other words, if the underlying homeownership rates for the various race/ethnicity, age, and household categories had remained the same, the homeownership rate in 2000 would have been almost a percentage point lower.

Decomposition 2 provides the clearest picture of how all aspects of public policy and other trends affected three sets of homeownership rates – those based on age, household type, and race and ethnicity. Public policy and other trends produced a substantial net increase in these homeownership rates. Relative to the national homeownership rate in 1990, the rate effect represented a 4 percent improvement.

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[22]   This distinction is not absolute. Tax and welfare policy can affect the pattern of household types and immigration policy can alter the racial and ethnic composition of the population.

Chapter Four
Decomposition of Changes in Gaps in Homeownership Rates for Race and Ethnicity, Income, and Location

Homeownership rates differ widely among the various components of the population. Differences that occur when the groups being compared differ only on race or ethnicity, income, or living inside or outside a central city have become matters of public policy concern. The term "gaps" has been applied to:

- The extent to which the homeownership rate of non-Hispanic Whites exceeds those of Hispanics, non-Hispanic Blacks, and non-Hispanic Other.

- The extent to which the homeownership rate of very high income households exceeds those of lower income classes.

- The extent to which the homeownership rate of areas outside of central cities exceeds that of central cities.

This Chapter focuses on these gaps. For each of these important gaps, the Chapter performs the following analyses:

- Reports changes in the homeownership rates of the different categories within each group and changes in the gaps using the 1990 and 2000 PUMS

- Compares the changes from PUMS data with the same changes in data from the decennial censuses and the Current Population Survey

- Applies the decomposition technique with the PUMS data to explain changes in the homeownership rates

- Applies the decomposition technique with the PUMS data to explain change in homeownership gaps

The Chapter closes with an analysis of race and ethnicity gaps controlling for income.

The decomposition analysis in this Chapter is similar to decomposition 1 in Chapter 3. We divide the population into 1,750 categories of households based on age of householder, household type, race and ethnicity of householder, household real income, and location inside or outside a central city. We then perform the decomposition analysis on subsets of these 1,750 categories. For example, when we study how the homeownership rate for Hispanics changed over the decade, we will use all 350 categories in which the householder is Hispanic. When we study how the homeownership rate for central cities changed, we will use all 875 categories for which households live in central cities.

Changes in Gaps: Race and Ethnicity

Table 15 shows that all racial and ethnic groups improved their homeownership rates between 1990 and 2000. Hispanics made the largest percentage point gain followed by non-Hispanic whites. As a result, the gap between Hispanics and non-Hispanic Whites narrowed very slightly while the gap between non-Hispanic Whites and all other groups widened slightly.[23]

Table 15

PUMS Homeownership Rates and Gaps by Race and Ethnicity, 1990-2000

Race and Ethnicity Category	1990 Homeownership Rate	2000 Homeownership Rate	Change in Rate	1990 Gap	2000 Gap	Change in Gap
Hispanics	42.14%	45.63%	3.50	26.92	26.81	-0.11
Non-Hispanic Whites	69.06%	72.45%	3.39	0.00	0.00	0.00
Non-Hispanic Blacks	43.86%	46.60%	2.74	25.20	25.85	0.65
Non-Hispanic Other	52.33%	53.56%	1.23	16.73	18.89	2.16

Sources: 1990 and 2000 PUMS

The information from the PUMS is generally consistent with that from the decennial census. Table 16 reports homeownership rates and gaps using the data from the 1990 and 2000 decennial census. The major difference is that the decennial census data show a widening in the gap for Hispanic households. The change in the gap for Hispanic households is very small in both the PUMS samples and in the decennial censuses.

Table 16

Decennial Census Homeownership Rates and Gaps by Race and Ethnicity, 1990-2000

Race and Ethnicity Category	1990 Homeownership Rate	2000 Homeownership Rate	Change in Rate	1990 Gap	2000 Gap	Change in Gap
Hispanics	42.41%	45.68%	3.26	26.66	26.77	0.11
Non-Hispanic Whites	69.07%	72.45%	3.38	0.00	0.00	0.00
Non-Hispanic Blacks	43.79%	46.55%	2.76	25.28	25.90	0.61
Non-Hispanic Other	52.72%	53.73%	1.01	16.35	18.72	2.37

Sources: American FactFinder for the 1990 and 2000 100-percent counts.

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[23] Our race and ethnicity categories are not consistent across censuses. The four categories account for all households in the 1990 PUMS. The 2000 PUMS contains a fifth category, non-Hispanics who claim to be members of two or more races. This group accounts for 1.4 percent of the households in the 2000 PUMS.

The information on gaps from the PUMS is not consistent with that reported by the Current Population Survey (CPS). (See Table 17.) Consistent with its higher national homeownership rate for 2000, the CPS finds higher homeownership rates for each of the race and ethnicity categories and larger changes over the decade. The CPS also finds that all the gaps, defined relative to the non-Hispanic Whites homeownership rate, narrowed over the decade. However, gaps in 2000 as measured by the CPS are larger than those measured by the PUMS in two out of three cases.

Table 17

CPS Homeownership Rates and Gaps by Race and Ethnicity, 1990-2000

Race and Ethnicity Category	1990 Homeownership Rate	2000 Homeownership Rate	Change in Rate	1990 Gap	2000 Gap	Change in Gap
Hispanics	41.2%	46.3%	5.1	28.2	27.5	-0.7
Non-Hispanic Whites	69.4%	73.8%	4.4	0.0	0.0	0.0
Non-Hispanic Blacks	42.6%	47.6%	5.0	26.8	26.2	-0.6
Non-Hispanic Other	49.2%	53.9%	4.7	20.2	19.9	-0.3

Sources: U.S. Housing Market Conditions

The differences in homeownership rates across race and ethnicity categories are only partly explained by differences in income across these categories. Table 18 uses the PUMS data for 2000 to estimate homeownership rates for 25 segments of the population defined by income and race and ethnicity. Regardless of income class, non-Hispanic Whites have substantially higher homeownership rates than all the other race and ethnicity categories. In general, the gaps – although still wide – become narrower as income rises.

Table 18

2000 Homeownership Rates by Income and Race and Ethnicity

Race/Ethnicity & Income	Very Low Income	Low Income	Moderate Income	High Income	Very High Income	All
Hispanics	25.91%	36.11%	48.11%	59.40%	72.48%	45.63%
Non-Hispanic Whites	50.08%	62.05%	70.86%	79.83%	88.41%	72.45%
Non-Hispanic Blacks	29.16%	39.11%	50.19%	63.36%	76.47%	46.60%
Other Non-Hispanic	26.27%	38.44%	47.87%	61.07%	77.37%	53.56%
Non-Hispanic two or more major race groups	27.86%	39.09%	47.49%	62.54%	73.58%	48.73%
All	42.00%	55.24%	65.45%	75.92%	86.14%	66.18%

Table 19 presents the decomposition analysis for different race and ethnicity categories. The category non-Hispanic two or more major race groups is not included because there is no information on this group in the 1990 PUMS.

Table 19

Decomposition of the Homeownership Rates for Race and Ethnicity Categories
(Effects in Percentage Points)

Race and Ethnicity Category	Rate Effect	Composition Effect	Change in Homeownership Rate
Hispanics	1.99	1.50	3.49
Non-Hispanic Whites	1.68	1.71	3.39
Non-Hispanic Blacks	0.72	2.02	2.74
Other Non-Hispanic	-0.46	1.69	1.23

Hispanics benefited from both a positive rate effect and a positive composition effect. This means that during the 1990 the composition of the Hispanic population changed in ways that favored homeownership. In particular, gains in real income helped push up the Hispanic homeownership rate. In addition to favorable demographic changes, the pattern of homeownership across all 350 categories containing Hispanic households improved. In fact, the rate effect was even stronger than the composition effect.

Non-Hispanic Whites and non-Hispanic Blacks also benefited from both positive rate effects and positive composition effects. For non-Hispanic Whites, the two effects were approximately equal. For non-Hispanic Blacks, the composition effect was much stronger; in fact the composition effect was stronger for non-Hispanic Blacks than for any other group. Non-Hispanic Other experienced a negative rate effect. The increase in the homeownership rate of non-Hispanic Other was due entirely to favorable changes in the composition of the population of non-Hispanic Other households.

Real income growth during the 1990's was the major factor accounting for the strong positive composition effects reported by all the race and ethnicity categories. To see this, we repeated the decomposition analysis but omitted the income and location categories. In other words, the composition effect now relates to shifts in the age structure and types of households in each category. Table 20 presents these results.

Table 20

Decomposition of the Homeownership Rates for Race and Ethnicity Categories Using Age and Household Type Only
(Effects in Percentage Points)

Race and Ethnicity Category	Rate Effect	Composition Effect	Change in Homeownership Rate
Hispanics	3.32	0.18	3.50
Non-Hispanic Whites	2.87	0.52	3.39
Non-Hispanic Blacks	2.78	-0.04	2.74
Other Non-Hispanic	0.58	0.65	1.23

Eliminating changes in the income and location composition of the population reduced the composition effects for non-Hispanic Whites and non-Hispanic Other by about two-thirds. This alternative approach virtually eliminated the composition effect for Hispanics and non-Hispanic Blacks. In fact, the composition effect for non-Hispanic Blacks is now negative. The strong rate effect for non-Hispanic Blacks includes both growth in real income and some movement out of central cities.

Table 19 shows variation in rate and composition effects across the various race and ethnicity categories. These differences can help explain why the homeownership gap closed for Hispanics but widened for non-Hispanic Blacks and non-Hispanic Other. Table 21 shows how the rate effects and composition effects for these groups compared to the same effects for non-Hispanic Whites. To the extent to which these groups had higher rate effects and composition effects than non-Hispanic Whites, the gaps narrowed. To the extent to which these groups had lower rate effects and composition effects the gaps widened.

Table 21

Contribution of Rate Effect and Composition Effect to Change in Homeownership Gap
(Effects in Percentage Points)

Race and Ethnicity Category	Rate Effect for Group Minus Rate Effect for Non-Hispanic Whites	Composition Effect for Group Minus Composition Effect for Non-Hispanic Whites	Decrease in Homeownership Gap
Hispanics	0.32	-0.21	0.11
Non-Hispanic Blacks	-0.96	0.32	-0.65
Non-Hispanic Other	-2.14	-0.01	-2.16

Totals may not add due to rounding.

The homeownership gap narrowed for Hispanics because their rate structure improved relative to non-Hispanic Whites. (In the decennial census data, this gap widens slightly.) This was partially offset by a shift in the composition of the population relative to that of non-Hispanic Whites that was disadvantageous to Hispanics. Non-Hispanic Blacks fell further behind non-Hispanic Whites in homeownership rates because their rate structure failed to improve as much as that of non-Hispanic Whites. Changes in the composition of the non-Hispanic Blacks population moderated the increase in the gap. Non-Hispanic Other fell further behind non-Hispanic Whites primarily because their rate structure failed to improve as much as that for non-Hispanic Whites. Changes in the composition of the non-Hispanic Other population had virtually no effect on their homeownership gap.

Changes in Gaps: Real Income

This report uses real income to classify households. Chapter 2 explained how the income classes are defined. Because of the growth in real income over the decade, the five classes in 2000 PUMS are no longer equal in size. Table 22 shows how the income classes changed in size between the two PUMS. All the lower classes – particularly, the class of very low income households, declined while the class of very high income households grew from 20.0 percent to 23.5 percent of all households.

Table 22

Distribution of Households by Income Class, 1990-2000

Income Class	Share of Households In 1990	Share of Households In 2000
Very low income households	20.0%	17.7%
Low income households	20.0%	19.9%
Moderate income households	19.9%	19.3%
High income households	20.1%	19.7%
Very high income households	20.0%	23.5%

All the classes are not precisely equal to 20.0 percent in 1990 due to the way in which the Census Bureau rounds household incomes.

The fundamental objective of this research is to determine whether the prospects of a household in 2000 for becoming a homeowner are better than those of a similarly defined household in 1990. We hold households constant in terms of the age of the householder, household type, the race and ethnicity of the householder, and location inside or outside of central cities. With respect to income we had two choices – hold them constant in real terms or relative terms. Using income quintiles in both 1990 and 2000 would have held households constant in relative terms. We believe that holding households constant in real income terms best achieves the goals of this research. Otherwise, growth in real income would show up as an increase in the homeownership rate of a particular quintile. By tracking real income, we are observing whether it becomes easier or more difficult for a household to become a homeowner at a fixed real income.

Table 23 shows how homeownership rates increase dramatically with income. The homeownership gap is defined as the difference between the homeownership rate of a particular income class and the homeownership rate of the very high income class. In approximate terms, the gap increases by 10 percentage points as one moves from one income class to the next lowest income class.

Table 23

PUMS Homeownership Rates and Gaps by Real Income Class, 1990-2000

Real Income Class	1990 Homeownership Rate	2000 Homeownership Rate	Change in Rate	1990 Gap	2000 Gap	Change in Gap
Very low income households	43.46%	42.00%	-1.46	42.45	44.14	1.69
Low income households	54.44%	55.24%	0.80	31.47	30.90	-0.57
Moderate income households	62.93%	65.45%	2.52	22.98	20.69	-2.28
High income households	74.33%	75.92%	1.58	11.57	10.22	-1.35
Very high income households	85.91%	86.14%	0.23	0.00	0.00	0.00

Sources: 1990 and 2000 PUMS

Four facts stand out in observing how homeownership rates changed by income class during the 1990's:

- Very low income households were worse off in 2000 than in 1990.

- All the other income classes were better off in 2000 than in 1990. Moderate income households who raised their homeownership rate by 2.5 percentage points made the largest gain. By the end of the decade moderate income households were only 0.73 percentage points below the overall homeownership rate of 66.18.

- The three middle income classes were able to close the gap between their homeownership rates and the homeownership rate of very high income households.

- The reductions in the gap were modest at best. The gap closed approximately 10 percent for moderate income and high income households but less than 2 percent for low income households.

We are unable to compare these PUMS estimates with similar estimates from the decennial censuses and the CPS. The tables released by the Census Bureau for the 1990 and 2000 censuses do not contain the information needed to compare the numbers from the PUMS with estimates derived from the full censuses. The CPS provides data on households with incomes above and below median income. This series does not go back to 1990 and it classifies households in relative rather than

absolute terms. An analysis using American Housing Survey data to track changes in homeownership rates between 1991 and 1997 found the income gaps for all classes had decreased over this period.[24]

The decomposition analysis provides particularly interesting results for the various income classes. When we have used decomposition in other situations, real income growth has posed difficulties in interpreting composition effects. Now we are taking an income class and looking inside it to see how changes in the composition of the class and changes in the homeownership rates for the various components of the class have combined to change the homeownership rate for the income class. The disaggregating does not involve income so the composition effect derives from shifts in the other four factors: age, household type, race and ethnicity, and location.

Table 24 shows that the composition effect is negative for all five income classes, although it is virtually zero for the moderate income class. This means that combined influence of changes in the age structure, the distribution of household types, the race and ethnicity composition, and the location of the population was to lower the homeownership rates of the various income classes. The very low income class was worst off at the end of the decade because it also experienced a negative rate effect. The two effects combined to lower the homeownership rate for very low income class by 1.46 percentage points between 1900 and 2000. The composition effect accounted for 79 percent of the decline. The remaining income classes had strongly positive rate effects so that the combined effect was an increase in homeownership rates for each of these classes.

Table 24

Decomposition of the Homeownership Rates by Income Class
(Effects in Percentage Points)

Real Income Class	Rate Effect	Composition Effect	Change in Homeownership Rate
Very low income	-0.31	-1.15	-1.46
Low income	1.82	-1.01	0.80
Moderate income	2.53	-0.02	2.52
High income	2.36	-0.78	1.58
Very high income	1.19	-0.96	0.23

The ability of the low income, moderate income, and high income classes to close the income gap derives from their having stronger rate effects than the very high income class. Table 25 shows that a stronger rate effect was the sole reason that low income households made modest progress in closing the gap. The rate effect was the dominant factor in the progress made by moderate income and high income households in reducing the gap.

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[24]   "What's Happened to Homeownership?" in U. S. Housing Market Conditions, February 2000, pp. 4-8. This analysis used five real income classes with break points at $20,000, $40,000, $60,000, and $80,000 in 1991 dollars.

Table 25

Contribution of Rate Effect and Composition Effect to Changes in Homeownership Gap
(Effects in Percentage Points)

Real Income Class	Rate Effect for Class Minus Rate Effect for Very High Income	Composition Effect for Class Minus Composition Effect for Very High Income	Decrease in Homeownership Gap
Very low income	-1.50	-0.19	-1.69
Low income	0.63	-0.06	0.57
Moderate income	1.34	0.94	2.28
High income	1.17	0.18	1.35

Changes in Gaps: Location

Changes in the amount of identifying information and the coding of that information between the 1990 and 2000 PUMS have limited our ability to study the gap between homeownership rates in central cities and other areas.[25] Table 26 contains our estimates of homeownership rates for areas inside and outside of central cities using the PUMS data. Between 1990 and 2000, the homeownership rate in central cities increased significantly (3.48 percentage points) whereas the rate outside central cities increased much less. As a result, the gap between central cities and the areas outside central cities declined by 2.81 percentage points

Table 26

PUMS Homeownership Rates and Gaps by Location, 1990-2000

Location	1990 Homeownership Rate	2000 Homeownership Rate	Change in Rate	1990 Gap	2000 Gap	Change in Gap
Inside central cities	54.17%	57.65%	3.48	16.12	13.31	-2.81
Outside central cities	70.28%	70.96%	0.68	0.00	0.00	0.00
All U. S.	64.23%	66.18%	1.96	NA	VA	NA

Sources: 1990 and 2000 PUMS

Using HUD's State of the Cities Data System, we can compare these estimates to estimates derived from the full censuses. Table 27 is identical in structure to Table 26 except that suburbs replace "outside central cities" and the gap is computed with respect to suburbs. As explained in Chapter 2, our "inside central cities" designation appears to pick up some suburban areas and therefore estimates

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[25] See the Appendix for a complete discussion of the problems in identifying the location of PUMS households.

a higher homeownership rate for central cities using PUMS data. The decennial census estimates show a widening of the central city homeownership gap.

Table 27

Decennial Census Homeownership Rates and Gaps by Location, 1990-2000

Location	1990 Homeownership Rate	2000 Homeownership Rate	Change in Rate	1990 Gap	2000 Gap	Change in Gap
Inside central cities	49.0%	50.5%	1.5	12.0	12.5	0.5
Suburbs	71.0%	73.0%	2.0	0.00	0.00	0.00
All U. S.	63.9%	66.2%	2.3	NA	VA	NA

Sources: The Census Bureau and HUD's State of the Cities Data System

The Current Population Survey provides a third set of estimates. Table 28 is identical in structure to Table 27. Again the CPS reports lower homeownership rates for central cities than our PUMS estimates. Like the decennial censuses, the CPS reports a widening of the homeownership gap between central cities and suburbs.

Table 28

CPS Homeownership Rates and Gaps by Location, 1990-2000

Location	1990 Homeownership Rate	2000 Homeownership Rate	Change in Rate	1990 Gap	2000 Gap	Change in Gap
Inside central cities	48.9%	51.4%	2.5	11.2	12.6	1.4
Suburbs	70.0%	74.0%	3.9	0.00	0.00	0.00
All U. S.	64.1%	67.4%	3.3	NA	VA	NA

Sources: U. S. Housing Market Conditions. Note that the All U.S. homeownership rates for 1990 differs from that reported in Chapter 3. All the 1990 estimates in this table are derived from the March Supplement of the CPS; the 2000 estimates are annual averages of CPS data.

Acknowledging the limitation in our ability to identify central cities, we apply the decomposition technique to explain the changes we observe with the PUMS data. Both the rate effect and the composition effect contributed to the increase in the homeownership rate inside central cities. The rate effect accounted for 70 percent of the increase. For areas outside central cities, the positive rate effect was sufficient strong to offset a negative composition effect and produce a small increase in homeownership rate.

Table 29

Decomposition of the Homeownership Rates by Location
(Effects in Percentage Points)

Location	Rate Effect	Composition Effect	Change in Homeownership Rate
Inside central cities	2.44	1.05	3.48
Outside central cities	1.04	-0.36	0.68

Totals may not add due to rounding.

Real income growth appears to have been an important contributor to the positive composition effect for central cities. We conclude this from an analysis of shifts in the distribution of central city households by income class between 1990 and 2000. Table 30 shows that the weights of the very low income, low income, and moderate income groups declined while the weights of high income and very high income groups increased. Only the very high group made a positive contribution to the composition effect.[26] There appears to have been a sizeable increase in real income in the areas we have identified as "inside central cities" between 1990 and 2000. Unfortunately, this cannot be interpreted as an increase in real income in central cities for two reasons. First, our "inside central cities" areas include some suburban areas. Second, the observed growth may be in part attributable to inconsistencies in our designating areas as "inside central cities" between the 1990 and 2000 PUMS.[27] However, comparison of 1990 and 2000 decennial census data reveal a 3.6 percent growth in real median household income in central cities.[28]

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[26] While the overall size of the high income grouping central cities increased between 1990 and 2000, its composition effect was negative because of changes in the makeup of the high income group. For example, there was a substantial decline in non-Hispanic white couples (with and without children) in central cities between 1990 and 2000. See the discussion of number of groups in the Appendix.

[27] The two reasons are conceptually different. In constructing central cities, we included categories from both the 1990 and 2000 Census Bureau groups of categories that included pieces outside of central cities. In addition, the categories differed between 1990 and 2000. In both 1990 and 2000, we chose categories that seemed most appropriate for this analysis. See the discussion of the delineation of "central cities" in the Appendix.

[28] HUD's State of the Cities Data System.

Table 30

Impact of Shifts in Real Income on the Inside Central City Composition Effect

Category	Change in Weight	Contribution to Composition Effect
Very low income households	-3.72	-1.35
Low income households	-0.99	-0.78
Moderate income households	-1.11	-0.80
High income households	0.04	-0.33
Very high income households	5.78	4.32
Sum	0.00	1.05

Totals may not add due to rounding.

Table 31 shows how differences in the rate effect and the composition effect resulted in a narrowing of the gap. The rate effect and the composition effect contributed equally to the decline in the gap. Because of the possible inconsistencies in identifying areas "inside central cities" across the two PUMS, it is difficult to interpret what these effects mean in the context of location.

Table 31

Contribution of Rate Effect and Composition Effect to Changes in Homeownership Gap
(Effects in Percentage Points)

Location	Rate Effect for Inside Central Cities Minus Rate Effect for Outside Central Cities	Composition Effect for Inside Central Cities Minus Composition Effect for Outside Central Cities	Decrease in Homeownership Gap
Inside central cities	1.40	1.41	2.81

Changes in Gaps: Race and Ethnicity Controlling for Income

Table 18 proves that the gap in homeownership rates between non-Hispanic Whites and other groups cannot be explained solely by differences in income. Holding real income constant, non-Hispanic Whites homeownership rates are still substantially higher than the homeownership rates of other groups. Even in the very high income class, where one might expect race and ethnicity differences to disappear, the non-Hispanic Whites homeownership rate is more than 10 percentage points higher the homeownership rates of the other groups. This pattern is perhaps the most troubling indication of inequality in access to homeownership. For this reason, this section explores how and why the homeownership gaps between non-Hispanic Whites and other groups by income class have changed over the decade.

Table 32 presents the numbers needed to track the homeownership experience of Hispanics and non-Hispanic Whites while controlling real income. Combining all income classes, both Hispanics and non-Hispanic Whites experienced sizeable increases in their homeownership rates over the decade. Among Hispanics, all income classes improved their homeownership rates except for very high income Hispanics whose homeownership rate was virtually unchanged. Among non-Hispanic Whites, all income classes improved their homeownership rates except for very low income non-Hispanic Whites whose homeownership rate was virtually unchanged.

Table 32

Homeownership Rates and Gaps for Hispanic and Non-Hispanic Whites by Income Class, 1990 -2000

	Very Low Income	Low Income	Moderate Income	High Income	Very High Income	All
Hispanics						
1990 homeownership rates	24.27%	32.74%	43.63%	57.49%	72.52%	42.14%
2000 homeownership rates	25.91%	36.11%	48.11%	59.40%	72.48%	45.63%
Change (1990 TO 2000)	1.63	3.36	4.48	1.91	-0.04	3.50
Non-Hispanics Whites						
1990 homeownership rates	50.17%	59.41%	66.75%	77.02%	87.32%	69.06%
2000 homeownership rates	50.08%	62.05%	70.86%	79.83%	88.41%	72.45%
Change (1990 TO 2000)	-0.09	2.64	4.11	2.81	1.09	3.39
Homeownership Gap						
1990	25.90	26.67	23.12	19.53	14.80	26.92
2000	24.17	25.95	22.75	20.43	15.93	26.81
Change (1990 TO 2000)	-1.73	-0.72	-0.37	0.89	1.13	-0.11

Table 32 shows that the gap between Hispanics and non-Hispanic Whites narrowed for very low income households, low income households, and moderate income households but widened for high income households and very high income households. As reported earlier in this Chapter, the gap narrowed slightly overall. Essentially the growth in homeownership rates during the 1990's had no effect on the relative position of Hispanics and non-Hispanic Whites. The change in the overall gap was a decrease of less than ½ percent of the 1990 gap. The largest changes in the gaps, both positive and negative, represent less than a 10 percent deviation from the 1990 level. In 2000, very high income Hispanic households were approximately 16 percentage points less likely to be homeowners than their non-Hispanic Whites counterparts.

As noted earlier in this Chapter, the improvement in the overall Hispanic homeownership rate was due to both a positive rate effect and a positive composition effect, with the rate effect being more important. At this level of aggregation, the composition effect takes into account changes in age, household type, income, and location. When we look at individual income classes, the composition effect takes into account changes in only age, household type, and location.

Shifts in the structure of the Hispanic population had varying effects on different income classes. (See Table 33.) Composition changes had positive effects for very low income, low income, and moderate income Hispanic households; had virtually no effect on high income Hispanic households, and had a negative effect on very high income Hispanic households. Shifts in the homeownership rates for these various components of the Hispanic population were uniformly positively for all income classes and were strongest for the three middle income classes.

Table 33

Decomposition of Changes in Rates and Gaps for Hispanic and Non-Hispanic Whites by Income Class, 1990 -2000

	Very Low Income	Low Income	Moderate Income	High Income	Very High Income	All
Hispanics						
Rate effect	0.32	2.89	3.67	1.95	0.74	1.99
Composition effect	1.31	0.47	0.80	-0.04	-0.78	1.50
Change in homeownership rate	1.63	3.36	4.48	1.91	-0.04	3.50
Non-Hispanic Whites						
Rate effect	0.13	2.06	2.62	2.32	1.09	1.68
Composition effect	-0.23	0.58	1.49	0.48	0.00	1.71
Change in homeownership rate	-0.09	2.64	4.11	2.81	1.09	3.39
Homeownership Gap						
Rate effect	-0.19	-0.83	-1.06	0.37	0.35	-0.31
Composition effect	-1.54	0.10	0.69	0.53	0.78	0.21
Change in homeownership rate	-1.73	-0.72	-0.37	0.89	1.13	-0.11

The improvement in the overall non-Hispanic Whites homeownership rate was due in equal parts to a positive rate effect and a positive composition effect. At this level of aggregation, the composition effect takes into account changes in age, household type, income, and location. When we look at individual income classes, the composition effect takes into account changes in only age, household type, and location. Shifts in the structure of the non-Hispanic Whites population had varying effects on different income classes. Composition changes had a negative effect on very low income non-Hispanic Whites households, a positive effect on low income, moderate income, and high income non-Hispanic Whites households, and no effect on very high income non-Hispanic Whites households. Shifts in the homeownership rates for these various components of the non-Hispanic Whites population were uniformly positively for all income classes but weak for very low income non-Hispanic Whites households.

With respect to changes in the gaps between Hispanics and non-Hispanic Whites for different income classes, composition shifts were generally more favorable to non-Hispanic Whites. Only very low income Hispanic households experienced more favorable changes in the distribution of the population

by age, household type, and location. Hispanics households in the very low income, low income, and moderate income classes improved their homeownership rates on average more than their non-Hispanic Whites counterparts. The opposite was true for the high income and very high income classes. Again the combined effects of the rate effects and composition effects were relative minor alterations in the gaps.

Table 34 presents the numbers needed to track the homeownership experience of non-Hispanic Blacks and non-Hispanic Whites while controlling real income. Among non-Hispanic Blacks, moderate income, high income, and very high income households improved their homeownership rates although the increase for very high income non-Hispanic Blacks was very small. Very low income and low income non-Hispanic Blacks households underwent small declines in their homeownership rates. Among non-Hispanic Whites, all income classes improved their homeownership rates except for very low income non-Hispanic Whites whose homeownership rate declined slightly.

Table 34

Homeownership Rates and Gaps for non-Hispanic Blacks and Non-Hispanic Whites by Income Class, 1990 -2000

	Very Low Income	Low Income	Moderate Income	High Income	Very High Income	All
Non-Hispanic Blacks						
1990 homeownership rates	29.46%	39.17%	46.87%	60.05%	76.42%	43.86%
2000 homeownership rates	29.16%	39.11%	50.19%	63.36%	76.47%	46.60%
Change	-0.30	-0.05	3.32	3.31	0.05	2.74
Non-Hispanic Whites						
1990 homeownership rates	50.17%	59.41%	66.75%	77.02%	87.32%	69.06%
2000 homeownership rates	50.08%	62.05%	70.86%	79.83%	88.41%	72.45%
Change	-0.09	2.64	4.11	2.81	1.09	3.39
Homeownership Gap						
1990	20.71	20.25	19.88	16.97	10.90	25.20
2000	20.92	22.94	20.66	16.47	11.94	25.85
Change	0.21	2.69	0.78	-0.50	1.04	0.65

Except for low income households, there was very little change in the gaps between non-Hispanic Blacks and non-Hispanic Whites. The gap for this group increased by 13 percent. Only the gap for high income households decreased.

The improvement in the overall non-Hispanic Black homeownership rate was due to both a positive rate effect and a positive composition effect, with the composition effect being more important (see Table 35). At this level of aggregation, the composition effect takes into account changes in age, household type, income, and location. When we look at individual income classes, the composition effect takes into account changes in only age, household type, and location. Shifts in the structure of the non-Hispanic Blacks population had varying effects on different income classes. Composition

changes had positive effects for very low income, moderate income, and high income non-Hispanic Blacks households and had negative effects on low income and very high income non-Hispanic Blacks households. The impact on very high income households was negligible. Shifts in the homeownership rates for these various components of the non-Hispanic Blacks population were positive for all income classes except very low income households. The rate effects were strongest for moderate income and high income households.

Table 35

Decomposition of Changes in Rates and Gaps for Non-Hispanic Blacks and Non-Hispanic Whites by Income Class, 1990 -2000

	Very Low Income	Low Income	Moderate Income	High Income	Very High Income	All
Non-Hispanic Blacks						
Rate effect	-0.52	0.53	1.86	2.57	0.14	0.72
Composition effect	0.22	-0.58	1.46	0.73	-0.09	2.02
Change in homeownership rate	-0.30	-0.05	3.32	3.31	0.05	2.74
Non-Hispanic Whites						
Rate effect	0.13	2.06	2.62	2.32	1.09	1.68
Composition effect	-0.23	0.58	1.49	0.48	0.00	1.71
Change	-0.09	2.64	4.11	2.81	1.09	3.39
Homeownership Gap						
Rate effect	0.66	1.54	0.76	-0.25	0.94	0.96
Composition effect	-0.45	1.16	0.03	-0.25	0.10	-0.32
Change	0.21	2.69	0.78	-0.50	1.04	0.65

As noted above, the only large change was a 2.69 percentage point increase in the gap between non-Hispanic Black and non-Hispanic White low income families. Non-Hispanic Blacks households in this income class failed to match the improvements in rate structure achieved by non-Hispanic Whites households and experienced negative composition changes while non-Hispanic Whites households experienced positive composition changes. Composition changes favored non-Hispanic Whites households in three of the five classes, all but very low income and high income households. Changes in the rate structure for the components of each class favored non-Hispanic Whites households in every class but high income. Non-Hispanic Blacks households narrowed the gap only in the high income class where the small gain was due in equal parts to rate effect and composition effect.

Conclusions

Analysis of PUMS data reveals that during the 1990's all race/ethnic groups, most income classes, and areas inside and outside of central cities improved their homeownership rates. In fact, among the 11 groups defined by either race and ethnicity, income, or location, only very low income households

had lower homeownership rates in 2000 than in 1990. The decomposition technique was very useful in explaining the changes in these key homeownership rates.

When the four racial and ethnic groups are disaggregated by age of householder, household type, income class, and location inside or outside of central cities, the decomposition analysis shows that all four groups benefited from shifts in the composition of their populations. In fact, the composition effect was more important than the rate effect for all groups except Hispanics. Hispanics, non-Hispanic Whites, and non-Hispanic Blacks also benefited from increases in the homeownership rates of the various components of their populations.

Real income growth accounts for the importance of composition effects in explaining the gains in homeownership rates for the race and ethnicity groups. When we disaggregated only by age of householder and household type, the decomposition analysis produced very positive rate effects for Hispanics, non-Hispanic Whites, and non-Hispanic Blacks. In these analyses, the composition effects were important only for non-Hispanic Whites and non-Hispanic Other. On the other hand, the rate effects were positive for all four groups and very strong for Hispanics, non-Hispanic whites, and non-Hispanic blacks.

Composition effects were uniformly negative when we used the decomposition technique to explain changes in homeownership rates for the various income classes. The combination of an aging population, declines in married couple households, growth in the minority populations, and a slight shift in population away from central cities had a detrimental effect on each of the income classes. (In general, the positive effects of aging and moving away from central cities were offset by growth in the minority population and the decline of married couple households.) The rate effect was negative for very low income households but positive for the other four income classes. It was very strong for moderate income households and high income households.

The increase in the central city homeownership rate, as measured by the PUMS surveys, resulted from both a positive rate effect and a positive composition effect. The rate effect accounted for 70 percent of the gain. A separate analysis indicated that the composition effect was primarily the result of real income growth.

Looking at all the analyses, there is clear evidence that homeownership rate increases between 1990 and 2000 were widespread across the various component classes within the population. Among the 11 classes studied, the decomposition analysis found negative rate effects only for non-Hispanic Other and very low income households. (The negative rate effect for non-Hispanic Other disappeared when we stopped using income and location to disaggregate the population.)

The decomposition analysis found positive composition effects as well but these disappeared when income was not used to divide the population. In other words, the combined effects of the aging of the population, the decline in married couple households, and the growth in the minority populations were negative.

While disadvantaged groups improved their homeownership rates during the 1990's, there was little progress in reducing gaps. The homeownership rates of non-Hispanic Whites, very high income households, and household living outside of central cities – the norms against which the gaps are

measured – also increased so that changes in gaps were smaller than the changes in homeownership rates. The three largest reductions in gaps were:

- A 2.81 percentage point decline for households in central cities, leaving a gap of 13.31 percentage points.

- A 2.28 percentage point decline for moderate income households, leaving a gap of 20.69 percentage points.

- A 1.35 percentage point decline for high income households, leaving a gap of 10.22 percentage points.

Three of the gaps increased:

- A 2.16 percentage point increase for non-Hispanic Other, leaving a gap of 18.89 percentage points.

- A 1.69 percentage point increase for very low income households, leaving a gap of 44.14 percentage points.

- A 0.65 percentage point increase for non-Hispanic Blacks, leaving a gap of 25.85 percentage points.

The following example explains how to interpret the results from applying the decomposition analysis to changes in the gaps.

> Moderate income households experienced a 2.53 percentage point rate effect; this compares to a 1.19 percentage point rate effect for very high income households. In computing these numbers, we divided both income classes into 350 subgroups defined by age, household type, race and ethnicity, and location. On average, the change in the rate structure was more positive for moderate income household than for very high income households.[29]

The decomposition technique was useful in explain both the narrowing and the widening of the gaps. In the five cases in which a narrowing of a gap occurred, relative differences in the rate effects contributed to the narrowing. In other words, the rate structure within the disadvantaged group increased more on average the rate structure of the group used as a standard. In the three cases in which a widening of a gap occurred, relative differences in the rate effect contributed to the widening.

The pattern with respect to changes in the composition of the population was not as clear. Relative differences in the composition effect contributed to a narrowing or widening of a gap in five cases but ran counter to the actual narrowing or widening in three cases.

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[29]   The average is calculated using population weights derived from 2000. This difference does not capture all the changes that affected the gap between moderate income and very high income households. Changes in the distribution of households in each class across the 350 subgroups also influenced the class homeownership rates. The composition effects picks up these influences.

A particularly troubling aspect of homeownership opportunities in the United States is that not only do minorities have lower homeownership rates than non-Hispanic Whites but that these gaps persist after controlling for income. This Chapter studied changes in these gaps over the decade. Between 1990 and 2000, the gap in homeownership rates between Hispanics and non-Hispanic Whites narrowed slightly. This narrowing was not uniform across income classes. The gap narrowed for very low income, low income, and moderate income households but widened for high income and very high income households. Again differences in rate effects were consistent with changes in the gaps. In the three cases in which the gaps narrowed, Hispanics had more positive rate effects than non-Hispanic Whites. In the two cases in which the gaps widened, Hispanics had less positive rate effects than non-Hispanic Whites. There was no consistency in the relationship between changes in the gaps and the relative size of the composition effects.

Between 1990 and 2000, the gap in homeownership rates between non-Hispanics Blacks and non-Hispanic Whites widened. A widening occurred for all the income classes except high income households. Again differences in rate effects were consistent with changes in the gaps. In the case in which the gap narrowed, non-Hispanics Blacks had a more positive rate effect than non-Hispanic Whites. In the four cases in which the gaps widened, non-Hispanics Blacks had less positive rate effects than non-Hispanic Whites. There was no consistency in the relationship between changes in the gaps and the relative size of the composition effects.

One disturbing finding is the failure of Hispanics and non-Hispanic Blacks to close the gaps in three of the four cases in which one would have thought it easiest to make progress, that is, among high income and very high income households. As noted, only high income non-Hispanic Blacks narrowed the gap. In the three cases in which the gaps widened, the composition effect showed that the disadvantaged group experienced changes in the population that acted to widen the gap. However, these compositional changes are not solely responsible. In the three cases, the rate effect also worked against a narrowing of the gap.

Chapter Five
Other Decompositions

The decomposition technique can be used to explain a variety of other changes in homeownership rates and homeownership gaps. This Chapter applies the technique to four populations of interest: families with children, young households, households of prime homebuying age, and elderly households.

Families with Children

Families with children experienced sizeable gains in homeownership over the decade; married couples with children had gains over 50 percent larger than the overall gain and other families with children had gains more than three times larger than the overall gain. (See Table 36.)

Table 36

PUMS Homeownership Rates for Families with Children, 1990-2000

Category	1990 Homeownership Rate	2000 Homeownership Rate	Change in Homeownership Rate
Married couples with children	72.74%	76.15%	3.41
Other families with children	33.12%	39.56%	6.44

Table 37 shows that these results are consistent with but smaller than estimates derived from the Current Population Survey. On the Census Bureau website, we were able to locate data on tenure by household for the 2000 census but not for the 1990 census.

Table 37

CPS Homeownership Rates for Families with Children, 1990-2000

Category	1990 Homeownership Rate	2000 Homeownership Rate	Change in Homeownership Rate
Married couples with children	73.5%	78.3%	4.8
Other families with children	36.0%	43.2%	7.2

Both groups benefits from substantial rate and composition effects. (See Table 38.) The rate effect was more important for married couples while the composition effect was more important for other families. For married couples, the rate effect accounted for 64 percent of the 3.41 percentage point increase while the composition effect accounted for 35 percent. For other families, the composition effect accounted for 60 percent of the 6.44 percentage point increase while the rate effect accounted for 40 percent.

Table 38

Decomposition of the Homeownership Rates for Families with Children
(Effects in Percentage Points)

Category	Rate Effect	Composition Effect	Change in Homeownership Rate
Married couples with children	2.20	1.21	3.41
Other families with children	2.56	3.88	6.44

Totals may not add due to rounding.

Once again it appears that the rise in real income is the major reason the composition factor is so strong. When we stop subdividing these classes by income and location, the rate effects increase considerably while the composition effects decrease substantially. (See Table 39.) In fact, the composition effect is negligible for married couples with children.

Table 39

Decomposition of the Homeownership Rates for Families with Children Using Age and Race and Ethnicity Only
(Effects in Percentage Points)

Category	Rate Effect	Composition Effect	Change in Homeownership Rate
Married couples with children	3.37	0.04	3.41
Other families with children	4.78	1.66	6.44

Totals may not add due to rounding.

Young Households

Table 1 in Chapter 2 shows how homeownership rates vary by age of householder. Households with householders younger than 30 years old have traditionally been predominately renter households. The 30-34 age bracket has been the transition age group, that is, the first age group with a homeownership rate greater than 50 percent. Table 40 shows the homeownership rates for these groups changed marginally during the 1990's. Households with householders younger than 30 years old were slightly less likely to be homeowners in 2000 than in 1990 while households with

householders between 30 and 34 years old were slightly more likely to be homeowners in 2000 than in 1990. [30]

Table 40

PUMS Homeownership Rates for Young Households, 1990-2000

Age Bracket	1990 Homeownership Rate	2000 Homeownership Rate	Change in Homeownership Rate
Households with householders younger than 30	28.90%	28.55%	-0.36
Households with householders of age between 30 and 34	52.61%	52.96%	0.34

Totals may not add due to rounding.

Table 41 indicates that, in both cases, the rate effects were positive but the composition effects were negative. Shifts in household types, race and ethnicity, real income, and location combined to markedly retard growth in homeownership rates for these groups. Without the negative composition changes, both groups would have increased their homeownership rates over the decade by more than 1.5 percentage points.

Table 41

Decomposition of the Homeownership Rates for Young Households
(Effects in Percentage Points)

Age Bracket	Rate Effect	Composition Effect	Change in Homeownership Rate
Households with householders younger than 30	1.53	-1.89	-0.36
Households with householders of age between 30 and 34	2.00	-1.66	0.34

Totals may not add due to rounding.

Table 42 provides the decomposition without including income and location in the disaggregation. In this case, the age classes are being separate on the basis of household type and race and ethnicity only. From the discussion in Chapter 2, we know that trends in the distribution of the population by both of these factors were detrimental to the growth of homeownership. The improvement in the pattern of homeownership rates across subgroups indicated by the strong rate effects now includes the impact of rising real income.

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[30]   The CPS reports a 2.8 percentage point gain for households with householders between 30 and 34. The CPS reporting format does not permit comparison with under 30 group. The decennial census tables report for householders 15 to 24 and 25 to 34.

Table 42

Decomposition of the Homeownership Rates for Young Households by Household Type and Race and Ethnicity Only
(Effects in Percentage Points)

Age Bracket	Rate Effect	Composition Effect	Change in Homeownership Rate
Households with householders younger than 30	2.80	-3.16	-0.36
Households with householders of age between 30 and 34	3.61	-3.27	0.34

Households of Prime Homebuying Age

Table 1 in Chapter 2 points out that homeownership rates increase sharply for the 35-44 and 45-54 age brackets. Households with householders between 35 and 44 have a homeownership rate approximately equal to the national average while approximately three-quarters of households with householders between 45-54 are homeowners. Table 43 reveals that households with householders in the 35-44 age bracket were slightly more likely to be homeowners in 2000 than in 1990 while households with householders in the 45-54 age bracket were slightly less likely to be homeowners in 2000 than in 1990.

Table 43

PUMS Homeownership Rates for Households of Prime Homebuying Age, 1990-2000

Age Bracket	1990 Homeownership Rate	2000 Homeownership Rate	Change in Homeownership Rate
Households with householders between 35 and 44	66.08%	66.31%	0.23
Households with householders of age between 45 and 54	75.30%	74.89%	-0.41

Totals may not add due to rounding.

Tables 44 and 45 contain estimates for the two groups based on the 1990 and 2000 decennial censuses and the CPS respectively. The PUMS estimates are close to those derived from the full censuses. As usual, the CPS indicates more positive results than the PUMS.

Table 44

Decennial Census Homeownership Rates for Households of Prime Homebuying Age, 1990-2000

Age Bracket	1990 Homeownership Rate	2000 Homeownership Rate	Change in Homeownership Rate
Households with householders of age between 35 and 44	66.17%	66.32%	0.15
Households with householders of age between 45 and 54	75.31%	74.93%	-0.38

Table 45

CPS Homeownership Rates for Households of Prime Homebuying Age, 1990-2000

Age Bracket	1990 Homeownership Rate	2000 Homeownership Rate	Change in Homeownership Rate
Households with householders of age between 35 and 44	66.3%	67.9%	1.6
Households with householders of age between 45 and 54	75.2%	76.5%	1.3

The decomposition analysis reveals positive rate effects and negative composition effects. As in the case of young homebuyers, shifts in household types, race and ethnicity, real income, and location combined to markedly retard growth in homeownership rates for these groups. Without the negative composition changes, both groups would have increased their homeownership rates over the decade. (See Table 46.)

Table 46

Decomposition of the Homeownership Rates for Households of Prime Homebuying Age
(Effects in Percentage Points)

Age Group	Rate Effect	Composition Effect	Change in Homeownership Rate
Households with householders of age between 35 and 44	2.17	-1.94	0.23
Households with householders of age between 45 and 54	1.24	-1.66	-0.41

When we subdivide the age brackets by household type and race and ethnicity only, the composition effects become much more negative, again indicating the importance of real income changes. (See Table 47.)

Table 47

Decomposition of the Homeownership Rates for Households of Prime Homebuying Age by Household Type and Race and Ethnicity Only
(Effects in Percentage Points)

Age Bracket	Rate Effect	Composition Effect	Change in Homeownership Rate
Households with householders of age between 35 and 44	3.10	-2.87	0.23
Households with householders of age between 45 and 54	2.29	-2.70	-0.41

Elderly Households

Older households – those over 65 – have historically had very high homeownership rates although those over 75 usually have lower rates than those between 65 and 74. Table 48 shows that older household in both groups were more likely to be homeowners in 2000 than in 1990 and the increased likelihood was sizeable.

Table 48

PUMS Homeownership Rates for Elderly Households, 1990-2000

Age Bracket	1990 Homeownership Rate	2000 Homeownership Rate	Change in Homeownership Rate
Households with householders between 65 and 74	78.50%	80.67%	2.17
Households with householders of age 75 and over	70.13%	74.25%	4.12

Totals may not add due to rounding.

These estimates are consistent with estimates derived from the decennial censuses in Table 49. CPS data are available for the households with householder 65 years old or older; these data indicate an increase of 4.1 percentage points, which appears to be somewhat higher than the other two estimates.

Table 49

Decennial Census Homeownership Rates for Elderly Households, 1990-2000

Age Group	1990 Homeownership Rate	2000 Homeownership Rate	Change in Homeownership Rate
Households with householders between 65 and 74	78.59%	80.85%	2.26
Households with householders of age 75 and over	70.17%	74.00%	3.84

Totals may not add due to rounding.

Table 50 contains the decomposition analysis for these groups. Both groups had positive rate and composition effects. For households with householders between 65 and 74, the rate effect predominated, accounting for 62 percent of the 2.17 percentage point. For households with householders over 75, the composition effect was slightly larger, accounting for 53 percent of the 4.11 percentage point.

Table 50

Decomposition of the Homeownership Rates for Elderly Households
(Effects in Percentage Points)

Age Bracket	Rate Effect	Composition Effect	Change in Homeownership Rate
Households with householders between 65 and 74	1.36	0.81	2.17
Households with householders of age 75 and over	1.94	2.17	4.11

Table 51 contains the decomposition based on household type and race and ethnicity only. As in the decompositions of other age brackets, this change greatly increases the contribution of the rate effect. However, unlike all the other age brackets (including the 55-64 bracket), composition changes have a positive effect on the change in homeownership rates.

Table 51

Decomposition of the Homeownership Rates for Elderly Households Using Household Type and Race and Ethnicity Only
(Effects in Percentage Points)

Age Bracket	Rate Effect	Composition Effect	Change in Homeownership Rate
Households with householders between 65 and 74	2.96	-0.79	2.17
Households with householders of age 75 and over	3.79	0.33	4.11

Conclusions

This Chapter studied trends in homeownership for four groups: families with children, young households, households of prime homebuying age, and elderly households. The PUMS data reveals that during the 1990's homeownership rates increased sharply for families with children and elderly households. There were no significant trends among the young households and households of prime homebuying age. Homeownership rates declined slightly among households with householders less than 30 years old or between 45 and 54 years old. They increased slightly among households with householders between 30 and 34 years old and between 35 and 44 years old. The decomposition technique was useful in explaining the changes in these homeownership rates.

Looking at all the analyses, there is clear evidence that homeownership rate increases between 1990 and 2000 were widespread across the various component classes within the population defined by the characteristics studied in this Chapter. Among the 8 classes studied, the decomposition analysis found positive rate effects in all eight cases, including the two cases in which homeownership rates fell. For households with householders under 30 years old and households with households between 45 and 54, positive rate effects were offset by larger negative composition effects.

The decomposition analysis found positive composition effects for families with children and elderly households. The composition effects were negative for young households and households of prime homebuying age. This finding is not surprising. Chapter 2 showed the trends in household type and the growing minority share of the population tended to reduce homeownership rates. Positive trends were the aging of the population, the growth in real income, and the slight shift of the population from inside to outside central cities. In looking inside the age brackets, we are holding age constant and therefore eliminating one of the positive trends. After eliminating real income growth and location shifts from the composition analysis, the contribution of the composition effect dropped markedly. In fact, it became a marginal positive factor for married couples with children and turned into a negative factor for households with householders between 65 and 74 years old.

Chapter Six
Summary and Conclusions

This report set out to answer three questions:

- To what extent was the growth between 1990 and 2000 in the national homeownership rate the result of favorable shifts in the demographic composition of the population and to what extent was it the result of a general upward shift in homeownership rates throughout the population?

- To what extent was the growth between 1990 and 2000 in the homeownership rates of particular groups within the population the result of favorable shifts in the demographic composition of the groups and to what extent was it the result of a general upward shift in homeownership rates across the various components of the groups?

- As gaps in homeownership rates narrowed or widened over the decade, what was the relative importance for these changes of shifts in demographic composition and shifts in homeownership rates across components of the groups being compared?

This Chapter pulls together the key findings with respect to these three questions.

Changes in the National Homeownership Rate

To study this question, we divided all the households in the 1990 and 2000 PUMS into 1,750 groups based on differences in the age of the householder, household type, the race and ethnicity of the householder, household income, and location inside or outside of a central city.

Our analysis concludes that the growth in the national homeownership rate between 1990 and 2000 was predominately due to widespread increases in homeownership rates throughout the various components of the population.

- Increases in homeownership opportunities were widespread throughout the population. A majority of the groups had higher homeownership rates in 2000 than in 1990 and these groups accounted for approximately three-fourths of all households.

  – Of the 1,750 groups, 350 had no members in the 1990 PUMS because the Census Bureau did not begin collecting data on persons of "two or more races" until the 2000 census. Another 37 groups represented very small segments of the population and had no members in either the 1990 or the 2000 PUMS. Of the remaining 1,363 cells, 793 had higher homeownership rates in 2000 than in 1990, 23 had the same homeownership rate in 2000 as in 1990, and 547 had lower homeownership rates in 2000 than in 1990. The 793 cells with higher homeownership rates equal 58 percent of the 1,363 cells and 74 percent of all households in 2000.

- The decomposition analysis showed that changes in the composition of the population were, at best, a minor factor in the growth of homeownership rates between 1990 and 2000.

  – The decomposition analysis using all 1,750 groups found that changes in homeownership rates accounted for 79 percent of the 1.96 percentage point gain in the national homeownership rate. Changes in the composition of the population accounted for only 21 percent.

  – A second decomposition analysis focused on the shifts in the population along three dimensions – age, household type, and race and ethnicity. This analysis incorporates changes in real income into the rate structure and treats moves into and out of central cities as part of the decision to own or rent. Under these assumptions, changes in homeownership rates accounted for all of the gain in the national homeownership rate. The combined effects of the aging population, the decline in married couple households, and the growth of minority share of the population over the decade was to lower the national homeownership rate. Without the offsetting gains in the rate structure, changes in the composition of the population would have lowered the national homeownership rate by 0.86 percentage points.

Changes in Group Homeownership Rates

We applied the decomposition analysis separately to 23 major population groups – 4 race/ethnicity groups,[31] 5 income classes, 2 locations, 7 age brackets, and 5 household types. Table 52 reports the results.

The last column tells how important changes in the rate structure were in bringing about the observed change in the group homeownership rate reported in column 4. If the rate effect was larger than the change in the group homeownership rate, the last column reports 100%. In these cases, the composition effect was negative, that is, changes in the composition of the group acted to lower homeownership rates. If the change in the group homeownership rate was negative and the rate effect was positive, then the last column lists the effect as "POSITIVE". If the rate effect was negative, then the last column lists the effect as "NEGATIVE" regardless of the change in the group homeownership rate.

Changes in the homeownership rates of the subgroups within each group accounted in large part for the changes in the group homeownership rate in almost all cases.

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[31] The analysis was not applied to "non-Hispanic two or more race" households because of the absence of information on homeownership rates in 1990 for this group.

Table 52

Decomposition of Homeownership Rate Changes for All Major Population Components

Population Component	1990 Homeownership Rate	2000 Homeownership Rate	Change in Homeownership Rate	Rate Effect	Composition Effect	Rate Effect as Percent of Change in Homeownership Rate
Race of Household Head						
Hispanics	42.14%	45.63%	3.50	1.99	1.50	57.1%
Non-Hispanic Whites	69.06%	72.45%	3.39	1.68	1.71	49.6%
Non-Hispanic Blacks	43.86%	46.60%	2.74	0.72	2.02	26.1%
Other Non-Hispanic	52.33%	53.56%	1.23	-0.46	1.69	NEGATIVE
Non Hispanic two or more major race groups	NA	48.73%	NA	NA	NA	NA
Household Income						
Very Low Income	43.46%	42.00%	-1.46	-0.31	-1.15	NEGATIVE
Low Income	54.44%	55.24%	0.80	1.82	-1.01	100.0%
Moderate Income	62.93%	65.45%	2.52	2.53	-0.02	100.0%
High Income	74.33%	75.92%	1.58	2.36	-0.78	100.0%
Very High Income	85.91%	86.14%	0.23	1.19	-0.96	100.0%
Location of unit						
Central City	54.17%	57.65%	3.48	2.44	1.05	69.9%
Non Central City	70.28%	70.96%	0.68	1.04	-0.36	100.0%
Age of Household Head						
<30	28.90%	28.55%	-0.36	1.53	-1.89	POSITIVE
30-34	52.61%	52.96%	0.34	2.00	-1.66	100.0%
35-44	66.08%	66.31%	0.23	2.17	-1.94	100.0%
45-54	75.30%	74.89%	-0.41	1.24	-1.66	POSITIVE
55-64	79.67%	79.68%	0.00	0.44	-0.44	100.0%
65-74	78.50%	80.67%	2.17	1.36	0.81	62.7%
75+	70.13%	74.25%	4.11	1.94	2.17	47.2%

Table 52

Decomposition of Homeownership Rate Changes for All Major Population Components

Population Component	1990 Homeownership Rate	2000 Homeownership Rate	Change in Homeownership Rate	Rate Effect	Composition Effect	Rate Effect as Percent of Change in Homeownership Rate
Household Type						
Married couples with children	72.74%	76.15%	3.41	2.20	1.21	64.5%
Married couples without children	81.36%	83.22%	1.86	0.99	0.86	53.5%
Other families with children	33.12%	39.56%	6.44	2.56	3.88	39.7%
Other families without children	63.75%	64.36%	0.61	0.46	0.15	75.0%
Other household types	46.56%	49.87%	3.31	1.48	1.83	44.7%

- In only two cases was the rate effect negative. Unfavorable movements in the homeownership rates of component subgroups reduced the gain for non-Hispanic Other and was a minor factor in the decline in the homeownership rate of very low income households.

- In five cases, the rate effect accounted for less than half of the observed gains. The five cases were: non-Hispanic Blacks, other household types, non-Hispanic Whites, householders 75 years old and older, and other families with children. In the last three cases, the rate effect was still sizeable.

- In the remaining 16 cases, the rate effect was the predominant explanation of the growth in group homeownership rates.

  – In 8 cases, it was the sole reason homeownership rates increased.
  – In 2 cases, it partially offset the deleterious impact of composition changes.

The importance of gains by subgroups in homeownership rates becomes even more important when we limited the analysis to sets of households defined by the age of the householder, household type, and the race and ethnicity of the householder. In this second analysis, we focus on purely demographic shifts in the population by moving changes in real income and location over to the rate effect side of the ledger. Table 53 contains these results.

- Among the 14 groups with increases in homeownership rates, the rate effect is the predominant explanation of the increase in all cases except non-Hispanic Other where it still accounts for 48 percent of the growth.

- In 8 cases, the composition effect is negative which means that the rate effect was the sole explanation of the growth in homeownership rates.

- In two cases, the homeownership rates declined – householders under 30 years old and householders between 45 and 54. In both cases, the rate effect was positive.

Comparing the two analyses suggests that real income growth was a key contributor to the composition effects in the analysis using all 1750 subgroups. This conclusion is reinforced by two additional considerations.

- In Table 52, the composition effects are uniformly negative across the five income classes. When we focus on an individual income class, we are holding income constant and looking only at the effects of changes along the age, household type, race and ethnicity, and location dimensions. The net effect of these changes is negative.

- Addition analysis of the composition effect for inside central cities reveals that real income changes were an important contributor to this effect.

Table 53

Decomposition of Homeownership Rate Changes for All Major Population Components Using Race and Ethnicity, Age, and Household Type Only

Population Component	1990 Homeownership Rate	2000 Homeownership Rate	Change in Homeownership Rate	Rate Effect	Composition Effect	Rate Effect as Percent of Change in Homeownership Rate
Race of Household Head						
Hispanics	42.14%	45.63%	3.50	3.32	0.18	94.9%
Non-Hispanic Whites	69.06%	72.45%	3.39	2.87	0.52	84.8%
Non-Hispanic Blacks	43.86%	46.60%	2.74	2.78	-0.04	100.0%
Other Non-Hispanic	52.33%	53.56%	1.23	0.58	0.65	47.2%
Non Hispanic two or more major race groups	NA	48.73%	NA	NA	NA	
Age of Household Head						
<30	28.90%	28.55%	-0.36	2.80	-3.16	POS
30-34	52.61%	52.96%	0.34	3.61	-3.27	100.0%
35-44	66.08%	66.31%	0.23	3.10	-2.87	100.0%
45-54	75.30%	74.89%	-0.41	2.29	-2.70	POS
55-64	79.67%	79.68%	0.00	1.74	-1.73	100.0%
65-74	78.50%	80.67%	2.17	2.96	-0.79	100.0%
75+	70.13%	74.25%	4.11	3.79	0.33	92.0%
Household Type						
Married couples with children	72.74%	76.15%	3.41	3.37	0.04	98.8%
Married couples without children	81.36%	83.22%	1.86	1.81	0.05	97.2%
Other Families with children	33.12%	39.56%	6.44	4.78	1.66	74.3%
Other Families without children	63.75%	64.36%	0.61	2.04	-1.43	100.0%
Other household types	46.56%	49.87%	3.31	2.96	0.35	89.3%

This paper also studied how homeownership rates changed when both income and race are held constant. We performed this analysis because the racial and ethnic gaps persist even when income differences are not a factor. The results indicate that most but not all groups defined by income and by race and ethnicity improved their homeownership rates over the decade.

- Among Hispanic households, homeownership rates increased for all income classes except the very high income group. The rate effect was positive across all income classes and accounted most of the increase in homeownership rates for low income, moderate income and high income Hispanic households. It was not strong enough to offset the negative effects of composition changes for very high income Hispanic households. Composition effects were slightly negative for high income households and were positive for the remaining classes. The composition effect accounted for most of the growth in the very low income homeownership rate.

- Among non-Hispanic Blacks households, homeownership rates increased for moderate income, high income, and very high income households but decreased for very low income and low income households. The rate effect was positive across all income classes except very low income households. A strong rate effect was the major reason for increased homeownership rates among moderate income and high income non-Hispanic Blacks. It balanced negative composition effects for low income and very high income non-Hispanic Blacks, leading to a small decrease for the former and a small increase for the latter. In the case of very low income non-Hispanic Blacks households, a negative rate effect offset a positive composition effect to produce a small decline in the homeownership rate.

Changes in Gaps

Despite widespread increases in the homeownership rates of disadvantaged groups, there was only modest progress, as measured by the PUMS surveys, in closing gaps between 1990 and 2000. Rate changes were important explanations for whatever narrowing or widening of the gaps occurred

The homeownership rates of non-Hispanic Whites, very high income households, and household living outside of central cities – the norms against which the gaps are measured – also increased during this time so that changes in gaps were smaller than the changes in homeownership rates. Three important gaps increased – those for non-Hispanic Blacks, non-Hispanic Other, and very low income households.

Table 54 shows the gaps in both 1990 and 2000 and the contribution of rate changes and composition changes in explaining the widening or narrowing of the gaps. Only two gaps closed by more than 10 percent and one gap widened by more than 10 percent.

Table 54

How and Why Gaps Changed during the 1990's

Category	Gap in 1990	Gap in 2000	Change In Gap	Percent Change	Contribution of Rate Changes	Contribution of Composition Changes	Percent Due to Rate Changes
Race & Ethnicity Gaps							
Hispanics	26.92	26.81	-0.11	-0.4%	-0.32	0.21	100.0%
Non-Hispanic Blacks	25.20	25.85	0.65	+2.6%	0.96	-0.32	100.0% WIDENED
Non-Hispanic Other	16.73	18.89	2.16	+12.9%	2.14	0.01	99.1% WIDENED
Income Gaps							
Very Low Income	42.45	44.14	1.69	+4.0%	1.50	0.19	88.8% WIDENED
Low Income	31.47	30.90	-0.57	-1.8%	-0.63	0.06	100.0%
Moderate Income	22.98	20.69	-2.28	-8.1%	-1.34	-0.94	58.8%
High Income	11.57	10.22	-1.35	-11.7%	-1.17	-0.18	86.7%
Location Gap							
Inside central cities	16.12	13.31	-2.81	-17.4%	-1.40	-1.41	49.8%

- Increases in homeownership rates across subgroups were the sole explanation of the small narrowing in the gaps for Hispanics and low income families. (In the decennial census data, the gap for Hispanics widened slightly.) Relative improvement in the rate structure explained the majority of the narrowing in the gaps for moderate income and high income households and explained almost half of the narrowing for households living in central cities.

- Homeownership rates for the various components of non-Hispanic Blacks population failed to improve as much as their non-Hispanic Whites counterparts. This difference offset favorable shifts in distribution of the non-Hispanic Blacks population across the various subgroups and produced a widening of the gap.

- Homeownership rates for the various components of non-Hispanic Other population fell on average over the decade while their non-Hispanic Whites counterparts experienced gains. Composition changes had little impact on the gap.

- Homeownership rates for the various components of the very low income population fell on average over the decade while their very high income counterparts experienced gains. This difference was the predominant reason that this gap widened although unfavorable shifts in distribution of the very low income population across the various subgroups also contributed.

The paper also looked at the gaps across groups defined by income and by race and ethnicity.

- The gaps between Hispanic households and non-Hispanic Whites households of the same income ranged from 15 to 25 percentage points. The gaps between non-Hispanic Blacks households and non-Hispanic Whites households of the same income ranged from 10 to 20 percentage points.

- While the overall gap between Hispanics and non-Hispanic Whites narrowed very slightly, the gaps at the high income and very high income levels actually widened. The rate effect contributed to the narrowing for the three lowest income classes and to the widening for the two highest income classes. Except for very low income households, the composition effects contributed to widening the gaps.

- The overall gap between non-Hispanic Blacks and non-Hispanic Whites widened and the gaps widened among all the income classes except for high income non-Hispanic Blacks. The rate effects worked toward widening the gap everywhere except for high income non-Hispanic Blacks households. The composition effects contributed to widening for all classes except very low income and high income.

One disturbing finding is the failure of Hispanics and non-Hispanic Blacks to close the gaps in three of the four cases in which one would have thought it easiest to make progress, that is, among high income and very high income households. As noted, only high income non-Hispanic Blacks narrowed the gap. In the three cases in which the gaps widened, the composition effect showed that the disadvantaged group experienced changes in the population that acted to widen the gap.

However, these compositional changes are not solely responsible. In the three cases, the rate effect also worked against a narrowing of the gap.

Appendix

The primary objective of this analysis is to determine the extent to which changes in various homeownership rates between 1990 and 2000 are the result of changes in the composition of the population or changes in the homeownership rates of various groups within the population.

The Decomposition Analysis – the Basic Arithmetic

For any group of households, the homeownership rate of that group is the ratio of the number of owner occupied households in that group to the number of all households in the group.

Let r_{ahrilt} be the homeownership rate of a group of households where t is the point in time at which we measure the homeownership rate and the remaining subscripts list the characteristics that define the group. We use five characteristics: a refers to an age class, h refers to a household type, r refers to race and ethnicity class, i refers to income class, and l refers to location.

The national homeownership rate is a weighted average of the homeownership rates of all the groups that form the population.

Let w_{ahrilt} be the group weight, that is, the number of households in a group divided by the number of households in the larger group to which the group belongs.

If w is calculated with respect to the total number of households in the population, then the national homeownership rate for a given year (R_t) is defined as: $\Sigma_a\Sigma_h\Sigma_r\Sigma_i\Sigma_l\ w_{ahrilt}r_{ahrilt}$, where the summation is taken over all groups.

The change in the national homeownership rate between 1990 and 2000 is:

$$R_{00} - R_{90} \equiv \Sigma_a\Sigma_h\Sigma_r\Sigma_i\Sigma_l w_{ahril00}r_{ahril00} - \Sigma_a\Sigma_h\Sigma_r\Sigma_i\Sigma_l\ w_{ahril90}r_{ahril90}$$

A simple manipulation enables us to decompose the change in homeownership rates into a part that is a weighted average of the changes in the individual group homeownership rates and a part that is a weighted average of the change in the distribution of the population across the individual groups. (In the first case, the weights are the group weights for 2000; in the second case the weights are the group homeownership rates for 1990.)

$$R_{00} - R_{90} \equiv \Sigma_a\Sigma_h\Sigma_r\Sigma_i\Sigma_l\ w_{ahril00}r_{ahril00} - \Sigma_a\Sigma_h\Sigma_r\Sigma_i\Sigma_l\ w_{ahril00}r_{ahril90} + \Sigma_a\Sigma_h\Sigma_r\Sigma_i\Sigma_l\ w_{ahril00}r_{ahril90} - \Sigma_a\Sigma_h\Sigma_r\Sigma_i\Sigma_l\ w_{ahril90}r_{ahril90}$$

$$\equiv \Sigma_a\Sigma_h\Sigma_r\Sigma_i\Sigma_l\ w_{ahril00}\left(r_{ahril00} - r_{ahril90}\right) + \Sigma_a\Sigma_h\Sigma_r\Sigma_i\Sigma_l\left(w_{ahril00} - w_{ahril90}\right) r_{ahril90}$$

We call the parts, the rate effect and the composition effect.

$\Sigma_a\Sigma_h\Sigma_r\Sigma_i\Sigma_l\ w_{ahril00}\ (r_{ahril00} - r_{ahril90})$ is the rate effect and

$\Sigma_a\Sigma_h\Sigma_r\Sigma_i\Sigma_l\ (w_{ahril00} - w_{ahril90})\ r_{ahril90}$ is the composition effect.

In this discussion, we defined the weights w with reference to the entire population. We could have defined them with respect to a subset of the population such as non-Hispanic Blacks. Then, if we restrict ourselves to cells defined by r = non-Hispanic Blacks = b, then the identity

$R_{00} - R_{90} \equiv \Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahbil00}r_{ahbil00} - \Sigma\Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahbil90}r_{ahbil90}$

equals the change in the homeownership rate for non-Hispanic Blacks between 1990 and 2000.

This change can likewise be split into a rate effect and a composition effect that sum to the actual change over the period in homeownership rates for non-Hispanic Blacks.

The decomposition analysis can also explain why homeownership gaps narrowed or widened over the decade. Consider the gap between non-Hispanic Blacks (r = b) and non-Hispanic Whites (r = w) as an example

$G_{00} - G_{90} \equiv (\Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahwil00}r_{ahwil00} - \Sigma\Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahbil00}r_{ahbil00}) - (\Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahwil90}r_{ahwil90} - \Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahbil90}r_{ahbil90})$

$\equiv (\Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahwil00}r_{ahwil00} - \Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahwil90}r_{ahwil90}) - (\Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahbil00}r_{ahbil00} - \Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahbil90}r_{ahbil90})$

$\equiv (\Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahwil00}r_{ahwil00} - \Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahwil00}r_{ahwil90} + \Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahwil00}r_{ahwil90} - \Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahwil90}r_{ahwil90}) -$
$(\Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahbil00}r_{ahbil00} - \Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahbil00}r_{ahbil90} + \Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahbil00}r_{ahbil90} - \Sigma_a\Sigma_h\Sigma_i\Sigma_l\ w_{ahbil90}r_{ahbil90})$

$\equiv$ (rate effect$_w$ + composition effect$_w$) – (rate effect$_b$ + composition effect$_b$)

$\equiv$ (composition effect$_w$ – composition effect$_b$) + (rate effect$_w$ – rate effect$_b$)

The Decomposition Analysis – Issues

Issue 1: Impact of Disaggregation Choices

How one disaggregates the population into groups affects the analysis. At one extreme, one could separate the population into groups based on only one characteristic, such as the age of the householder. The same mathematics would apply and one could calculate both a rate effect and a composition effect. Chapter 2 contains decomposition analysis using only one dimension.

The composition effect would be: $\Sigma_a(w_{a00} - w_{a90})\ r_{a90}$, where "a" denotes different age brackets. The composition effect tells us how much the homeownership rate would have increased if the only change had been a shift in the distribution of the population across age brackets. This one-dimensional analysis implicitly assumes that the population is homogenous within age brackets. As

stated, the composition effect is positive if age brackets with higher than average homeownership rates grow relative to age brackets with lower than average homeownership brackets. In the one-dimensional analysis, growth is measured solely by share of the population. However, we know that as the population of a particular age bracket increased or decreased between 1990 and 2000, the makeup of that bracket changed in terms of types of households, race and ethnicity, real income, and location. Changes in makeup can offset changes in weight.

Table 30 is a good example of how the makeup of growth affect the analysis. The table shows that high income households grew in relative terms in central cities but that the increase in high income households actually lowered the composition effect of location. This happened because the growth in the share of high income households was accompanied by an unfavorable change in the makeup of high income households in central cities. For example, the share of married couples, both with and without children, among high income central city residents fell substantially between 1990 and 2000.

A one-dimension analysis can produce a misleading estimate of the composition effect. For example, Table 2 shows a 1.33 percentage point composition effect looking only at age but Table 12 shows a composition effect of only 0.42 percentage points when the analysis is broadened to include household type, race and ethnicity, income, and location. A comparison of Tables 4 and 12 provides another example of how a one-dimension analysis can produce a misleading estimate of the composition effect. In this case, an analysis based on household type alone shows a negative composition effect of -1.04 percentage points compared to a positive 0.42 percentage points when the analysis is broadened to include age, race and ethnicity, income, and location.

In a one-dimension analysis involving only age, the rate effect would be $\Sigma_a w_{a00} (r_{a00} - r_{a90})$. Here it is easier to see the importance of makeup. because we know that both r_{a00} and r_{a90} are weighted averages. In the context of the five characteristic breakout that we discussed above: r_{a00} equals $\Sigma_h \Sigma_r \Sigma_i \Sigma_l\, w_{ahril00} r_{ahril00}$ and r_{a90} equals $\Sigma_h \Sigma_r \Sigma_i \Sigma_l w_{ahril90} r_{ahril90}$ where a is held constant in each summation and w is now defined over the population of each age bracket.

The rate effect equals: $\Sigma_a w_{a00}(\Sigma_h \Sigma_r \Sigma_i \Sigma_l\, w_{ahril00} r_{ahril00} - \Sigma_h \Sigma_r \Sigma_i \Sigma_l\, w_{ahril90} r_{ahril90})$ Note that "a" varies in the outer summation but is fixed in the inner summations. In this context, the rate effect is an amalgamation of the population shifts and rate changes within age brackets.

We can use the same manipulation inside of $\Sigma_a w_{a00}(\Sigma_h \Sigma_r \Sigma_i \Sigma_l\, w_{ahril00} r_{ahril00} - \Sigma_h \Sigma_r \Sigma_i \Sigma_l\, w_{ahril90} r_{ahril90})$, so that the rate effect equals:

$\Sigma_a w_{a00}(\Sigma_h \Sigma_r \Sigma_i \Sigma_l\, w_{ahril00} r_{ahril00} - \Sigma_h \Sigma_r \Sigma_i \Sigma_l\, w_{ahril00} r_{ahril90} + \Sigma_h \Sigma_r \Sigma_i \Sigma_l\, w_{ahril00} r_{ahril90} - \Sigma_h \Sigma_r \Sigma_i \Sigma_l\, w_{ahril90} r_{ahril90})$

which can be rewritten as

$\Sigma_a w_{a00}(\Sigma_h \Sigma_r \Sigma_i \Sigma_l\, w_{ahril00}(r_{ahril00} - r_{ahril90}) + \Sigma_h \Sigma_r \Sigma_i \Sigma_l\, (w_{ahril00} - w_{ahril90}) r_{ahril90})$.

The rate effect across all a's is $\Sigma_a w_{a00}$(rate effect for changes within each a + composition effect for changes within each a). Thus the rate effect for age is a weighted sum of the rate and composition

effect for each component of a. In suppressing the other dimensions, we have encompassed their rate and composition effects in the rate effect for the remaining dimension.

Tables 2, 4, and 12 again show us the impact of compressing the analysis to one-dimension. In Table 2, the rate effect is only 0.62 percentage points when age is considered alone compared to 1.54 percentage points when using all 5 categories. On the other hand, the rate effect in Table 4 is 3.00 percentage points when household type is considered alone compared to 1.54 percentage points when using all 5 categories.

If the makeup effects are on average positive, then limiting the analysis to one dimension deflates measurement of the composition effect and inflates measurement of the rate effect. If the makeup effects are on average negative, then limiting the analysis to one dimension inflates measurement of the composition effect and deflates measurement of the rate effect.

Issue 2: Impact of Small Cells

If a cell contains no households, then the weight (w) will be zero and the rate (r) will be indeterminate.

Consider what happens if a specific cell has no observations in one year, say 1990.[32] The contribution of any cell to the change in overall homeownership rate is the algebraic sum of:

$$w_{ahril00} \left(r_{ahril00} - r_{ahril90} \right) + \left(w_{ahril00} - w_{ahril90} \right) r_{ahril90}^{33}$$

Assume that $w_{ahril90}$ is 0. Then the contribution of this cell reduces to:

$$w_{ahril00} \left(r_{ahril00} - r_{ahril90} \right) + w_{ahril00} \, r_{ahril90} = w_{ahril00} \, r_{ahril00}$$

Since this is an expression not containing $r_{ahril90}$, one might assume that it is not necessary to have an estimate of $r_{ahril90}$. Unfortunately, this is not true because we separately consider $w_{ahril00} \left(r_{ahril00} - r_{ahril90} \right)$ and $\left(w_{ahril00} - w_{ahril90} \right) r_{ahril90}$ in order to calculate the rate and composition effects. In this context, we need to have an estimate of $r_{ahril90}$. If we assume that $r_{ahril90}$ is zero, then the analysis concludes that the contribution of this cell is all rate effect. Alternatively, if we assume that $r_{ahril90}$ equals $r_{ahril00}$ then the analysis concludes that the contribution of this cell is all composition effect.

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[32]   Note that the absence of any observations in a particular cell does not mean that there were no households with this particular set of characteristics. The PUMS is a one-percent sample of long form returns from the decennial census. Since only one in every 6 households receives a long form, only one out of every 600 households are reported in the PUMS. Small demographic groups could be overlooked in drawing this sample. For example, if there were 1,000 households of a particular type in 1990, there is approximately a 20 percent chance that the 1990 PUMS does not contain a single member of that household type.

[33]   Note that it would not be appropriate to attach significance to the contribution of any one cell to the change in homeownership rates. The contributions of individual cells are not independent. The weights must sum to one. If one cell has a positive composition effect, then there must be at lease one other cell with a negative composition effect.

This is not a serious problem because there are few empty cells and they account for a very small share of the population. Only 52 of 1750 cells were empty in 2000. Excluding the 350 cells corresponding to the "two or more racial groups", only 18 of 1400 cells were empty in 1990. An example of cells that were empty in both years is: other families with children with high incomes living in central cities and with householders who are Hispanic and 75 years old or older.

Nevertheless, we will attempt to reduce any bias by handling empty cells in the following manner:

- All empty 2000 cells (except cells with households of "two or more racial groups" will be assigned a homeownership rate of 66.18% (the average for the 2000 PUMS sample).

- All empty 1990 cells (except the cells corresponding to the "two or more racial groups" cells in the 2000 PUMS) will be assigned a homeownership rate of 64.23% (the average for the 1990 PUMS sample).

- For the cells that correspond to the "two or more racial groups," cells in the 1990 PUMS will be assigned a homeownership rate of 45.62%, which is equal to the weighted homeownership rate of the non-Hispanic Blacks and non-Hispanic Other groups in 1990. A few cells in the 2000 PUMS related to this group are empty and will be assigned a homeownership rate of 48.35%, which is equal to the weighted homeownership rate of the non-Hispanic Blacks and non-Hispanic Other groups in 2000.

The "two or more racial group" category presents a special situation. In 2000, 1.4 percent of all households had householders described themselves as non-Hispanic and members of two or more racial groups. If we had been able to do the analysis using the 1990 rules, the households in this race/ethnicity category would have been placed in one of the other four categories. The effect of the new rules compared to the approach used with 1990 PUMS is to reduce the weights ($w_{ahril00}$) of the cells in the other categories by a combined 1.4 percentage points and add new cells with a combined weight of 1.4 percentage points. The new rules also affects the various homeownership rates ($r_{ahril00}$) as well since each homeownership rate is the ratio of the owner-occupant households in the cell to all households in the cell. Removing households from cells may affect this ratio.

The composition effect is $\Sigma_a \Sigma_h \Sigma_r \Sigma_i \Sigma_l (w_{ahril00} - w_{ahril90}) r_{ahril90}$. If the addition of the new category affects the old weights by an amount $\delta_{ahril00}$ and we define the new weights as $w'_{ahril00} = w_{ahril00} + \delta_{ahril00}$, then the new composition effect is $\Sigma_a \Sigma_h \Sigma_r \Sigma_i \Sigma_l (w'_{ahril00} - w_{ahril90}) r_{ahril90}$ which equals $\Sigma_a \Sigma_h \Sigma_r \Sigma_i \Sigma_l (w_{ahril00} + \delta_{ahril00} - w_{ahril90}) r_{ahril90} = \Sigma_a \Sigma_h \Sigma_r \Sigma_i \Sigma_l (w_{ahril00} - w_{ahril90}) r_{ahril90} + \Sigma_a \Sigma_h \Sigma_r \Sigma_i \Sigma_l \delta_{ahril00} r_{ahril90}$

The addition of the new categories alters the composition effect by $\Sigma_a \Sigma_h \Sigma_r \Sigma_i \Sigma_l \delta_{ahril00} r_{ahril90}$. As a result of the decisions explained above, the homeownership rate (r) is assumed equal to 45.62 percent for all the 350 cells corresponding to the "two or more racial groups". So $\Sigma_a \Sigma_h \Sigma_r \Sigma_i \Sigma_l \delta_{ahril00} r_{ahril90} = (1.4\%)(45.62\%) = 0.6$ percentage points over these 350 cells. For the remaining 1,400 cells, $\delta_{ahril00}$ is either zero or negative and the sum equals -1.4 percent. So the total over the 1,400 remaining cells is a negative number equal to a weighted average of homeownership rates where the sum of the weights equal 1.4 percent. It would appear that the $\Sigma_a \Sigma_h \Sigma_r \Sigma_i \Sigma_l \delta_{ahril00} r_{ahril90}$ taken over all 1,750 cells is small

and the impact of the new rules for categorization race and ethnicity on the composition effect is therefore small.[34]

Since the sum of the composition effect and the rate effect equals 1.96 percentage points regardless of how we split the sample, the impact of the new rules on the rate effect must equal the negative of the impact on the composition effect. Again the impact of the new rules for categorizing race and ethnicity on the rate effect are small.[35]

We will be able to calculate a homeownership rate for all non-empty cells but the precision of the estimate will be very low for cells with few observations. We considered alternatives, such as, combining small cells or assigning homeownership rates from similar cells. However, we rejected these ideas because we are not concerned by the affects of imprecision in measuring the homeownership rates for small cells. In both 1990 and 2000 PUMS, cells with 10 or fewer observations account for less than one-tenth of one percent of the households in the samples. Other alternatives would have disrupted the basic identity that equates the change in homeownership rates to the sum of the rate effect and the composition effect.

Disaggregation Choices

The first choice was to select the characteristics that we will use to disaggregate the population. We divided the population by:

- Household type
- Household income
- Age of the householder
- Race of the householder
- Location

Historically, homeownership rates vary substantially among groups within the population defined by these characteristics.

There is some question of simultaneity between tenure choice and choice of location. To extent that households move from central cities to suburbs between censuses in order to become homeowners, failure to take this interaction into account will bias the results in favor of attributing the increase in the national homeownership to population shifts rather than increases in the underlying group homeownership rates.

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[34] If the homeownership rate were 50.0 percent in all the cells from which households are drawn to form the "two or more races" group, then the weighted average would be -0.7 percentage points and $\Sigma \delta_{ahril00} \, r_{ahril90}$ taken over all 1,750 cells would be -0.1 percentage points.

[35] One can derive that the impact on the rate effect is $-\Sigma_a \Sigma_h \Sigma_r \Sigma_i \Sigma_l \, \delta_{ahril00} \, r_{ahril90}$ directly, that is, without relying on the constancy of the sum of the two effects. The derivation is long and requires breaking $\delta_{ahril00}$ and similar terms into their constituent parts.

Also using real income to disaggregate the population causes growth in real income to show up in the composition effect. This characterization may not be useful for our purposes. One basic rationale for decomposition analysis is to separate changes in homeownership rates that result from demographic phenomena that are generally outside of public control, such as the aging of the population or changes in the racial or ethnic character of the population, from changes that are subject to public policy interventions, such as lowering mortgage interest rates. Real income growth is a major goal of public policy. To the extent that increases in the national homeownership rate are due to changes to real income growth, perhaps they should be attributable to the rate effect.

For these reasons, we also apply the decomposition analysis to a disaggregation along three dimensions: age, household type, and race and ethnicity. From the discussion of Issue 1 above, this incorporates the rate and composition effects of real income growth and location changes into the rate effect for these three dimensions.

The next choice is to decide how to break the population down with respect to each characteristic. For example, should we divide households by income quartiles or income quintiles? In part, the format used by the Census Bureau to report the data helped determine these decisions. But we were also conscious of two other considerations:

- What are the most policy relevant distinctions? For example, from a policy perspective, it would be useful to include as much detail as possible about race and ethnicity.

- How do these decisions affect the accuracy of the analysis? The 1990 PUMS contains 918,782 households. The number of distinct groups being analyzed is the product of the number of divisions used for each characteristic. Even relative compact breakdowns for each characteristic can quickly lead to a large number of cells, many of which will contain few observations and some of which may be empty.

For these reasons we chose a categorization based on age of the householder (7 age brackets), household type (5 types), the race and ethnicity of the householder (5 race and ethnicity combinations), real household income (5 classes) and the location of the household (inside or outside of central cities). This categorization produces 1,750 cells (2*5*7*5*5). For each cell we will count the number of households (n) in both the 1990 and 2000 PUMS and calculate a homeownership rate (r) for each cell (the number of owner-occupant households/all households in the cell).

Location presented special problems. We would have liked to have had three location categories: central cities, suburbs, and outside metropolitan areas. However, between 1990 and 2000, the Census Bureau changed its confidentially requirements. For the 1990 census, PUMS data were organized into areas of 100,000 or more people called PUMA's. For the 2000 census, PUMS data are organized into areas of 400,000 or more people called Super PUMA's. For both samples, the Census Bureau created a detailed set of codes to identify the metropolitan status of the observations. We were unable to establish a consistent central city, suburb, outside metropolitan area breakdown across the two PUMS. We were able to obtain a reasonably consistent central city and outside central city split across the PUMS.

The codes for the 1990 PUMS were:

10   **Central city**
11   **Central city part**
20   MSA/PMSA - outside central city
21   MSA/PMSA - outside central city part 21
22   **Central city (part) and outside central city (part)**
30   Entire MSA
31   2 or more MSAs/PMSAs
40   Mixed MSA/PMSA/non-MSA/PMSA
50   Outside MSA/PMSA

The codes for the 2000 PUMS were:

11   **Contains only metropolitan territory inside central city (MSA part of fully-identified MSA)**
12   Contains only metropolitan territory outside central city (MSA part of fully-identified MSA)
13   **Contains only metropolitan territory both inside and outside central city (MSA part of fully identified MSA)**
14   Contains an entire MSA (and no other territory)
21   **Contains only metropolitan territory inside central city (MSA part of partially-identified MSA)**
22   Contains only metropolitan territory outside central city (MSA part of partially-identified MSA)
23   **Contains only metropolitan territory both inside and outside central city (MSA part of partially-identified MSA)**
31   **Contains only metropolitan territory inside central city (PMSA part of fully-identified PMSA and fully-identified CMSA)**
32   Contains only metropolitan territory outside central city (PMSA part of fully-identified PMSA and fully-identified CMSA)
33   **Contains only metropolitan territory both inside and outside central city (PMSA part of fully-identified PMSA and fully-identified CMSA)**
34   Contains an entire PMSA (and no other territory) (PMSA belongs to a fully-identified CMSA)
41   Contains only metropolitan territory inside central city (PMSA part of fully-identified PMSA and partially-identified CMSA)
42   Contains only metropolitan territory outside central city (PMSA part of fully-identified PMSA and partially-identified CMSA)
43   **Contains only metropolitan territory both inside and outside central city (PMSA part of fully-identified PMSA and partially-identified CMSA)**
44   Contains an entire PMSA (and no other territory) (PMSA belongs to a partially-identified CMSA)
51   **Contains only metropolitan territory inside central city (PMSA part of partially-identified PMSA and partially-identified CMSA)**
52   Contains only metropolitan territory outside central city (PMSA part of partially-identified PMSA and partially-identified CMSA)
53   **Contains only metropolitan territory both inside and outside central city (PMSA part of partially-identified PMSA and partially-identified CMSA)**
70   Contains both metropolitan and nonmetropolitan territory
80   Contains only metropolitan territory in two or more partial and/or entire MSAs/PMSAs/CMSAs
90   Contains only nonmetropolitan territory

The bolded categories were used to define inside central cities for the respective PUMS. The codes we use to identify "inside central cities" pick up some neighboring suburban areas and the codes we use to identify "outside central cities" pick up some small central cities.

The Census Bureau offers the following interpretation of "fully-identified" and "partially-identified": "A geographic area must have a minimum of 400,000 population to be fully identified in the 1 percent sample file."

Metropolitan Area (MA) codes are based upon June 30, 1999 Office of Management and Budget definitions. A "'fully-identified" MA indicates that the entire MA and no other territory is shown in one or more super-PUMAs. A "partially-identified" MA indicates that at least one portion of the MA is contained within a super-PUMA (or super-PUMAs) that also contains territory outside of the particular MA.

> **Example 1.** Two-county MSA (containing county A and county B) with the only central city (as well as other noncentral city part) in county A. Super-PUMA 1 only contains county A and Super-PUMA 2 only contains county B. Super-PUMA 1 receives the code "13" indicating that it "contains only metropolitan territory both inside and outside central city (MSA part of fully-identified MSA)." Super-PUMA 2 receives the code "12" indicating that it "contains only metropolitan territory outside central city (MSA part of fully-identified MSA)."

> **Example 2.** Two-county MSA (containing county A and county B) with the only central city (as well as other noncentral city part) in county A. Super-PUMA 1 only contains county A and Super-PUMA 2 contains county B, plus a non-MA county. Super-PUMA 1 receives the code "23 " indicating that it "contains only metropolitan territory both inside and outside central city (MSA part of partially identified MSA)." Super-PUMA 2 receives the code "70" indicating that it "contains both metropolitan and nonmetropolitan territory."

It appears that the areas that we identify as "inside central cities" have more households and a higher homeownership rate than central cities as identified by the Census Bureau. According to HUD's State of the Cities Data System, 32.5% of households lived in central cities in 1990 and 31.0% in 2000. Our PUMS estimates are 37.6% and 35.9% respectively. The State of the Cities Data System reports a central city homeownership rate of 49.0% in 1990 and 50.5% in 2000. Our PUMS estimates are 54.17% and 57.65% respectively. This suggests that we have included some neighboring suburban areas in our "inside central cities" cells.