

The Changes in Young Households' Tenure Choice across Time:
Evidence from American Housing Survey

A thesis

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Yanting Zhou

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ADVISER: Jeffrey Zabel

Abstract

Despite the overall increase in the homeownership rate across decades, the U.S. housing market has seen a decrease among young households. This paper takes into account the investment value and consumption cost of a housing unit, as well as education, income, and other demographic factors to study the tenure choice process of young households. The study also adopts the Oaxaca Decomposition to decompose the difference in homeownership rate between time periods into coefficients and endowments effects to understand the real source of these changes.

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1. Introduction

Homeownership has been a vital component in defining the American Dream. Owning a home is generally associated with a more stable life, thus, is often favored by the government. The U.S. government has had a policy goal of increasing the homeownership rate for decades. (Stroebel and Floetotto 2010). Mortgage interest rates are subsidized by Fannie Mae^① (Federal National Mortgage Association), Freddie Mac^② (Federal Home Loan Mortgage Corporation) and Ginnie Mae^③ (Government National Mortgage Association). Tax rules, such as exempting imputed rents on owner-occupied housing from income taxation and the deduction of mortgage interest and property tax payments from property owners' taxable income, and not fully taxing the capital gains on real estate, have been directed at raising the attractiveness of owner-occupied housing.

At the same time, the housing tenure choice of young households have changed over time. U.S. Census data (Figure 1) shows that homeownership rates among young adults aged 25 to 35 declined continuously between the early 1980s and late 1990s. Between 2000 and 2005, young households' homeownership rate increased as did the

^① Fannie Mae, a government sponsored enterprises, whose function is to expand the secondary mortgage market by creating mortgage backed securities from bank's loans.

^② Ginnie Mae, a corporation wholly owned by the U.S. government, which guarantees mortgages made by banks so the banks can get a better price for the loans that they sell on the secondary market.

^③ Freddie Mac, a government sponsored enterprises, whose function is to buy mortgages on the secondary markets and pool them and sell them as a mortgage backed security to investors. The goal of Fannie Mae, Ginnie Mae and Freddie Mac is to free up the banks' capital so they can make more mortgage loans.

overall rate, but by less in older than that of the older age groups. Young people in the U.S. seem to be less willing to buy houses than they used to be. At least one study has found a similar trend in other developed countries (Scanlon and Whitehead 2004). Their study of households' tenure choice (Table 1) shows that while the percentage of owner-occupiers has continued to increase in recent years, the proportion of younger households entering owner-occupation are stable or falling.

Housing tenure choice is a subject that has been closely studied in the housing literature. Economic models of tenure choice assume that a household makes tenure choice decisions according to current and previous information about the household characteristics and housing market, information that often reflects the expectation and preference of the household.

Expectations influence people's tenure decisions. If a person expects the value of a house, the cost of renting, or his income to increase, he will be more likely to buy a house, and vice versa. However, the impact of expectation is short-term because people will change their expectations based on their information set about the housing market. For an example, a young household that prefers to buy a house in their 30s may delay entering owner-occupation for a few years because they expect price to fall. Preference, on the contrary, may change people's decision in the long-run. A young household that prefers to rent in their 30s may not buy a house until their 40s. People's social or demographical characteristics may reflect their preference towards owning or renting. These factors, include age, education, occupation, marital status,

race and immigration status, could change the way that people think about the tenure decision. Thus, if young households in different time have different characteristics, or value these characteristics differently, their preference for tenure choice may also change in the long-term.

Many studies have focused on the factors that reveal people's expectations. These factors include the owning cost (such as down payment, mortgage payment, interest rate, property tax, and maintenance cost) or renting cost (mainly rent), housing (either owning or renting) cost relatively to income, and potential capital gain from owning. By comparing the current level of these factors to the previous level, people will form expectations about future, and make tenure choice accordingly. These factors vary dramatically across countries, thus, are not likely to result in similar trends in multiple countries. Since the changes in housing tenure choice among young household are happening in many other developed countries (Scanlon and Whitehead 2004) that belong to different regions of the world, it is more reasonable to consider changes in preference to be the reason that have led to the decline in homeownership rate among young adults. Therefore, studying the changes in young adults' sociological or demographical characteristics, such as age, education, marital status and race, would be a good way to solve the problem.

In this paper, I use data from the American Housing Survey (AHS) to estimate the impact of different factors on young households' (people between 25 and 34) tenure choice. The estimates are given by the results of Tenure Choice Regression based on a

Logit model. As I defined, people's expectations are reflected by their income, house value and rent. Preferences are reflected by their education level, marital status, gender, race, and age.

One factor that changes young households' tenure preferences is the delay in household formation. Marriage is a common reason for people to purchase a home. Despite marriage rates having dropped 15 percent among young people between 1980 and 2000^④, there was not a dramatic decrease in the homeownership rate. A growing share of single home owners could be an explanation of this mismatch. Another aspect is that pursuing a higher education can delay the decision to own. Even though higher education has a positive impact on people's future income, it delays the time of receiving this income. Moreover, student loans can also be a burden, preventing people from paying the down payment on a house, and weakening their eligibility for tax deduction.

This paper also explores how young people's attitude towards homeownership changes over time. The data of this paper covers 1975, 1985, 1995 and 2005, and aims to study the changes over 30 years. One may expect there to be some difference in the mean of outcomes, which is the probability of owning, across time periods. According to Oaxaca Decomposition, this difference can be explained by two channels: differences in coefficients, and/or differences in endowments. The change in coefficients measures how people value the factor differently across time, and the

^④ Source: U.S. Census

change in endowment measures to what extent has the factor itself changed over time. This paper will use the Oaxaca Decomposition to decompose the difference in the mean of outcomes to understand the real source of the change in young households' tenure choice.

Housing tenure choice of young households has a long-term impact on the housing industry. Figure 1 suggests that the drop of young households' homeownership rate is always compensated by the increase of homeownership rate among other age group. Therefore, whether the current young households will catch up with the homeownership rate when they become the main purchasing power in their 40s could be a determinant of the trend in U.S. housing market. Studying their behavior can help anticipate the future trend of tenure choice after controlling for other changes in market conditions. Furthermore, the results of this paper will give very interesting insight into both economic and sociological aspects of tenure choice.

The rest of this paper will be arranged follows: 2 Literature review, 3 Models and how the models will help us understand the behavior of young households' tenure choice; 4 Data and how the key variables were obtained; 5 Regression results and explanations, and 6 Conclusion.

2. Literature Review

As I mentioned in the Introduction, people make their tenure decision according to information sets which reflects their expectations and Preferences. The impact of expectations has been intensively studied in the housing literature.

Goodman (1985) presented models of permanent income, housing price, tenure choice, and housing demand using data from 1978's Annual Housing Survey (which later became American Housing Survey). A major contribution of his work is the separation of the consumption and investment motives in the tenure choice decision, through the formulation of the owner-renter price ratios and value-rent ratios. These ratios are obtained by estimating separate hedonic price functions for renters and owners. The owner-renter price ratio is estimated at the regional level, while the value-rent ratio is estimated by the household level. Therefore, holding the price ratio constant, the value-rent ratio represents the investment potential of the unit. The estimated coefficient of owner-renter price ratio shows that when house prices increase relative to rents, people will be more likely to rent. Holding this ratio constant, the coefficient of value-rent ratio is positive, suggesting that an increase in the value of house relatively to the value of renting will result in a tendency to own.

One common belief in the housing literature is the dual role of housing as a consumption and investment good. Henderson and Ioannides (1983) built up a theoretical model to study how these two roles influence people's tenure choice. Their work suggests that with perfect certainty, owning housing stock does not differ from

holding any other asset, and renting along with equilibrium in asset holding was dominated by owning. With uncertainty in the picture, renting gains favor, and the choice of renting versus owning will depend on consumers' level of risk aversion.

The tenure choice decision is always related to income. However, few studies separate the income of a married couple into different labor income components to see if one income has more effect in the tenure decision than the other. Carter (2007) studies the tenure decision of dual income households, taking the second income of a household as endogenous to tenure choice. His result shows that failing to account for the endogeneity will result in underestimation of the influence of the second income on tenure decision.

Some scholars also conducted research to study how expectations change across time. Boehm and Schlottmann (2011) uses an extended continuous time probability model to examine the transition from renting to owning and subsequent possible transitions either back to rental or to another owned home across three decades from the 1970s to the 1990s. Their paper studies the impact of out-of-pocket housing cost and house price appreciation, and finds that in each time period, there exists a main factor that has the most significant influence on tenure choice: the change in the late 1970s was driven by house price appreciation, the change in the early 1980s was driven by the interest cost of mortgage lending, and the change in the 1990s was driven by increases in the alternative mortgage instruments including subprime alternatives.

If people form their expectations according to the information they have, then whether

their information is the same as the true condition in the housing market becomes very important in studying their tenure decisions. If their information is not complete, then using actual market data to study household behavior in the housing market is improper. According to Case, Shiller and Thompson (2012) based on their questionnaire surveys in 1988 and annually from 2003 to 2012, homebuyers are generally well informed, and their short-term expectation of home prices are very similar to the actual data. Another finding from their survey data shows that the opinions of buyers vary over time. This fact supports my claim in this paper that people's expectations only influence their tenure decisions in short-term.

On the contrary, changes in preferences may have a longer effect on people's tenure decision. Haurin and Rosenthal (2007) study the influence of family formation on homeownership rates across time and race. They examine their hypothesis on an age-specific basis using data from the 1970s to 2000, and find lower headship rates tend to reduce homeownership rates. This relation is the strongest among young people in their early or mid-20s. Besides, family formation has a different influence on people's tenure choice among different races. African American headship rate narrows the white-black gaps in homeownership while Hispanic headship rates widen white-Hispanic gaps in homeownership.

Race also affects the time when people transit into first-time homeownership according to Dawkins (2005). Despite the common belief that racial segregation has contributed to racial gaps in homeownership, the author argues that it is the

observable housing characteristics differences between black and white neighborhoods that contribute the most to the delay of black people's transition into homeownership. These differences are housing values, owner occupied unit concentrations, and central city location. Moreover, the racial differences in demographic and labor market characteristics are the main causes of the racial gap in homeownership transitions.

Changes in young people's demand for education may also change their tenure preference. One way that education influences young household's tenure decision is through student debt because students will have to pay back the loans before saving for their down payment for a home. Under the background of increasing tuition and fees in UK, Andrew (2010) studied British young adults' tenure choice using micro-simulation analyses. He finds that increased student debt levels and their interaction with lender-imposed borrowing restrictions delay young household's first-time homeownership.

From the literature survey, one can easily see that most of the studies on tenure choice focused on the expectation aspect of the question, and very few focused on the preference aspect. Moreover, most cross-year studies only estimate the coefficients of the relevant variables, but fail to explore how the average level of the explanatory variables changes across time. This study designed to provide a more comprehensive understanding of what factors have influenced the changes in young households' tenure choice decision over time by putting more emphasize on these two issues.

3. Model

3.1 Tenure Choice Regression

One of the main methods in this paper is the tenure choice regression, which models the relationship between marriage, education and other factors on young household's choice of owning or renting a house. The formula is as follow:

$$\begin{aligned} TENURE_{it} = & \beta_{0t} + \beta_{1t}lgY_{it}^P + \beta_{2t}lgY_{it}^T + \beta_{3t}PRICERATIO_{it} + \beta_{4t}VRATIO_{it} + \\ & \beta_{5t}Famsize_{it} + \beta_{6t}Black_{it} + \beta_{7t}Female_{it} + \beta_{8t}Mar_{it} + \beta_{9t}Age_{it} + \\ & \sum_j \gamma^{jt} Educ_{it}^j + \varepsilon_{it} \end{aligned} \quad (1)$$

where $TENURE_{it}$ represents household i 's tenure choice at time period t , lgY_{it}^P represents the log of household's permanent family income, lgY_{it}^T represents the log of household's transitory family income, $PRICERATIO_{it}$ represents the ratio of owning price to renting price which is constant within each SMSA and each time period, $VRATIO_{it}$ represents the ratio of imputed owning value to imputed rent which is constant within each household and each time period, $Famsize_{it}$ represents the number of people in the family, $Black_{it}$ is a dummy which equals 1 if the household head is black, $Female_{it}$ is a dummy which equals 1 if the household head is female, MAR_{it} is a dummy variable which equals 1 if the household head is married, AGE_{it} is a dummy variable which equals 1 if the household head age is between 30 and 34, and $EDUC_{it}^j$ is a set of dummy variables measuring the education level of the householder.

Three important control variables in equation (1) are the householder's permanent income, lgY_i^p , the price ratio, $PRICERATIO_{it}$, and the value ratio, $VRRATIO_i$.

3.2 Permanent Income Regression

Permanent income is essential in estimating housing choice. This paper adopts the *Human Capital Model* in Goodman (1988)'s study. Goodman used this model to predict the permanent income of the household head, where permanent income is a function of human capital assets (such as age, education or training) and nonhuman assets (such as geographic difference). However, in this paper, I use a similar model to predict the permanent income of the household. This is because family income, rather than household head income, should have more power in explaining the tenure choice decision. The formula of this model is as below:

$$\begin{aligned} \lg Y_{it} = & \alpha_{0t} + \alpha_{1t} \text{NUMINC}_{it} + \alpha_{2t} \text{Black}_{it} + \alpha_{3t} \text{Female}_{it} + \alpha_{4t} \text{MAR}_{it} + \\ & \alpha_{5t} \text{AGE}_{it} + \sum_j \gamma^{jt} \text{EDUC}_{it}^j + \sum_l \mu^{lt} \text{SMSA}_{it}^l + \epsilon_{it} \end{aligned} \quad (2)$$

where NUMINC_{it} represents the number of people who have income in household I at time period t, SMSA_{it}^l is a set of dummy variables measuring the SMSA that the household lives in. The dependent variable $\lg Y_{it}$ is the log of current income. According to the *Human Capital Model*, the log of permanent income $\lg Y_{it}^P$ is the fitted value of the above regression, and the transitory income $\lg Y_{it}^T$ is the residual of the same regression.

3.3 Price Ratio and Value Ratio

The price ratio is a factor that can be treated as the relative owning cost to the renting cost. When households make tenure decision, they often consider the relative price of owning versus renting. The owning or renting price of a housing unit is often

considered the same within a certain area. This is because mobility within metropolitan areas is easy relative to mobility among metropolitan them. In this paper, I treat the price to be constant within each SMSA, as SMSA defines the smallest region that the AHS National Survey provides. The first step of estimating the price ratio is to estimate the hedonic price function for owners and renters separately:

$$V_{it} \text{ or } R_{it} = \rho_{0t} + \mathbf{H}_t' \boldsymbol{\rho}_t + \sum_l \mu_t^l \text{SMSA}_{it}^l + u_{it} \quad (3)$$

where V_{it} and R_{it} represent the owning value and the rental value of the house respectively, \mathbf{H}_t is a vector representing all kinds of house characteristics.

The second step is to plug in the mean value within each SMSA to the estimated function in step 1:

$$V_{it}(l) \text{ or } R_{it}(l) = \rho_{0t} + \mathbf{H}_t' \boldsymbol{\rho}_t + \mu_t^l \text{SMSA}_{it}^l \quad (4)$$

Therefore, the price ratio should be obtained by

$$\gamma_{ir} = V_{it}(l) / R_{it}(l) \quad (5)$$

The value ratio ψ_i is a factor that can be treated as the relative investment value of owning to renting. This factor is unique within each unit in each period. Since the value of asset is related both to the stream of services that it produces and to the expected capital gain to its owner, the calculation of housing value must take these two factors into account.

According to Goodman (1985), in equilibrium, V_i , the value of an owner-occupied unit i yields y_i units of housing services per year is:

$$V_i = Dy_i + D'\tau_i V_i + D(X_i - t_i V_i) \quad (6)$$

where D and D' are discount factor for the stream of services and capital gains separately, and τ_i is the expected capital gain rate. X_i is the dollar value of local public goods and t_i is the property tax rate.

Solving for V_i :

$$V_i = D(y_i + X_i)/(1 + Dt_i - D'\tau_i) \quad (7)$$

Consider a renter-occupied housing that provide the same amount of services and public good, but does not have potential capital gains. R_i , the rent value can be written as:

$$R_i = y_i + X_i \quad (8)$$

Therefore, the Value Ratio is only a function of capital gain rate and property tax rate as shown below:

$$\psi_i = V_i/R_i = D/(1 + Dt_i - D'\tau_i) \quad (9)$$

However, data on the owning value and the renting value of a house in the same period is very hard to get because a household head only reports renting price if he is a renter, and vice versa. Therefore, this paper uses the hedonic price regression estimated in (4) to obtain the imputed rent and the imputed owning value.

For renters, the imputed owning value is obtained by substitute his value into the owner's hedonic price function. To make the numerator and denominator comparable, imputed rent, which is the fitted value of the renter's hedonic price function, is used instead of the real rent to calculate the renter's value ratio. For an owner, imputed renting value is obtained by substitute his independent variables into the renter's hedonic price function. Again, the imputed owning value is used instead of the real

owning value to calculate the owner's Value Ratio. The Value Ratio is then determined by:

$$\psi_i = \hat{V}_i / \hat{R}_i \quad (10)$$

3.4 Oaxaca Decomposition

Another main method of this paper is the *Oaxaca Decomposition*. The aim of this paper is not only to find how factors influence young households' tenure choice, but also to find how the impact of these factors changes across decades. However, a simple comparison of the coefficients of different regressions can only give an ambiguous indicator about the cause of the changes. Therefore, Oaxaca Decomposition is used to analyze the changes from both the endowment and coefficient sides.

The impact of a designated social change on young households' tenure choice across decades can be explained by a gap between the mean of the dependent variable in different times. Typically, there are two channels, through which the designated factor has impact on the outcomes. The two channels are: (1) changes in the designated factor (education, marriage and moving mobility) across time which is often phrased as the 'Endowment', and (2) changes in how young people value this factor in their tenure choice function, which is reflected in the 'coefficient' of the tenure choice regression. Taking education as an example, here is an example of how a change in Endowment leads to a change in the outcome.

Assume that at all times one more year education on average will increase the

possibility of buying a house by 5%, in 1985, young people have an average education of 15 years, and in 1995 the average education length increase to 16 years. Controlling for other factors, the additional year of education in 1995 should cause young people in that period to be 5% more likely to buy a house than young people in 1985.

An example of how difference in coefficient may lead to a change in the outcome is as below.

Assume that at all times young people have an average education length of 15 years, in 1985, one more year of education on average increases the likelihood of buying a house by 5%, and in 1995, one more year of education on average will increase the likelihood of buying a house by 6%. Controlling for other factors, the likelihood of buying a house among young people in 1995 is 15% higher than it is for the same age group in 1985.

The Oaxaca Decomposition (Oaxaca, 1973) is a method to isolate the effects from differences in the coefficients and effects from the differences in the endowments. Suppose Y is our outcome of interest, young people's tenure choice, and we are going to estimate the decision making mechanism in year 1985 and year 1995, and Y is explained by a vector of determinants, X . Then, the model can be represented as follows:

$$Y = \begin{cases} \beta_{95}X_{95} + \varepsilon_{95} & \text{if year} = 1995 \\ \beta_{85}X_{85} + \varepsilon_{85} & \text{if year} = 1985 \end{cases} \quad (7)$$

where the vector β includes intercept and the coefficient of a single-variable

regression. I then apply this model to the scenario discussed above, where we are trying to estimate the impact of education on tenure choice across time. As shown in figure 2, the equation for 1995 will have a steeper regression line than the equation for 1985 by construction. The young people in 1985 should have a lower mean value of the probability of entering owner-occupied housing than those in 1995.

The effect that this paper is interested in analyzing is the difference between the mean of Y_{1995} and Y_{1985} , which can be measured by $\bar{Y}_{95} - \bar{Y}_{85}$. From Figure 1, it is clear that

$$\bar{Y}_{95} - \bar{Y}_{85} = d_1 + d_2 + d_3 \quad (8)$$

where

$$d_1 = \beta_{95}(\bar{X}_{95} - \bar{X}_{85}) - \beta_{85}(\bar{X}_{95} - \bar{X}_{85}) = \Delta\beta\Delta X$$

$$d_2 = d_4 = \beta_{95}\bar{X}_{85} - \beta_{85}\bar{X}_{85} = \Delta\beta\bar{X}_{85}$$

$$d_3 = \beta_{85}\bar{X}_{95} - \beta_{85}\bar{X}_{85} = \beta_{85}\Delta X$$

Thus, the gap between \bar{Y}_{95} and \bar{Y}_{85} can be measured by:

$$\bar{Y}_{95} - \bar{Y}_{85} = \Delta\beta\bar{X}_{85} + \beta_{85}\Delta X + \Delta\beta\Delta X = C + E + CE \quad (9)$$

Therefore, the gap in mean outcomes can be thought of as deriving from a gap in education level, a gap in coefficients and a gap arising from the interaction of the education level and the coefficient. More generally, the gap between the two time groups can be explained by: (1) a gap in the endowments, (2) a gap in the coefficients, and (3) a gap arising from the interaction of endowments and coefficients.

This paper uses another way to decompose the difference, which can be obtained from

equation (7):

$$\begin{aligned}\bar{Y}_{95} - \bar{Y}_{85} &= \Delta\beta\bar{X}_{85} + \beta_{85}\Delta X + \Delta\beta\Delta X \\ &= \Delta\beta\bar{X}_{85} + (\beta_{85} + \Delta\beta)\Delta X \\ &= \Delta\beta\bar{X}_{85} + \beta_{95}\Delta X = C + E\end{aligned}\tag{10}$$

4 Data

The data used in the empirical model is derived from the American Housing Survey (AHS), covering the years 1975, 1985, 1995 and 2005. The AHS is sponsored by the Department of Housing and Urban Development (HUD) and conducted by the U.S. Census Bureau.⁵ The AHS provides a wide range of housing and housing related information. The physical condition of housing units, characteristics of occupants, housing cost and housing value are several categories that this paper draws its variables from.

The two surveys of AHS, Metropolitan Survey and National Survey are conducted separately before 2007. The samples of the National Survey are selected from all SMSA, which is defined by metropolitan areas over 100,000 in population, while the Metropolitan Survey provides larger samples on each of 29 selected Metropolitan areas. Because the object of this paper is to study young households' behavior nationwide, the National Survey is more suitable for the purpose of this paper.

Housing units participating in the AHS have been selected to represent a cross section of all housing in the nation. Each unit in the AHS national sample represents about

⁵ Part of the information about the American Housing Survey comes from the website of U.S. Census Bureau: <http://www.census.gov/housing/ahs/>

2,000 units in the United States. It follows the same units every two years until new samples are added. The Census Bureau updates the sample by adding newly constructed units and units discovered through coverage improvement. Table 2 presents the definition of variables and Table 3 presents the mean and standard deviation of variables.

4.1 Restrictions to the Sample

To meet the objects of this paper, some restrictions have been made to the sample. The age of the household head has been restricted between 25 and 34, as this paper aims to study the tenure choice of young households. Observations on mobile homes, condos, vacant housing units, and any tenure status other than owning and renting are also excluded from the sample.

4.2 The consistency of data across years

Over the years, several major changes in the survey sample and methodology may influence the consistency of the data. Between 1973 and 1981, the AHS was conducted under the name of Annual Housing Survey with a sample size of 60,000 housing units. This is the period that the first sample of this paper, 1975, was drawn from. After 1981, Annual Housing Survey became biennial because of budget constraints, and changed to its current name. The national sample also underwent a redesign, and decreased to 47,000 housing units in 1985, which is the second sample of this study. From 1985 and on, there is no major change in the sample design, despite some difference in the questionnaires and the record methods.

The historical changes in AHS indicate that the samples from 1975 and 1985 and on may not be compatible. Besides, inflation has made all nominal variables to be inconsistent across years. In this paper, I have made some adjustments to standardize some of the variables.

The neighborhood rating and the house rating represent scores of the neighborhood and house rating by the household head. From 1975 to 2005, the scale of this variable has changed from 1-4 (4 is the highest rate) to 9-1 (1 is the highest rate). In order to make them compatible, I standardized these two variables with the mean of 0 and standard deviation of 1.

The house value, rent cost, household income and household head income are four variables that are not comparable due to the inflation. Therefore, the CPI deflation is used to put these variables in real terms (2005 is the base year). The CPI deflator is obtained from the website of U.S. Bureau of Labor Statistics[®].

There are also differences in how the AHS records the age and education level of the household members. Pre-1985, data on age is only provided in a 5 year interval, while post-1985 the exact age is provided. Therefore, a dummy variable has been generated to represent whether the observation is in the 30-34 group or the 25-30 group. Dummy variables representing different education level have also been created to control for the nonlinearity in education.

4.3 Controlling for missing variable

[®] Website of U.S. Bureau of Labor Statistics: <http://www.bls.gov/cpi/>

In the hedonic price regression, several variables of the housing unit's physical conditions and structure have been included as explanatory variables. These variables often have a significant amount of missing values. If dropped from the sample, they could significantly reduce the total observations of this study. A solution to this problem is to generate a missing variable flag for each of these variables. A missing variable flag is a dummy variable that equals 1 when its corresponding variable has a missing value for the same observation, and equals 0 if it is not missing. After generated the flags, the missing observations can be replaced by 0, and will not be automatically dropped out in the regression.

After the regression, if insignificant coefficients of the flags are observed, then the missing value can be viewed as randomly missing, and this does not influence the estimation of other coefficients.

4.4 Variables in the Hedonic Price Regression

The factors that decide the value of a unit should be different from the factors that decide the rent. Due to the design of the hedonic price regression, however, the two regressions should include the same variables on the right hand side. Therefore, I have to drop some of the variables that might have a significant influence in either regression. For examples, the lot size may be relevant to both the owning value and renting value, while real estate tax is only relevant to the owning cost. However, the AHS only provides the values of these variables for owner occupied houses.

Neighborhood quality is a very important variable in predicting house value or rent.

The most relevant measure provided by the AHS is the neighborhood rating, which is a score of the neighborhood given by the household head. However, this variable is biased because people self-selected into their neighborhood. The poorer the neighborhood, the more likely that people will over rate their neighborhood quality. A way to solve this problem is to find a proxy for the neighborhood quality. Commonly, people choose their community according to their income. A household with a higher income will be more likely to live in a better neighborhood. Therefore, income should be a good proxy for the neighborhood quality.

The Renting Price and Owning Price is a pair of variables resulted from the hedonic regression. For owner occupied housing in each SMSA, I plug in the mean value of all explanatory variables to the owner's hedonic price function, and obtained the owning price. For renter occupied housing, I plug in the mean value of all explanatory variables to the renter's hedonic price function, and obtained the renting price within each SMSA.

The Predicted Value and Predicted Rent is another pair of variables resulted from the hedonic price regression. For owner occupied housing, Predicted Value is the fitted value of the owners hedonic price regression, and Predicted Rent is the predicted value obtained by substitute the owner's values into the renter's hedonic price regression, and vice versa, for renter occupied housing.

After predicting the four variables, they are all taken exp

4.5 Variables in the Tenure Choice Regression

Two of the most important controls in the tenure choice regression are the Price Ratio and the Value Ratio. These are calculated as:

$$\text{Price Ratio} = \frac{\text{Owning Price}}{\text{Renting Price}}$$

$$\text{Value Ratio} = \frac{\text{Predicted Value}}{\text{Predicted Rent}}$$

A household should be less likely to buy a unit if it is expensive, controlling for other factors, and should be less willing to rent a unit if the rent is high. Therefore, theoretically, the Price Ratio should have a negative impact on young households' buying decisions. After controlling for the Price Ratio, the Value Ratio represents the investment value of a housing unit. Therefore, households should be more willing to buy if the owning value increases relative to the renting value. The Value Ratio should have a positive impact on young households' tenure decision. It is possible that the renters and owners have different Value Ratios. However, the Figure 3 shows that their Value Ratio is comparable.

Another important control is the permanent income of a household. Instead of current income, households make tenure decisions according to the permanent income which measures the long-term income. Buying or renting a house is not a one-time transaction of money, but rather a long-term investment which requires mortgage payment or rent payment in future periods of life. Therefore, when making tenure decisions, households have to take into account their ability to pay in the future, which could be reflected by their permanent income. The permanent income should have a positive influence on young people's choice of entering owner occupation.

Education level is one of the factors that could have a different influence on young households, compared with other age groups. I expect education to have a positive relation with tenure choice when the education level is below graduate school. Graduate education is expected to have a negative effect on young household's buying decision. One of the reasons is that having graduate education will delay income to the later part of people's life. As Andrew (2010) argues, the delay of income will result in lender-imposed borrowing restrictions, and the student loan could decrease the young household's disposable income as well. However, in the regression, the income effect of having graduate education is control by including permanent income in the Tenure Choice Regression. Therefore, the effect left out measures to what extent education delays the time of settling down or how education changes people's preference of owning.

5 Results

5.1 Permanent Income Regression

The purpose of the permanent income regression is to compute permanent household income. Table 4 shows the results of the permanent income regression, where the samples are limited to young households (household head age between 25 and 34). The estimates of the coefficients are biased because of omitted variables. In particular, ability is not included. However, as long as this regression is only used to predict the fitted value, it could still produce a good proxy of the permanent income. From the results, we can also observe that all factors have the expected influence on household income: education, marriage and number of income earners in the family have

positive impacts on household income, while the household head being black or being female has a negative impact. The dummy variable Central city has picked up an interesting effect. Living in the suburb or in the central city of an SMSA shouldn't impact a family's income, but the regression results show a quite significant and negative effect of living in central cities. The effect could be explained by the fact that rich are more likely to live in the suburbs. Statistics^⑦ of 2000 show that more than 19 percent of people living in central cities are poor, while just 7 percent of people in suburbs live in poverty. The traditional explanation of urban poverty is that the income elasticity of demand for land is too low for the poor to live where land is cheap. However, Glaeser, Kahn, and Rappaport (2008) suggest that a better access to public transportation in the central cities is the main reason that city centers are more appealing to the poor.

Instead of household income, Goodman (1985) used household head's income as dependent variable. To make my results of the young household more comparable to Goodman's overall results, the Permanent Income Regression which uses the household head's income is estimated in Table 5. Compared to Table 4, one important change is the coefficient of Number of income earners. The number of income earners has a negative relationship with household head's income in Table 5. This is because one of the most important reasons for a household to have multiple earners is because the income of the primary earner is not enough.

^⑦ Source: Glaeser, Kahn, and Rappaport 2008

5.2 Hedonic Price Regression

The purpose of hedonic price regression is to predict the renting price, owning price, imputed rent and imputed owning value. Table 6 and Table 7 show the results of the Hedonic Price Regression for owners and renters separately. The housing prices and values do not depend on the age of the household head or any other demographic characteristics of the household. Therefore, including all age groups in the hedonic regression should not bias the result, and adds observations to estimate a more reliable hedonic function for each SMSA.

There are two ways to interpret these results: the first one is to compare across years and the second one is to compare among different tenure status. From the first way, it can be observed that certain characteristics lost importance to the household through the decades. For example, having electricity in the kitchen and an air conditioner are more valuable in the 1970s than they are in the 2000s. This is possibly due to the fact that improvements in living condition have made these features available to almost every household.

From the second way, the unit size and living in the central city obviously have different influence on owning value and renting value. A 1% increase in the unit size of an owner occupied house will lead to about a 0.20% increase in the value, while the same increase of a renter occupied house will lead to less than a 0.08% increase in the value. Housing units that are located in the suburbs have more value to an owner than the ones located in the central city, while renters do not care much about this

characteristic. Other than the above two exceptions, renters and owners value a housing unit with quite similar standards. Put it in another way, having a different living environment will not be a reason that a young household choose to enter owner-occupied housing.

5.3 Tenure Choice Regression

Table 8 shows the result of the tenure choice regression given by a Logit model. The influence of each variable is shown in elasticity form. One surprising outcome is the regression results in 1975. Almost all the coefficients estimated in 1975 regressions are dramatically different from those of 1985, 1995 and 2005. This is possibly due to the fact that the AHS redesigned the survey and changed the sample between 1975 and 1985. Therefore, I consider the results from 1985, 1995 and 2005 to be more comparable with each other.

Another unexpected outcome is the influence of transitory income. According to Goodman (1988), ‘transitory income may not be significant in the tenure choice decision since home purchase typically entails substantial transaction costs that might not be covered by transitory income.’ However, the results in Table 8 indicate that transitory income has at least the same influence as permanent income has on tenure decisions. Holding other variables constant, the elasticity of the permanent income to the probability of owning is 0.61, which means a 1% increase in permanent income will lead to a 0.61% increase in young household’s probability of buying a house, whereas the elasticity of transitory income is 0.80. In 1995, the elasticity is 0.62 for

permanent income and the 0.64 for transitory income. In 2005, the elasticity is 0.42 for permanent income and 0.47 for transitory income. Goodman (1988) showed that the impact of transitory income was about one tenth of the impact of permanent income (marginal effects are 0.08% vs. 0.007%). One possible explanation of this difference could be the different measures of permanent income between Goodman's study and this paper. To exclude this factor from my analysis, Table 9 shows the regression result of Tenure Choice Regression using the permanent income of household head. The influence of transitory income, though has become smaller, is still on the same level of the influence of permanent income. Therefore, according to the result in Table 8, Table 9 and Goodman (1985)'s study, young households is more short-sighted than older age groups since they rely more on transitory income when making tenure decisions.

Besides, the elasticity in 2005 is significantly lower than those of 1995 and 1985. If associated this difference with the housing run-up in the early 2000s, a plausible explanation could be that the potential capital gain from owning a house off-set young households' concern about their ability to pay back mortgage. This result could also be related to the subprime mortgage crisis in 2008. Before the housing market peaks in 2006, banks issued subprime mortgages to less qualified borrowers. The increasing access to the subprime mortgages makes young household with lower income to be able to finance their house. However, all the elasticities are less than one, which suggests that the owning decision is inelastic to income.

Price Ratio, as we expected, has negative influence on young households' tenure decisions. The elasticity of Price Ratio to the probability of owning is -4.14, which means a 1% increase in the Price Ratio will result in a 4.14% decrease in the probability of owning. The elasticities for 1995 and 2005 are -2.41 and -4.37 respectively. Value ratio does not fail our hypotheses of having a positive effect on young households' owning decisions either. The elasticities of Value Ratio to the probability of owning are 2.73, 1.85 and 3.41 for 1985, 1995 and 2005 separately. Elasticities of Price Ratio and Value Ratio are all larger than 1 (absolute value), which suggests that owning decision is elastic to these two factors. However, the elasticities of Price Ratio are always larger than those of Value Ratio (absolute value), which indicates that young households value the consumption cost of the housing unit more than the investment value when making tenure decisions.

Female led households become similar to male led household when making tenure choice. In 1975, the partial elasticity of female led young households to the probability of owning is 4.5, which means on average, a female led young household is 4.5% less likely to buy a house than male led household is. However, in the following decades, result show that the difference between female led households and male led households becomes insignificant. Combining these effects with the effects of marriage, whose partial elasticity have dropped from 0.43 to 0.13, a possible explanation could be the increase in young single home buyers has increase young single women's probability of owning.

Table 7 also shows that from high school to college, an increase in the education level will increase the probability of owning a house between aged between 25 and 34 relative to household head with no high school degree. However, the graduate education may not have a positive impact in entering owner-occupied housing, or even make young household to be less likely to buy a house than college graduates. This result is consistent with the previous hypothesis in this paper that graduate education may have negative effects on young households' owning decisions.

Ceteris paribus, black young household are about 8 percent less likely to buy a house than non-black household; households with household head age between 30 and 34 on average are 17% more likely to be a house owner.

5.4 Oaxaca Decomposition

The Tenure Choice Regression tells us mainly about how each factor influences young households' decision of owning, while the result of Oaxaca Decomposition focuses more on how these factors determine the difference between each time periods.

Table 8 and Table 9 show the results of the Oaxaca Decomposition of two groups: 1985 and 1995 group, and 1985 and 2005 group. As I mentioned in the last section, the regression results of 1975 and other years are not comparable. Thus, I do not include 1975 in this part. The base is year 1985 in both groups. Raw differences indicate the difference between the means of outcome variable, tenure choice. The raw difference is then decomposed into two parts: the difference due to endowment

and the difference due to coefficients. A further breakdown ties a fraction of the endowment difference or coefficient difference to each explanatory variable. The raw differences of the tenure choice are -3.9% and -4.3% for group 1995 and group 2005. This means that compared to 1985, on average, young households in 1995 are 3.9% less likely to buy a house, and young households in 2005 are 4.3% less likely to buy. From 1985 to 1995, the difference due to endowment contributes -0.7% to the raw difference, which means 0.7% out of 3.9% of the difference in the outcome of interest is resulted from the changes in the value of independent variables. The difference due to coefficient contributes -3.1% to the raw difference, which means 3.1% out of 3.9% of the difference in the outcome of interest is resulted from the changes in the value of the coefficients. From 1985 to 2005, difference due to endowment contributes -11% to the raw difference, and difference due to coefficient contributes 6.2% to the raw difference.

A summary of the changes in endowment and/ or coefficients comparing to their contribution to the raw difference is presented in Table 10. Column Type indicates whether the change listed in the same row is a change in the endowment or coefficient. Column Change listed the actual change in the mean of endowment or the change in coefficients. Column Contribution listed the contribution of the change in endowment or coefficient to the overall probability of owning a house.

The result of the Oaxaca Decomposition shows that some of the changes across years have resulted from a pure increase or decrease of the endowments, such as the

influence of race, age, marriage and education. An example of explaining these changes is as follows: From 1985 to 1995, the percentage of married young household heads drops 5%, which contributes to a 0.52% decrease in the probability of owning. From 1985 to 2005, the same percentage drops 12%, which in turn results in a 2.1% decrease in the probability of owning. This result reinforces my previous claim that marriage has become a less important factor when young adults consider buying a house, and the marriage rate is decreasing over time.

Table 10 shows that the changes in education have contribute to the change of young household's preference towards owning. The changes in coefficients (how people value education in their tenure decisions) are not the source of changes in tenure preference, but rather the changes in endowments (average education level) have changed young households' tenure decision. From 1985 to 1995, the percentage of young household heads with high school degree decreased by 9%, which leads to a 0.56% decrease in the homeownership rate. However, from the 10% increase in the percentages of young household heads with college education (includes some college and college graduates), it is reasonable to believe that most of the decrease in the percentage of high school graduates is resulted from a shift to college education. The difference between 1985 and 2005 also support this claim, where the decrease in high school graduate equals the increase in people with college education. Moreover, the decrease in homeownership resulted from decrease in high school graduate is partially offset by the increase in homeownership brought by the increase in people with college education.

The graduate education however, is a whole different story. From 1985 to 1995, the 2% increase in the percentage of masters does not have a significant influence in the homeownership rate, while the 7% decrease in the percentage of Ph.D. leads to a 0.75% increase in the homeownership rate. From 1985 to 2005, though the 5% increase in the percentage of master has a positive influence in homeownership rate, the 7% decrease in the percentage of Ph.D. does not have a significant influence. Therefore, the result of Oaxaca Decomposition is consistent with my previous result in the Tenure Choice Regression that graduate school may not have or have a negative effect on homeownership rate.

Pure changes in the endowment only account for part of the overall change in the tenure choice. Most of the changes are due to combinations of differences in endowment and coefficient. These two changes can reinforce or cancel out each other when acting in the same or opposite directions.

As shown in Table 10, income becomes less important for young households to make tenure decisions. From 1985 to 1995, though the endowment of income (average log of current income) increases by 0.1, it results in a 0.87% decrease in the owning probability. Moreover, the coefficient of current income drops 0.05 in the same period and enhances the decrease in owning probability by 99%. Similar situation happened in the comparison between 1985 and 2005. This results about the influence of income on young households' tenure decision is unexpected, it shows that though income has a positive effect on young people's owning decision, this influence is decreasing.

The endowments of Value Ratio have increased by 11.56 and 61.77 in 1995 and 2005 compared to 1985. The increases in endowments contribute 2.9% and 28% to the owning probability in the same period. On the other hand, the coefficients of value ratio have decreased by 0.0019 and 0.0009 in 1995 and 2005. The decreases contribute -56% and -13% to the owning probability. The decrease in the coefficients and their corresponding effect on homeownership rate shows that the importance of the investment value of a housing unit decreases compared to 1985. However, the housing run-up in the early 2000s has made the investment value (endowment of the Value Ratio) so high that the changes in endowments offset the changes in coefficients, and the overall influence of the changes in Value Ratio on homeownership rate is positive from 1985 to 2005.

The endowments of Price Ratio have increased by 13.47 and 66.85 in 1995 and 2005 compared to 1975. The increases contribute -3.2% and -35% to the owning probability in corresponding years. Meanwhile, the coefficients of price ratio also increase by 0.0033 and 0.0025, which contribute 97% and 37% to the owning probability. The changes in the Price Ratio has increase the homeownership rate among young households, but it still have a negative effect on people's owning decision according to the Tenure Choice Regression. This means that the consumption cost of a housing unit becomes less appealing to young households.

6 Conclusion

This paper identifies the factors that influence young households' tenure choice

through different channels:

High school education and college education always increases young households' probability to own. On the other hand, graduate education has no effect or negative effect on their propensities to own. Education changes people's tenure choice because more young people are getting higher degrees, not because they value education differently than in the past. Some young households seem to delay the first time homeownership later in their lives as they choose to have graduate education first.

Female-headed young households used to be less likely to buy a house than male-headed households. However, these two kinds of households become very similar in making tenure decisions in recent years, and part of this change could be explained by the change in marriage. Not only does marriage rate among young household drops significantly, but the young people also start to consider marriage as a less important reason to buy a house. Therefore, the ratio of single household head increases, which ultimately changes female's owning ratio. Policies favoring single home buyer could be a good stimulus for the cold housing market in the future, as many of the tax rules today favors married homeowners.

Incomes, no matter in which forms, always have a positive impact on a young households' owning decision, Though the role of income has become less important, especially when the housing market is hot and young adults are expecting higher housing price in the future. This could be a result from the availability of more finance options, and lenders' willingness to issue subprime mortgages in hot market.

Further study is needed to support this idea. However, this could also increase the possibility that young households with less income cannot payback their mortgages, thus, results in more risk in the housing market and mortgages backed securities. Meanwhile, taking into account permanent income and transitory income, young households consider these two factors to have the same importance when making tenure decisions. This result suggests that they are short-sighted compared to other age groups[®].

The consumption cost of a housing unit has a negative impact on a young households' owning decision, while the investment value has a positive impact. Young households value the consumption cost of a housing unit more than the investment value, though the importance of consumption cost is decreasing over time and the investment value is largely affected by the market condition.

[®] This comparison is based one Goodman's (1988) study.

Appendix:

Table 1: Comparison of Changes in Tenure, Young Households vs. Total

Country	Total			Young Households			Year of Data Sources
	Earlier year(%)	Lastest Year(%)	Annual % Change	Earlier year(%)	Lastest Year(%)	Direction of Change	
Slovenia	68	82	1.3				1991;2002
Australia	70	70	0	50	47	Down	1994;1999
UK	68	70	0.34	74	59	Down	1995;2002
USA	64	68	0.34	56	62	Up	1991;2002
Canada	63	66	0.32	47	47	Stable	1991;2001
Finland	71	64	-0.78	41	39	Down	1992;2001
France	54	56	0.13	21	17	Down	1990;2002
Sweden	55	55	0	45	46	Stable	1991;1997
Denmark	55	53	-0.13	23	20	Down	1990;1999
Netherlands	47	53	1.14	43	44	Stable	1993;1998
Germany	38	41	0.18				1987;2001

1. Source: Adopted from Scanlon and Whitehead 2004

Table 2 Definitions of Variables

Variable	Definition
centc	1 lives in central city, 0 not in
smsa	SMSA code
area1-area163	Dummy variable for each SMSA
tenure	1 the unit is owned, 0 if it is rented
rooms	the number of rooms in the unit
bedrms	the number of bedrooms in the unit
comkitch	1 has complete kitchen; 0 do not have
ckfuel	1 electricity used in cooking, 0 electricity does not used in cooking
water	1 has access to public provided water, 0 does not have
numbath	The number of bathrooms in the unit
htfuel	1 has heating fuel, 0 no heating fuel
aircond	1 has air conditioner, does not have
garage	1 has garage, 0 does not have
neighbt	Neighborhood rate given by house head, small number is better
houstr	House rate given by house head, small number is better
built	Years since the unit is built
crackhole	1 cracks or holes in the unit, 0 no cracks and holes
black	1 house head is black, 0 house head is other race
female	1 house head is female, 0 male
famsiz	Number of people in the household
date	The year of the data
hhmar	1 if the house head is married, 0 not married
hhage1	1 house head age between 30-34, 0 age between 25-29
hhage	Actual age of house head
somedu	1 some education but no college degree
highsch	1 hige school graduate
somcllg	1 some college
college	1 college graduate
master	1 master degree
phd	1 Ph.D or professional degree
numinc	Number of people that has income in the household
devalue	CPI deflated house value
deinc1	CPI deflated house head income
derent	CPI deflated rent
dezinc	CPI deflated household income
lgsf	Log of the square feet of the unit
prvalue	Imputed house value
prrent	Imputed rent
vrratio	Value-rent ratio unique within each household
priceratio	Price ratio unique within each SMSA

Table 3 Summary Statistics for Each Sampled Year

	1975		1985		1995		2005	
	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
centc	0.42	0.49	0.56	0.50	0.53	0.50	0.57	0.50
smsa	4490	2533	4447	2445	4300	2323	4663	2575
tenure	0.45	0.50	0.36	0.48	0.34	0.48	0.39	0.49
rooms	4.99	1.63	4.81	1.83	5.01	1.73	5.13	1.92
bedrms	2.34	0.95	2.25	1.00	2.25	1.04	2.36	1.06
comkitch	1.00	0.07	0.99	0.19	1.01	0.11	0.97	0.16
ckfuel	0.43	0.50	0.44	0.50	0.43	0.50	0.48	0.50
water	0.94	0.24	0.99	0.11	0.89	0.32	0.85	0.36
numbath	1.45	1.08	1.23	0.50	1.30	0.53	1.35	0.55
htfuel	0.99	0.10	0.99	0.11	0.98	0.14	1.00	0.07
aircond	0.54	0.50	0.30	0.46	0.29	0.46	0.30	0.46
garage	0.76	0.43	0.48	0.50	0.50	0.50	0.51	0.50
neigr	1.96	0.77	7.41	2.24	8.71	10.66	7.51	1.90
houstr	1.98	0.78	7.60	2.04	8.87	9.81	7.66	1.71
built	20.80	14.40	28.72	21.44	34.13	24.53	43.82	24.30
crackhole	0.08	0.27	0.11	0.31	0.08	0.28	0.07	0.25
unitsf	-	-	1378	840	1818	2069	1423	1341
black	0.14	0.35	0.17	0.37	0.17	0.37	0.18	0.39
female	0.20	0.40	0.32	0.47	0.39	0.49	0.48	0.50
famsiz	1.78	0.61	2.77	1.45	2.85	1.59	2.77	1.56
hhmar	0.69	0.46	0.54	0.50	0.49	0.50	0.42	0.49
hhage1	0.46	0.50	0.52	0.50	0.56	0.50	0.54	0.50
hhage	-	-	29.68	2.81	29.87	2.85	29.78	2.90
somedu	0.14	0.35	0.12	0.32	0.15	0.36	0.14	0.35
highsch	0.34	0.47	0.35	0.48	0.26	0.44	0.21	0.41
somcllg	0.23	0.42	0.22	0.42	0.28	0.45	0.27	0.44
college	0.15	0.36	0.19	0.39	0.23	0.42	0.28	0.45
master	0.04	0.19	0.03	0.17	0.05	0.23	0.08	0.27
phd	0.10	0.30	0.10	0.30	0.03	0.16	0.03	0.17
devalue	95,302	23,776	145,592	84,849	160,551	97,338	268,455	255,631
deincl	36,434	24,382	34,643	26,902	30,817	25,244	35,105	41,013
derent	582	261	664	290	725	286	830	477
dezinc	44,659	29,897	49,872	37,052	48,353	39,316	54,103	56,174
numinc	1.32	0.70	1.54	0.97	1.60	1.11	2.77	1.56
vrratio	138.11	24.66	159.95	37.27	171.51	68.77	221.72	106.53
pratio	135.13	13.11	164.70	33.29	177.17	58.47	231.55	100.31

1. neigr and houstr are on scale of 1 to 4 in 1975, and on scale of 1 to 9 in other years. Later regressions use standardized format to adjust for the difference.
2. Deflated values are included here to compare between different times. Later regressions use log form of the deflated values.

Table 4 Permanent Income Regression

	(1)	(2)	(3)	(4)
Variables	1975	1985	1995	2005
Num of earners	0.22*** (0.020)	0.19*** (0.011)	0.20*** (0.012)	-0.015 (0.014)
High school	0.32*** (0.036)	0.45*** (0.034)	0.42*** (0.042)	0.47*** (0.061)
Some college	0.41*** (0.038)	0.60*** (0.036)	0.57*** (0.041)	0.61*** (0.059)
College	0.57*** (0.041)	0.87*** (0.037)	0.82*** (0.043)	0.99*** (0.061)
Master	0.52*** (0.060)	0.83*** (0.063)	0.87*** (0.062)	1.01*** (0.078)
Ph.D	0.54*** (0.046)	0.87*** (0.043)	1.12*** (0.082)	1.09*** (0.11)
Age dummy	0.12*** (0.021)			
Head age		0.021*** (0.0035)	0.031*** (0.0044)	0.028*** (0.0059)
Black	-0.094*** (0.033)	-0.33*** (0.029)	-0.23*** (0.036)	-0.27*** (0.049)
Female	-0.41*** (0.036)	-0.22*** (0.024)	-0.18*** (0.027)	-0.25*** (0.035)
Marital status	0.23*** (0.032)	0.41*** (0.023)	0.45*** (0.027)	0.63*** (0.040)
Central city	-0.11*** (0.024)	-0.19*** (0.023)	-0.22*** (0.029)	-0.12*** (0.040)
Constant	9.45*** (0.16)	8.92*** (0.25)	8.97*** (0.38)	9.30*** (0.38)
Observations	4095	4897	4906	3233
R-squared	0.258	0.413	0.316	0.297

1. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
2. Age dummy is a dummy that equals 1 if house head is between 30-34, and head age is the actual age.
3. The regressions also include controls for each SMSA.
4. The independent variable is household income

Table 5 Permanent Income Regression (Goodman's Approach)

Variables	(1) 1975	(2) 1985	(3) 1995	(4) 2005
Num of earners	-0.064*** (0.021)	-0.050*** (0.013)	-0.063*** (0.013)	-0.050*** (0.016)
High school	0.29*** (0.037)	0.45*** (0.040)	0.31*** (0.044)	0.38*** (0.072)
Some college	0.38*** (0.039)	0.55*** (0.042)	0.45*** (0.043)	0.53*** (0.070)
College	0.52*** (0.042)	0.79*** (0.042)	0.71*** (0.044)	0.89*** (0.071)
Master	0.46*** (0.062)	0.76*** (0.069)	0.74*** (0.061)	0.94*** (0.089)
Ph.D	0.51*** (0.047)	0.81*** (0.048)	0.98*** (0.081)	1.00*** (0.12)
Age dummy	0.20*** (0.022)			
Head age	-0.11*** (0.034)	-0.27*** (0.032)	-0.19*** (0.037)	-0.082 (0.056)
Black	-0.39*** (0.037)	-0.32*** (0.026)	-0.29*** (0.027)	-0.39*** (0.040)
Female	0.17*** (0.033)	0.095*** (0.025)	0.077*** (0.027)	0.087* (0.046)
Marital status	-0.13*** (0.025)	-0.18*** (0.025)	-0.24*** (0.028)	-0.093** (0.046)
Central city		0.023*** (0.0038)	0.034*** (0.0043)	0.034*** (0.0068)
Constant	9.74*** (0.16)	9.56*** (0.29)	9.30*** (0.35)	9.18*** (0.46)
Observations	3995	4481	4281	2865
R-squared	0.189	0.244	0.222	0.188

1. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
2. Age dummy is a dummy that equals 1 if house head is between 30-34, and head age is the actual age.
3. The regressions also include controls for each SMSA.
4. The independent variable is the income of household head

Table 6 Owners' Hedonic Price Regression

	(1)	(2)	(3)	(4)
Variables	1975	1985	1995	2005
Log of head income	0.058*** (0.0034)	0.091*** (0.0063)	0.065*** (0.0057)	0.074*** (0.0095)
Num of rooms	0.036*** (0.0022)	0.051*** (0.0040)	0.059*** (0.0038)	0.065*** (0.0060)
Log of unit size	- -	0.23*** (0.014)	0.14*** (0.011)	0.22*** (0.023)
Complete kitchen	0.084 (0.076)	0.034 (0.064)	0.0038 (0.085)	-0.011 (0.28)
Electricity in kitchen	0.073*** (0.0059)	0.11*** (0.012)	0.10*** (0.012)	-0.0082 (0.024)
Public water supply	-0.024** (0.010)	-0.092*** (0.030)	0.0029 (0.022)	0.12*** (0.038)
Num of bathrooms	0.018*** (0.0019)	0.10*** (0.0092)	0.16*** (0.0094)	0.18*** (0.018)
Heating fuel	-0.077 (0.062)	-0.049 (0.11)	-0.030 (0.064)	0.58** (0.23)
Air conditioner	0.038*** (0.0061)	-0.0065 (0.015)	-0.034* (0.018)	-0.064** (0.029)
Neighborhood rate	-0.049*** (0.0035)	-0.076*** (0.0069)	-0.12*** (0.0073)	-0.078*** (0.015)
House rate	-0.043*** (0.0038)	-0.031*** (0.0075)	-0.023*** (0.0079)	-0.058*** (0.016)
House age	-0.0049*** (0.00024)	-0.0023*** (0.00036)	-0.00022 (0.00038)	-0.0016*** (0.00056)
Cracks or holes	-0.065*** (0.016)	-0.044* (0.026)	-0.12*** (0.028)	-0.020 (0.056)
In central city	-0.060*** (0.0063)	-0.099*** (0.013)	-0.099*** (0.013)	-0.071*** (0.027)
Constant	10.6*** (0.11)	8.43*** (0.20)	9.17*** (0.18)	7.95*** (0.46)
Observations	7543	7411	7263	6430
R-squared	0.537	0.574	0.594	0.423

1. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
2. The regressions also include controls for each SMSA and flags for missing variables
3. The hedonic price regression includes all age groups.

Table 7 Renters' Hedonic Price Regression

VARIABLES	(1) 1975	(2) 1985	(3) 1995	(4) 2005
Log of head income	0.060*** (0.0050)	0.097*** (0.0076)	0.054*** (0.0061)	0.091*** (0.0074)
Num of rooms	0.058*** (0.0036)	0.054*** (0.0063)	0.071*** (0.0045)	0.056*** (0.0064)
Log of unit size		0.081*** (0.016)	0.023*** (0.0076)	0.071*** (0.016)
Complete kitchen	0.18*** (0.048)	-0.077 (0.065)	-0.18*** (0.057)	-0.042 (0.041)
Use electricity in kitchen	0.091*** (0.012)	0.095*** (0.017)	0.061*** (0.014)	0.033* (0.020)
Public water supply	0.22*** (0.034)	0.16** (0.075)	0.0091 (0.018)	0.053** (0.023)
Num of bathrooms	0.11*** (0.0078)	0.12*** (0.017)	0.10*** (0.013)	0.14*** (0.021)
Heating fuel	0.12** (0.050)	0.029 (0.056)	0.054 (0.046)	0.28** (0.11)
Air conditioner	0.13*** (0.011)	0.0046 (0.018)	0.020 (0.016)	-0.067*** (0.020)
Neighborhood rate	-0.048*** (0.0053)	-0.024*** (0.0070)	-0.042*** (0.0062)	-0.053*** (0.0090)
House rate	-0.0049 (0.0053)	0.016** (0.0067)	0.013** (0.0061)	0.013 (0.0089)
House age	-0.0094*** (0.00039)	-0.0033*** (0.00044)	-0.0013*** (0.00039)	-0.0013*** (0.00041)
Cracks or holes	-0.024 (0.015)	-0.051** (0.022)	-0.024 (0.022)	-0.020 (0.030)
In central city	-0.017* (0.0099)	-0.057*** (0.016)	-0.021 (0.014)	0.00083 (0.019)
Constant	4.90*** (0.11)	4.35*** (0.20)	5.06*** (0.16)	4.42*** (0.28)
Observations	5946	3937	4358	4025
R-squared	0.464	0.404	0.433	0.326

1. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
2. The regressions also include controls for each SMSA and flags for missing variables
3. The hedonic price regression includes all age groups

Table 8 Tenure Choice Regression_Logit

VARIABLES	(1) 1975	(2) 1975	(3) 1985	(4) 1985	(5) 1995	(6) 1995	(7) 2005	(8) 2005
Log of current income	0.41*** (0.043)		0.78*** (0.052)		0.63*** (0.050)		0.47*** (0.052)	
Log of permanent income		-0.045 (0.14)		0.61*** (0.11)		0.62*** (0.095)		0.42*** (0.14)
Log of transitory income		0.47*** (0.046)		0.80*** (0.055)		0.64*** (0.052)		0.47*** (0.053)
Family Size	0.29*** (0.083)	0.40*** (0.088)	0.29*** (0.050)	0.31*** (0.052)	0.17*** (0.051)	0.17*** (0.053)	0.12* (0.062)	0.12* (0.063)
Price ratio	0.85*** (0.25)	0.67*** (0.26)	-4.12*** (0.27)	-4.14*** (0.27)	-2.41*** (0.23)	-2.41*** (0.23)	-4.38*** (0.29)	-4.37*** (0.30)
Value ratio	-0.98*** (0.15)	-0.94*** (0.15)	2.72*** (0.20)	2.73*** (0.20)	1.85*** (0.18)	1.85*** (0.18)	3.41*** (0.23)	3.41*** (0.23)
Black	-0.053*** (0.013)	-0.058*** (0.013)	-0.019 (0.012)	-0.027** (0.013)	-0.040*** (0.014)	-0.040*** (0.015)	-0.069*** (0.020)	-0.071*** (0.021)
Female	-0.045* (0.025)	-0.099*** (0.030)	-0.011 (0.021)	-0.023 (0.022)	-0.0041 (0.022)	-0.0050 (0.023)	0.0015 (0.029)	-0.0043 (0.033)
Age dummy	0.17*** (0.013)	0.19*** (0.014)	0.16*** (0.019)	0.16*** (0.019)	0.20*** (0.022)	0.20*** (0.023)	0.16*** (0.026)	0.16*** (0.027)
Marital status	0.37*** (0.040)	0.43*** (0.044)	0.10*** (0.028)	0.13*** (0.032)	0.14*** (0.023)	0.14*** (0.027)	0.13*** (0.018)	0.13*** (0.029)
High school	0.090*** (0.023)	0.14*** (0.027)	0.077** (0.034)	0.11*** (0.038)	0.073*** (0.024)	0.074*** (0.025)	0.066*** (0.023)	0.071*** (0.025)
Some college	0.078*** (0.017)	0.13*** (0.021)	0.053** (0.025)	0.082*** (0.030)	0.063** (0.029)	0.065** (0.032)	0.10*** (0.031)	0.11*** (0.037)
College	0.032*** (0.012)	0.076*** (0.017)	0.046** (0.020)	0.076*** (0.026)	0.046* (0.025)	0.048 (0.030)	0.090*** (0.034)	0.10** (0.047)
Master	0.0025 (0.0055)	0.014** (0.0060)	0.0019 (0.0054)	0.0069 (0.0059)	0.0013 (0.0081)	0.0019 (0.0092)	0.037*** (0.010)	0.041*** (0.014)
Ph.D	0.0066 (0.0088)	0.033*** (0.011)	0.000062 (0.012)	0.017 (0.016)	-0.013** (0.0066)	-0.013* (0.0072)	-0.0029 (0.0071)	-0.0011 (0.0084)
Observations	3940	3940	3142	3142	2938	2938	2332	2332

1. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

2. This table shows the elasticity of each variable

3. All Income variables are household income

Table 9 Tenure Choice Regression_Logit (Goodman's Approach)

VARIABLES	(1) 1975	(2) 1975	(3) 1985	(4) 1985	(5) 1995	(6) 1995	(7) 2005	(8) 2005
Log of current income	0.44*** (0.042)		0.55*** (0.044)		0.40*** (0.042)		0.27*** (0.037)	
Log of permanent income		0.64*** (0.16)		0.74*** (0.13)		0.50*** (0.11)		0.25*** (0.13)
Log of transitory income		0.43*** (0.042)		0.53*** (0.046)		0.39*** (0.044)		0.27*** (0.038)
Family Size	0.42*** (0.084)	0.44*** (0.084)	0.27*** (0.049)	0.28*** (0.049)	0.19*** (0.051)	0.19*** (0.051)	0.13** (0.061)	0.13** (0.063)
Price ratio	0.87*** (0.26)	0.97*** (0.27)	-4.17*** (0.27)	-4.14*** (0.27)	-2.46*** (0.23)	-2.45*** (0.23)	-4.50*** (0.29)	-4.49*** (0.29)
Value ratio	-0.96*** (0.15)	-0.97*** (0.15)	2.81*** (0.20)	2.80*** (0.20)	1.93*** (0.18)	1.92*** (0.18)	3.55*** (0.23)	3.55*** (0.23)
Black	-0.046*** (0.013)	-0.042*** (0.013)	-0.019* (0.011)	-0.011 (0.012)	-0.048*** (0.014)	-0.045*** (0.014)	-0.080*** (0.020)	-0.081*** (0.020)
Female	-0.043* (0.025)	-0.020 (0.030)	0.012 (0.020)	0.033 (0.024)	0.024 (0.021)	0.035 (0.024)	0.018 (0.029)	0.014 (0.037)
Age dummy	0.15*** (0.014)	0.14*** (0.019)	0.15*** (0.019)	0.14*** (0.020)	0.22*** (0.022)	0.21*** (0.024)	0.16*** (0.026)	0.17*** (0.027)
Marital status	0.37*** (0.041)	0.35*** (0.045)	0.22*** (0.026)	0.21*** (0.026)	0.24*** (0.020)	0.23*** (0.021)	0.19*** (0.016)	0.19*** (0.016)
High school	0.090*** (0.023)	0.069** (0.028)	0.098*** (0.033)	0.067* (0.038)	0.084*** (0.023)	0.077*** (0.024)	0.084*** (0.022)	0.086*** (0.024)
Some college	0.082*** (0.017)	0.065*** (0.022)	0.077*** (0.025)	0.050* (0.030)	0.088*** (0.028)	0.074** (0.032)	0.13*** (0.031)	0.13*** (0.035)
College	0.035*** (0.012)	0.019 (0.018)	0.070*** (0.019)	0.040 (0.026)	0.078*** (0.024)	0.062** (0.030)	0.13*** (0.032)	0.13*** (0.043)
Master	0.0034 (0.0054)	-0.00077 (0.0065)	0.0055 (0.0051)	0.00070 (0.0061)	0.0086 (0.0077)	0.0046 (0.0090)	0.046*** (0.0096)	0.048*** (0.013)
Ph.D	0.0100 (0.0087)	0.00013 (0.012)	0.016 (0.012)	-0.0010 (0.016)	-0.0083 (0.0062)	-0.011 (0.0072)	0.0043 (0.0064)	0.0050 (0.0076)
Observations	3940	3940	3142	3142	2938	2938	2332	2332

1. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

2. This table shows the elasticity of each variable

3. All income variables are income of the household head

Table 10 Oaxaca Decomposition_1985 vs 1995

VARIABLES	E	C	Summary	E	C	Summary
Log of permanent income				-0.016*** (0.0047)	-0.17 (0.76)	
Log of transitory income				0.0077*** (0.0017)	-0.0068** (0.0033)	
Log of current income	-0.0087*** (0.0018)	-0.99** (0.50)				
Family size	-0.00041*** (0.00016)	-0.079* (0.045)		-0.00041*** (0.00016)	-0.092* (0.048)	
Price Ratio	-0.032*** (0.0070)	0.97*** (0.31)		-0.032*** (0.0075)	0.98*** (0.31)	
Value Ratio	0.029*** (0.0061)	-0.56*** (0.21)		0.029*** (0.0066)	-0.57*** (0.21)	
Black	-0.00078** (0.00030)	-0.0055 (0.0062)		-0.00078** (0.00031)	-0.0023 (0.0066)	
Female	-0.00020 (0.0011)	0.0029 (0.010)		-0.00024 (0.0011)	0.0073 (0.011)	
Age dummy	0.0037*** (0.00079)	0.013 (0.018)		0.0037*** (0.00083)	0.0099 (0.019)	
Marital status	-0.0052*** (0.0015)	0.028 (0.026)		-0.0052*** (0.0016)	0.0100 (0.030)	
High school	-0.0056** (0.0025)	0.0086 (0.023)		-0.0057** (0.0025)	-0.0052 (0.025)	
Some college	0.0027* (0.0014)	-0.0022 (0.017)		0.0028* (0.0015)	-0.015 (0.020)	
College	0.0022* (0.0014)	-0.0078 (0.016)		0.0023 (0.0015)	-0.024 (0.021)	
Master	0.00014 (0.00090)	-0.00059 (0.0034)		0.00020 (0.0010)	-0.0029 (0.0040)	
Ph.D	0.0075*** (0.0026)	-0.021* (0.011)		0.0072** (0.0033)	-0.030** (0.014)	
Difference due to endowment			-0.0076 (0.0051)			-0.0074 (0.0053)
Difference due to coefficient			-0.031*** (0.012)			-0.031** (0.012)
Raw difference			-0.039*** (0.011)			-0.039*** (0.011)
Constant	0 (0)	0.62 (0.44)		0 (0)	-0.12 (0.69)	
Observations	9473	9473	9473	9473	9473	9473

1. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 11 Oaxaca Decomposition_1985 vs. 2005

VARIABLES	E	C	Summary	E	C	Summary
Log of permanent income				-0.013*** (0.0042)	-0.72 (0.52)	
Log of transitory income				-0.000*** (0.0000)	-0.0070*** (0.0013)	
Log of current income	-0.015*** (0.0015)	-1.10*** (0.21)				
Family size	-0.0016* (0.00088)	-0.061** (0.027)		-0.0016* (0.00088)	-0.070** (0.027)	
Price ratio	-0.35*** (0.020)	0.37*** (0.088)		-0.35*** (0.020)	0.37*** (0.088)	
Value ratio	0.28*** (0.017)	-0.13* (0.077)		0.28*** (0.017)	-0.13* (0.077)	
Black	-0.0058*** (0.0016)	-0.0052 (0.0038)		-0.0060*** (0.0017)	-0.0036 (0.0040)	
Female	0.00018 (0.0035)	0.0026 (0.0063)		-0.00051 (0.0039)	0.0046 (0.0068)	
Age dummy	0.00093*** (0.00016)	-0.0052 (0.012)		0.00094*** (0.00017)	-0.0061 (0.012)	
Marital status	-0.021*** (0.0035)	0.031* (0.017)		-0.022*** (0.0053)	0.025 (0.022)	
High school	-0.013*** (0.0047)	0.0086 (0.015)		-0.014*** (0.0053)	0.0021 (0.016)	
Some college	0.0025*** (0.00080)	0.0090 (0.011)		0.0027*** (0.00094)	0.0027 (0.013)	
College	0.0089*** (0.0034)	0.0031 (0.010)		0.010** (0.0048)	-0.0045 (0.014)	
Master	0.0082*** (0.0025)	0.0038* (0.0021)		0.0091*** (0.0033)	0.0027 (0.0025)	
Ph.D	0.0019 (0.0047)	-0.0026 (0.0074)		0.00073 (0.0056)	-0.0064 (0.0090)	
Difference due to endowment			-0.11*** (0.0096)			-0.11*** (0.0096)
Difference due to coefficient			0.062*** (0.015)			0.062*** (0.015)
Raw difference			-0.043*** (0.011)			-0.043*** (0.011)
Constant	0 (0)	0.94*** (0.21)		0 (0)	0.60 (0.48)	
Observations	7828	7828	7828	7828	7828	7828

1. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 12 Changes in Endowment or Coefficient, and Their Contribution to the Changes in Tenure Choice

Variable	Type	1985 vs. 1995		1985 vs. 2005	
		Change	Contribution	Change	Contribution
Black	E	0.00	-0.00078	0.01	-0.0058
High School	E	-0.09	-0.0056	-0.14	-0.013
Some College	E	0.06	0.0027	0.05	0.0025
College	E	0.04	0.0022	0.09	0.0089
Master	E	0.02	-	0.05	0.0082
Ph.D.	E	-0.07	0.0075	-0.07	-
Age Dummy	E	0.04	0.0037	0.02	0.00093
Marriage Status	E	-0.05	-0.0052	-0.12	-0.021
Log of Current Income	E	0.10	-0.0087	0.02	-0.015
	C	-0.05	-0.99	-0.11	-1.10
Value Ratio	E	11.56	0.029	61.77	0.28
	C	-0.0019	-0.56	-0.0009	-0.13
Price Ratio	E	13.47	-0.032	66.85	-0.35
	C	0.0033	0.97	0.0025	0.37
Family Size	E	0.08	-0.00041	0.00	-0.0016
	C	-0.016	-0.097	-0.023	0.061

1. Changes of the endowments are calculated from the mean of variables in Table 3
2. Changes of the coefficients are calculated from the coefficients estimated in Table 8
3. Contribution to the total change in tenure choice are drawn from Table 7 and Table 8

Figure 1: U.S. Homeownership Rate (Under 35 vs. Total)

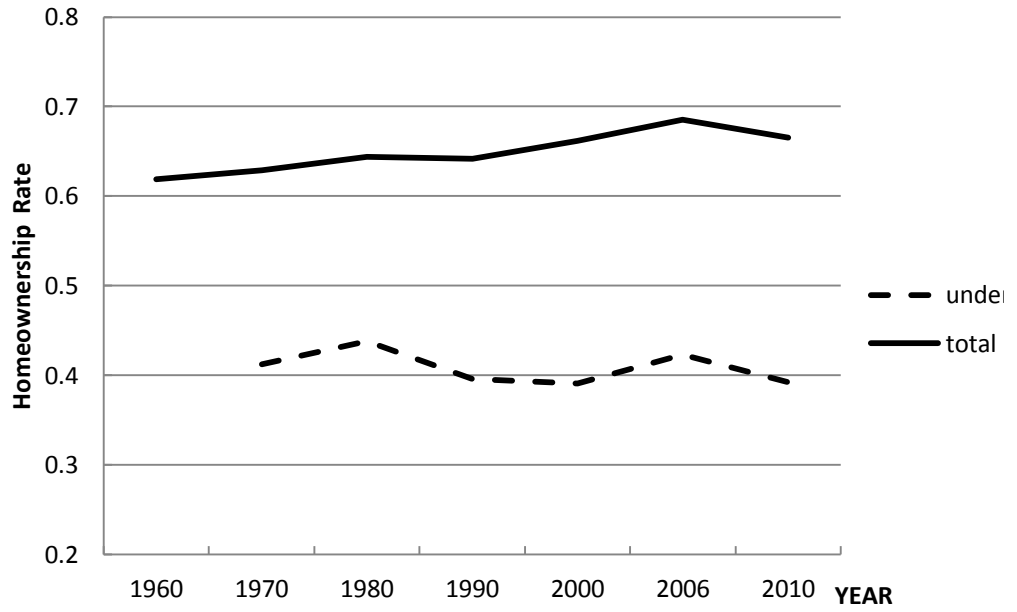


Figure 2: Three-fold Oaxaca Decomposition

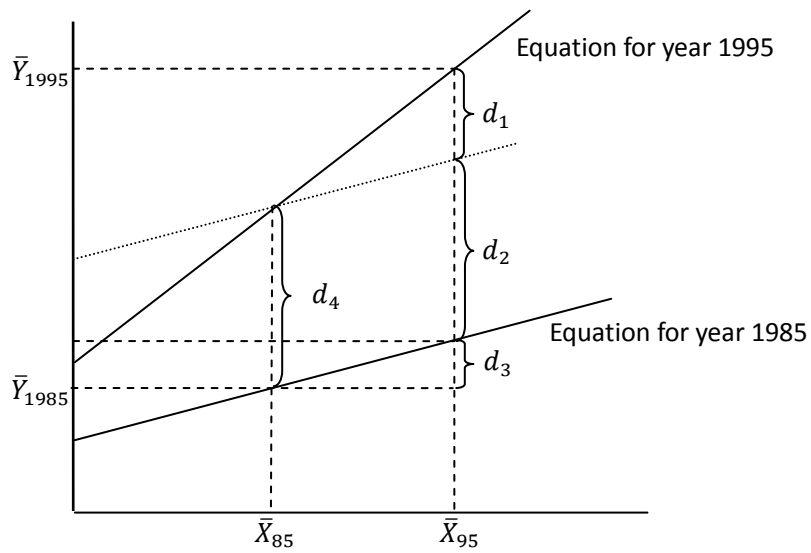
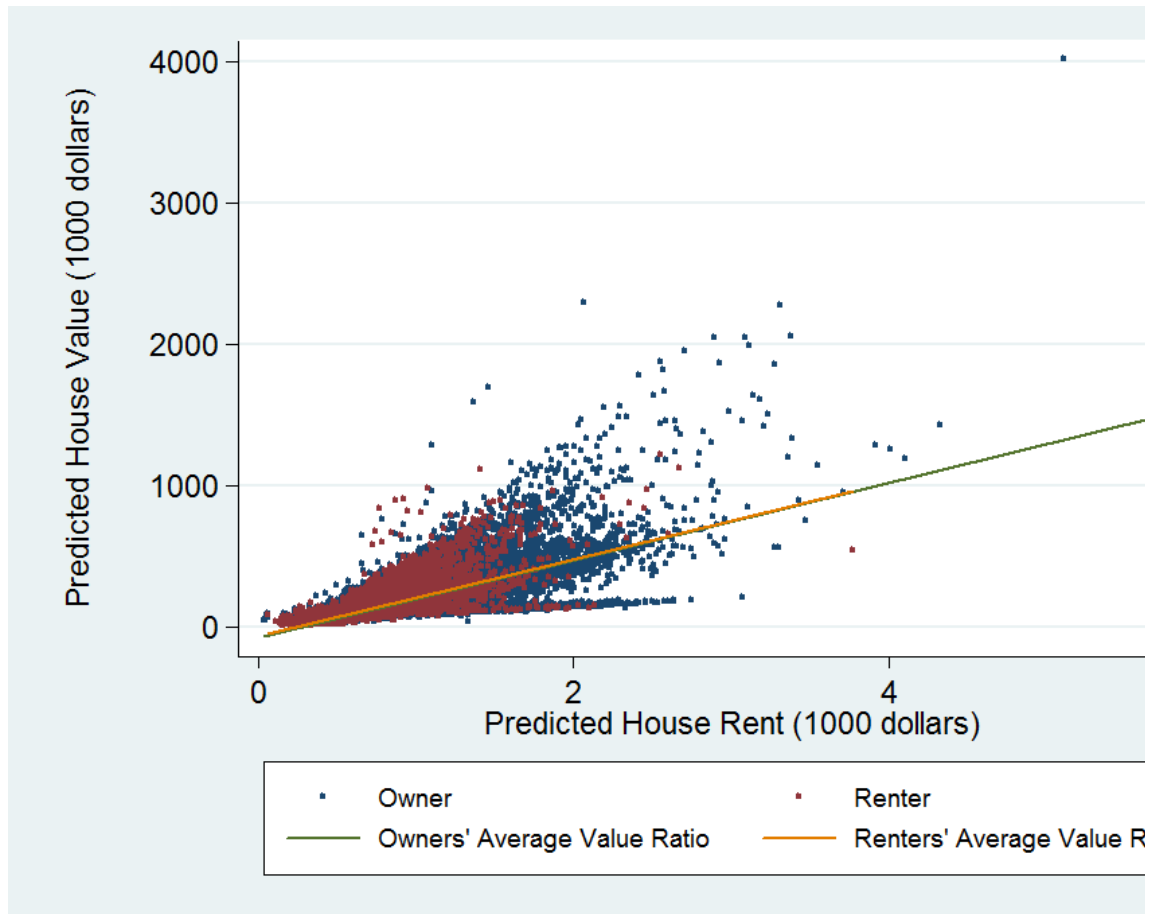


Figure 3: Comparison between Owners' and Renters' Value Ratio



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