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The Determinants of Home Ownership

An Application of Human Capital Investment Theory
To the Home Ownership Decision

Jaclyn K. Hood
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I. INTRODUCTION

The decision to purchase a home is one of the most important financial decisions made by young adults today. This decision is influenced by several factors including the individual's demographics and family characteristics. The purpose of this study is to focus on the influence of these factors on the probability of home ownership for young adults.

Recent changes in the economy and society call for the reevaluation of the determinants of home ownership. In essence, the impact of these determinants has fluctuated with the economy. Joseph Gyourko and Peter Linneman (1996) suggest some trends. According to them, marital status remains important to the home ownership decision, though its effect has weakened. The impact of the level of education is now just as important as the presence of children in a household. Also, first-time buyers are increasing in age as well as income levels. This is most likely reflecting the steep increases in the real cost of "affordable housing." One factor that has remained the same is the impact of race. No matter what the level of progress of minorities in society, economically, many remain below the wealth constraint for home ownership (1996).

The purpose of this research is to test family income, race, gender, educational attainment, parental home ownership, age, marital status and family size as determinants of home ownership. This paper differs from past research in that it applies human capital investment theory to the home ownership decision. Section II explores the human capital investment theory and adapts it to the home ownership model. Section III provides the research design for this project and section IV develops the empirical model. Section V interprets the results while section VI summarizes the paper and provides concluding remarks.

II. THEORY

Human capital investment theory is based on the idea that any activity that increases the productivity of labor may be considered as investment in human capital. This theory involves determining the present value of cost and benefit streams associated with investment. This investment includes expenditures on education, training and retraining. One characteristic of investment is that current costs are incurred with the expectation of future returns. In terms of human capital, individuals make expenditures on education and training thereby enhancing their knowledge and skills. This leads to an increase in future earnings. Similarly, an individual incurs initial costs through a home purchase in anticipation of benefits (such as equity) in the future. The primary point is that expenditures on education and training are understood as an investment in human capital just as expenditures in housing can be treated as an investment in housing capital.

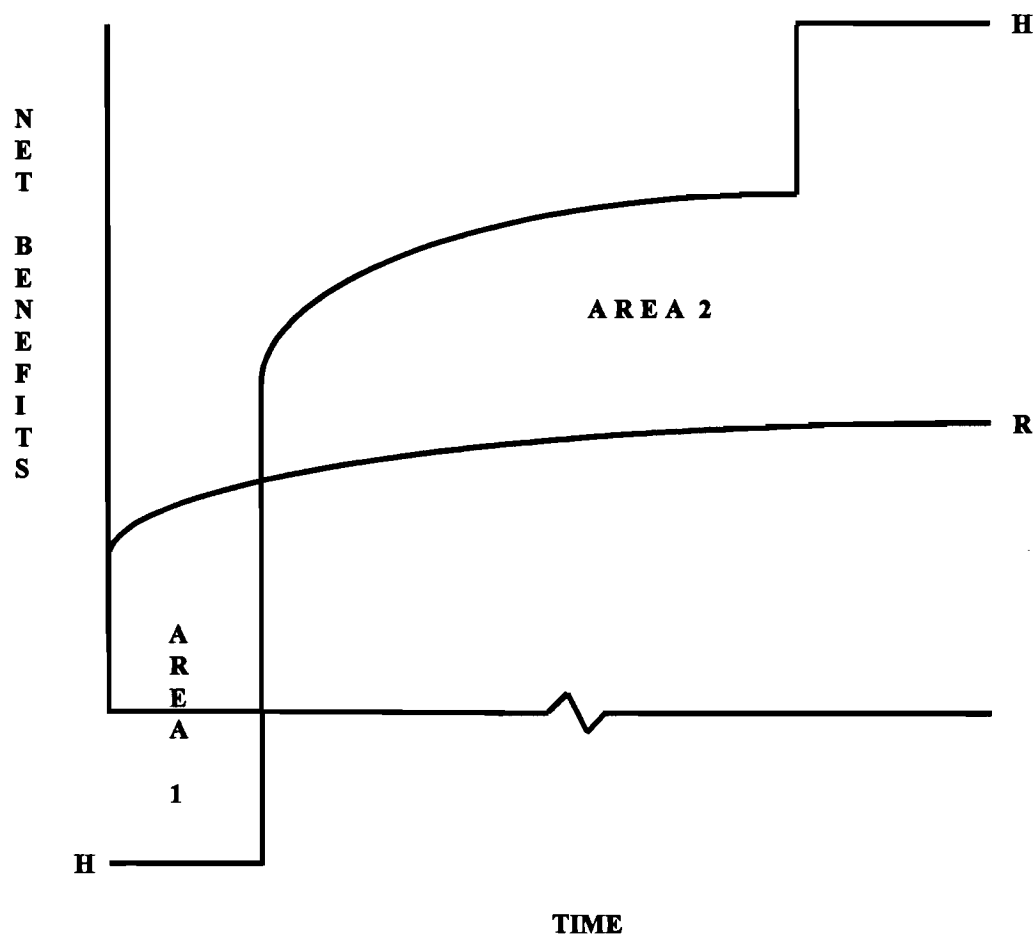
The next section adapts human capital investment theory to the home ownership decision. It follows the human capital investment theory as outlined by Campbell R. McConnell and Stanley L. Brue in *Contemporary Labor Economics*.

The Home Ownership Model

The model for home ownership is similar to that for human capital. First of all, there are costs associated with housing investment, primarily in the first year of ownership. These costs are directly related to the purchase of a house and include a downpayment, mortgage payments, an insurance policy and special fees including closing and attorney costs. A few costs, such as taxes and maintenance, occur every year during the ownership lifetime.

There are also benefits associated with this model. Benefits of home ownership include such aspects as space (several rooms and a yard) and more importantly, the pride of home ownership. Another thing to consider in the home ownership model is the role of equity at the end of the ownership life. Equity is strictly

**FIGURE 1:
RENTAL AND HOME OWNERSHIP PROFILES**



associated with home ownership and not rental properties. At the end of his ownership life an individual has a major asset, namely a house, through which he may realize capital

gains as well as other benefits. Essentially, all costs that are incurred through the purchase of the house may be returned through its sale.

Graphically, this model is interpreted in Figure 1. A potential benefits stream is indicated by curve RR, where a person has decided to rent over the course of his ownership life. This curve is net of costs which means both costs and benefits are depicted by RR. Benefits associated with renting include warmth, protection from the elements and convenience. Convenience concerns maintenance issues and the fact that a renter does not have to pay for repairs or upkeep of the property. Costs of renting are rental payments, utility costs and restrictions on living conditions.

Curve HH represents the net benefit stream associated with a housing purchase. The first leg of the HH curve represents the costs, or negative benefits, incurred during the first year of home ownership. These costs include the downpayment, closing costs and attorney fees and are generally greater than the benefits during this year. The middle section of the HH curve is the net benefits incurred over the ownership life. It is important to understand the meaning of net benefits. It is the flow of services obtained through home ownership such as shelter, warmth, plenty of living space and future equity considering the associated costs. The costs of home ownership include factors such as mortgage and insurance and utility payments, property taxes and maintenance costs. These costs, depending on the length of the ownership life, generally occur every year. Since this curve takes into account both services (benefits) and costs realized through the home ownership life, it is a net benefit curve. The final leg of HH is the equity received at the end of the ownership life. The costs incurred during this year are generally minimal compared to the equity received. Given the costs of home ownership, high income

families are more likely to own a home. However, the benefits of home ownership suggest that large families have a higher need for home ownership.

Area 1 designated below the RR curve and above the HH curve during the first year represents the initial cost accrued through home ownership. The initial cost is the total investment in the purchase of a home. The difference between curves RR and HH (Area 2) represents the additional net benefits a homeowner will realize over the course of his ownership life compared to those of a renter.

Net Present Value and the Decision Rule

A rational homebuyer bases the home ownership decision on a comparison of costs and benefits. Since costs and benefits accrue at different points of time, they must be compared at a common point of time. Therefore, the net present value of the present and future costs and benefits of home ownership need to be determined. In order to do so, the concept of time preference must be considered. Time preference can be viewed as preference of present consumption over future consumption. Basically, time preference takes into account the fact that people are impatient and prefer a basket of goods in the present over the same basket in the future (prefer the costs and benefits in the present rather than those associated with the future). Today's dollars are worth less than those of next year or several years from now due to the interest rate associated with borrowing dollars. Consequently, an interest payment is necessary to defer present consumption to the future.

Home ownership also includes risk. Risk associated with home ownership includes various events, economic and otherwise, including unexpected depreciation of value or a

catastrophic loss. Therefore, when specifically discussing the present value of home ownership, the discount rate will include a component (r) which will account for risk.

Due to the previous reasoning and the fact that a future dollar is worth less than today's dollar, the preference for present consumption requires a positive interest rate. Essentially, a dollar today can be loaned or invested at a certain interest rate and be worth more than a dollar a year from now. Algebraically, this is:

$$V_p(1 + i + r) = V_1$$

where V_p = present value
 V_1 = value 1 year from now
 i = interest rate
 r = risk factor

Rather than determining the future value of a present dollar, it is important in this study to determine the present value of a future dollar. This is portrayed in the discount formula:

$$V_p = V_1 / (1 + i + r)$$

However, this study is comparing the costs and benefits over several years which results in an extension of the discount formula. Thus, applied to home ownership:

$$V_p = B_0 + B_1/(1 + i + r) + B_2/(1 + i + r)^2 + B_3/(1 + i + r)^3 + \dots + B_T/(1 + i + r)^T \\ + \text{Expected Equity in } T/(1 + i + r)^T$$

where B = stream of net incremental benefits
 B_1 = additional benefits received the next year, etc.
 T = duration (years) of benefits stream over ownership life
 i = interest rate
 r = risk factor

The immediate incremental benefits (or costs) incurred, B_0 , are not discounted. However, the incremental benefits incurred the following year, B_1 , must be discounted by

one year. Observe that the power of each successive denominator is equivalent to the number of years that benefit stream must be discounted to determine its present value.

Therefore, the equation may be restated as:

$$V_p = \sum_{t=0} B_t / (1 + i + r)^t + \text{Expected Equity in } T / (1 + i + r)^T$$

This equation simply states the present value of the sum of the discounted incremental benefits over an individual's ownership life. The ownership life is indicated by the range of t from 0 to z where 0 is the year of the housing purchase and z is the end of the ownership life (through sale, catastrophic loss, death of individual, etc.). This range is unique to each individual and, therefore, can not be assigned a specific value.

It is important to recall that the decision to buy a home depends on both costs and benefits. In order to keep this model to one equation, costs are treated as negative benefits (Area 1 in Figure 1) and are generally apparent in the first year of home ownership (B_0). Hence, the first year is negative which represents the initial cost incurred during this year. In the following years, the sum is, in most cases, positive since benefits are expected to exceed costs. By accounting for both the costs and benefits in this equation, the result of this equation is the net present value of home ownership. Recall that the rental curve, RR , is net of rent (or costs). Therefore, the stream of net benefits for RR is generally positive, however, it will have little variation as it spans the rental life. The difference between the two curves is the incremental net benefits of home ownership depicted by the area below the HH curve and above RR (Area 2 in Figure 1).

The decision rule developed through the previous calculations is that a prospective homeowner should invest in a house if the net present value of the benefits is greater than zero. That is:

$$V_p (\text{Net Benefits}) > 0$$

Wealth Constraint

However, the decision rule is subject to a wealth constraint. An individual will not invest in a home if he does not have the wealth to do so. To a financial institution, wealth is collateral and is necessary to secure a loan or mortgage. Therefore, this decision rule is only followed if an individual has the wealth (ability to receive a loan) to invest in a home. A positive present value of net benefits leads to a housing investment if and only if an individual has the wealth to do so. After considering the wealth constraint, a positive value suggests that the present discounted value of the benefits exceeds the present discounted value of the costs. Thus, the decision to invest in a house is economically rational. Likewise, a negative value means that the costs are greater than the benefits and an investment would not be rational.

Generalizations

The home ownership model has considerable explanatory power. Three generalizations arise from the basic model. All else equal, the longer the stream of post-investment incremental benefits, the more likely the net present value of an investment in housing will be positive. A housing investment made for a shorter period of time will have a lower net present value because there are fewer years of positive incremental benefits after the

completion of the investment. For example, if an individual has a high mobility rate (tends to relocate often), his stream of incremental benefits may be rather short and therefore lead to a low or even a negative net present value. I expect older families and married families, those with lower mobility rates, to have a higher net present value for a housing investment. Next, other things constant, the lower the relative cost of a housing investment, the more likely an individual will find that investment profitable. For example, when mortgage rates are low, an individual is more likely to invest in housing. Therefore, because of the lower relative cost of housing for high income families, these families have an increased net present value of benefits for home ownership. Finally, other things constant, the larger the benefits differential, the more likely an individual will invest in housing. If the benefits of home ownership drastically outweigh the costs, then housing investment is more likely. Because of their need for space, large families may find the benefits of home ownership surpass the costs.

III. RESEARCH DESIGN

The factors affecting home ownership fall into two categories: constraints and net benefits. Constraints in the home ownership decision include race, gender and educational attainment. The determinants of net benefits include age, marital status and family size. Two determinants, net family income and parental home ownership, may affect both constraints and net benefits.

Race. Race is an important factor in home ownership. However, Gyourko and Linneman found that housing market discrimination is not the cause of the impact of race on the investment decision. Rather, the cause is more likely associated with the increasing

cost of housing (due to large downpayments, fees and zoning) and the inability of minority households to meet the wealth constraint. This is related to the lack of intergenerational wealth transfers from their parents, transfers to which white households with similar characteristics may have access. Basically, suburban land use policies have raised the cost of home ownership and “disproportionately punished members of the middle class whose parents cannot transfer wealth for downpayments” (Gyourko and Linneman, 1995).

Gender. The gender of the head of the household also is a factor in home ownership. Given equal incomes, males often have more certain incomes. Certainty of income is important with gender because males will, most likely, never leave the workforce for such events as child bearing and rearing. Since males are less likely to leave the workforce, they have the opportunity to gain more experience in the workforce (by working continuously over their work life) and even more with a particular company. Therefore, males are more likely to maintain a certain level of income. With more certain incomes, males are more likely to secure a loan or mortgage. Thus, they are more willing to commit to home ownership.

Education. The level of educational attainment also will determine the home ownership decision. An individual with a high level of educational attainment has the knowledge of the factors necessary to purchase and maintain a home. Also, an individual with more education often saves more of his income because he is knowledgeable of future living expenses. This increased savings creates the capital and wealth to secure a loan. Therefore, he has a greater ability to be approved for a mortgage. Because of this link between education and savings, an individual’s educational attainment will influence his home ownership decision.

Age. Age is a major determinant of home ownership for several reasons. First, older households have more certainty of income. As a household gains increasingly more experience in the workforce or with a particular company, it is more likely that it will, at least, maintain a certain level of outcome. In other words, as a household's level of experience increases, it is less likely to lose its income altogether in the near future. Thus, older households are more likely to commit to home ownership. Also, older households have more wealth. This means that an investment in housing is more easily diversified and a smaller proportion of the wealth of older households contributes toward the housing investment. This leads to a preference for home ownership. Finally, older households are also less mobile - they tend to relocate less often than younger households. Therefore, their annual-equivalent transaction costs are lower which makes home ownership more attractive (Haurin, Hederschott and Ling, 1987).

It is important to realize that there is an offsetting effect. As an individual grows older, his prospective ownership life is shorter. This creates a shorter stream of benefits that potentially could be negative. However, this study focuses on young adults ranging in age from 31 to 39 and is not concerned with the effects of significantly older households on the home ownership decision.

Marital Status. The marital status of an individual also affects home ownership. Married couples are often interested in "settling down" and are therefore less mobile than unmarried individuals. Less mobility leads to lower annual-equivalent transaction costs in a housing purchase and likelihood of home ownership. Married couples also pool their income and wealth. By pooling their income and wealth, they may be able to cross the wealth constraint that prevented home ownership as single individuals. Finally, married

couples often forecast a future with children and want to provide a stable environment to raise them. With more people in a household, the level of net benefits of home ownership increases. Hence, married couples are looking to make long term investment decisions with their money. With the equity and net benefits that home ownership provides, it is a smart investment decision. Therefore, if an individual is married, he has a greater probability of owning a home.

Family Size. The next factor in the home ownership decision is the size of a family. Past studies have found that the presence of a child in a household has a significant positive effect on home ownership (Haurin, Hendershott and Kim, 1992). Gyourko and Linneman found a 20% increase in the probability for households with children compared to those without children. An increasing number of children yields a greater need for home ownership. In fact, buying a home may be less costly (with mortgage payments and tax benefits) than renting the space that would accommodate larger families. On the other hand, large families are subject to financial constraints that may prevent home ownership. With more children in the family, the day-to-day expenses (food, day care, illnesses, etc.) increase drastically and may not allow for a sizeable commitment of income and wealth. However, this study will follow the theory preferred in past studies which predicts a higher probability of ownership for households with children.

Net Family Income. The net family income has both a direct and indirect influence on the home ownership decision. It is directly related in that as the net income rises within a family, the opportunity for home ownership also rises. A higher income has more potential to cover the initial costs incurred by home ownership such as securing a

mortgage. Income is indirectly related because as income rises, the relative cost of home ownership decreases. Given that costs are constant, as income increases, the costs become an increasingly smaller proportion of the income. Also, families with a higher income are more likely to obtain better financing and more favorable credit conditions. This creates greater value of investment in a non-taxed asset for investors in higher income brackets (Haurin, Hederschott and Ling, 1987). In both cases, a higher net family income should lead to a higher probability of home ownership.

At this point, it is important to discuss the effect of mortgage rates. Although theory states that mortgage rates are important, the rates faced by individual respondents at the time of their home purchase are not available in this database. However, it is likely that if an respondent has a low income, he will face higher mortgage rates and vice versa. Therefore, I consider the mortgage rate as factor of the family income variable. A respondent with a higher income (and a lower mortgage rate) is more likely to own a home.

Parental Home Ownership. Whether or not the parents of an individual owned a house is important to the home ownership decision. First of all, children often look to their parents as financial examples. Parental tenure choice may condition the child's home ownership decision (DiSalvo and Ermisch, 1997). Second, parents who own homes often have a certain level of wealth which creates intergenerational transfers for their children- assets and wealth to pass down to future generations. Individuals with lower levels of educational attainment and stagnant or declining real incomes often become home owners due to better access to intergenerational transfers from their parents (Gyourko and Linneman, 1995). Regarding the benefit stream, children of homeowners are aware of the

costs and benefits associated with home ownership and, thus, more able to accurately assess the net benefits of home ownership. Therefore, for both reasons, if the parents own a home then their children also are more likely to own a home as well.

IV. EMPIRICAL MODEL

This section presents the estimate of a single-equation logistic model of the probability of home ownership in 1996. Since this study seeks to relate the fraction of homeowners to its determinants, a logistic model allows the dependent variable to remain within the range $[0, 1]$ where 1 denotes home ownership while 0 is non-home ownership. (Ramanathan, 1998). This model will predict a probability of home ownership.

The data used for this study are obtained from the National Longitudinal Survey of Youth (NLSY) focusing on the 1996 panel of young adults (ages 18 to 39), the most recent survey year. This database is appropriate because it includes data describing a respondent's demographic characteristics, earning experiences, wealth and housing choices. From the possible 12,675 respondents, 4050 had dropped out of the survey by 1996. Of the remaining cases, 2741 were rejected due to missing data leaving a healthy sample size of 5884.

The dependent variable is represented by a dummy variable distinguishing between homeowners (1) and non-home owners (0) in 1996. The following independent variables are summarized in Table 1.

Race (WHITE) is depicted as a dummy variable. A white (1) individual is expected to have a higher probability of owning a house than a black or Hispanic individual (0) due to

**TABLE 1:
DESCRIPTIVE STATISTICS**

VARIABLE	DEFINITION	EXPECTED VALUE	HOME OWNER MEAN	NON-HOME OWNER MEAN
WHITE	1 = White 0 = Other	+	0.64	0.35
MALE	1 = Male 0 = Female	+	0.54	0.45
EDUCATION	Highest grade completed by respondent as of 1996	+	13.51	12.53
AGE	Age of respondent in 1996	+	34.79	34.37
MARRIED	1 = Married, widowed or separated 0 = Single or divorced (as of 1996)	+	0.78	0.30
FAMSIZE	Number of people in the respondent's family in 1996	+	3.53	3.06
FAMINCOME	Net income of respondent's family as of 1996	+	84019.83	35060.76
PARENT	Educational attainment of respondent's father as of 1996	+	11.28	10.48

access to intergenerational transfers. Therefore, I expect the coefficient of this variable to be positive.

The gender (MALE) of a respondent is designated by a dummy variable where a male is 1 and a female is 0. Since the theory in this study suggests higher ownership probabilities for males, this variable's coefficient should be positive.

The educational attainment (EDUCATION) of an individual is the highest grade completed by that individual, ranging from no education to doctorate levels. As the level of education increases for an individual, so does his probability of home ownership.

Hence, I expect a positive coefficient for this variable.

Age (AGE) is represented by the actual age of the respondent. I expect this coefficient to be positive. As an individual grows older, his home ownership probability increases. Because the respondents in this survey ranged in age from 31 to 39, the effect of a wide variety of ages can not be tested.

The marital status (MARRIED) of an individual also is a dummy variable. Theory suggests that married individuals (1) are more likely to own a home than single individuals (0). For simplicity, divorcees are designated as single individuals and widows and separated individuals are placed in the married category. Of course this assumes that existing home ownership is deprived of both individuals in divorce settlements and widows retain the home even after the death of a spouse. In times of separation, it is assumed that the couple still owns the home (still has the deed) even though one spouse may not be living there. These assumptions are generally true; therefore this categorization is adequate in measuring the effects of marriage on home ownership. Hence, the coefficient of marital status should be positive.

The family size (FAMSIZE) variable consists of the number of people in the respondent's family, ranging from one to 13. As the family size increases, the probability of home ownership should increase as well. Thus, I expect a positive coefficient for this variable.

Net family income (FAMINCOME) is represented by the actual net income of the respondent in 1996. Based on the theory in the previous section, I expect the coefficient to be positive. As the net family income of an individual increases, it is more likely that he will own a house.

Parental home ownership status is not available through the NLSY. Assuming that there is a strong relationship between home ownership and the educational attainment of the respondent's father, I use the father's education (PARENT) as a proxy for the parent's home ownership status (Haurin, Hendershott and Kim, 1992). Considering the theory from the previous section, as the highest grade completed by the father increases, the child is more likely to own a home. This variable should have a positive coefficient.

The theory of the previous section and the definitions of the variables result in the following model:

$$\ln [P/(1-P)] = \alpha + \beta_1 \text{WHITE} + \beta_2 \text{MALE} + \beta_3 \text{EDUCATION} + \beta_4 \text{AGE} + \beta_5 \text{MARRIED} + \beta_6 \text{FAMSIZE} + \beta_7 \text{FAMINCOME} + \beta_8 \text{PARENT} + \mu$$

where P is the probability of home ownership.

V. RESULTS

Regression Results

Overall, the model performed well. The results are displayed in Table 2 where Model A is the original model as described in the previous section.

All variables except PARENT and FAMSIZE are highly significant, most to the 0.0005 level, with the expected sign. Gender and marital status have the strongest effects, these variables will have rather significant effects on the home ownership decision. Even though the results of FAMINCOME is positive and highly significant, the coefficient is extremely small. Therefore, this variable will probably have the smallest effect on the probability of home ownership.

PARENT did not have the expected sign. Remember from earlier discussion that father's educational attainment is used as a proxy for parental home ownership in this model. Theoretically, this variable should have a positive effect; the higher the education

**TABLE 2:
REGRESSION RESULTS
DEPENDENT VARIABLE: HOME OWNERSHIP**

VARIABLE	EXPECTED VALUE	MODEL A	MODEL B
WHITE	+	0.8917***	0.8901***
MALE	+	0.2558**	0.2405***
EDUCATION	+	0.1068***	0.1074***
AGE	+	0.0764***	0.0763***
MARRIED	+	1.8152***	1.17165***
FAMSIZE	+	-.0243	0.1027*
FAMSIZE5	~	~	-0.1048***
FAMINCOME	+	2.52×10^{-6} ***	2.53×10^{-6} ***
PARENT	+	-0.0363***	-0.0369***
N	~	5884	5884

* Significant at .05 level

** Significant at .0001 level

*** Significant at .00005 level

level of the father, the more likely the child will own a home. However, its negative coefficient and high level of significance suggests otherwise. The model indicates that the probability of an individual owning a home decreases if his parents owned a home.

Because the negative sign is unexpected, I performed exploratory analysis to determine if this background variable is working through intervening variables. In particular, I wanted to see if PARENT is actually working through FAMINCOME and EDUCATION to determine the probability of home ownership. It is possible that the variable's indirect effects through the homeowner's own education and income offset the direct effect measured by PARENT. Generally, the results show father's education does have strong indirect effects through FAMINCOME and EDUCATION which offset the unexpected direct effect measured by the estimated value of PARENT in Model A. Therefore, when indirect effects are taken into account, it does not appear that the father's educational attainment has a significant effect on the probability of home ownership. However, since father's education is actually a proxy for parental home ownership, it is possible that it is simply an insufficient proxy and that future research should address this issue. Details of this analysis are presented in Appendix A.

The coefficient of FAMSIZE in Model A is not significant. According to theory, as the size of a family grows larger, the probability that the head of the household owns a home increases. Because of its lack of significance, FAMSIZE suggests that the theory is not correct. After close examination of the data I discovered that as the size of a family exceeds four, fewer families actually own their home. With this in mind, I consider the opposing family size theory briefly mentioned in the theory section. This states that the probability of home ownership increases with family size up to a certain point (four people in this study) then decreases as family size increases after this point. This is mainly due to the fact that as the number of people in a family increases, the costs within that family increase as well. Thus, even with a high value of net benefits, larger families are subject to

a wealth constraint that does not allow them to invest in a home. Therefore, I create an interaction effect, FAMSIZE5, between FAMSIZE and a dummy variable DUMMY_{FS} to test the difference in family size. The DUMMY_{FS} variable is 1 for families of five or more people and 0 for families smaller than five people. From this interaction, FAMSIZE5 represents the additional effect of families of five or more of family size on the home ownership decision. Including this variable, Model B is:

$$\ln [P/(1-P)] = \alpha + \beta_1 \text{WHITE} + \beta_2 \text{MALE} + \beta_3 \text{EDUCATION} + \beta_4 \text{AGE} + \beta_5 \text{MARRIED} + \beta_6 \text{FAMSIZE} + \beta_7 \text{FAMSIZE5} + \beta_8 \text{FAMINCOM} + \beta_9 \text{PARENT} + \mu$$

where FAMSIZE5 = FAMSIZE x DUMMY_{FS}.

When an individual has a family smaller than five people, the FAMSIZE5 variable drops out of the model (because DUMMY_{FS} is 0 when FAMSIZE is less than 5). Thus, β_6 is the sole effect of family size on the home ownership decision. However, when the size of a family is five or more, $\beta_6 + \beta_7$ is the additive effect of family size on home ownership.

When regressed in Model B, FAMSIZE has a significant, positive coefficient while the coefficient for FAMSIZE5 proved to be negative and highly significant. However, because of the values of the coefficients of FAMSIZE and FAMSIZE5, the variables do not quite act according to the new theory. Since the coefficient of FAMSIZE is 0.1027 and the coefficient for FAMSIZE5 is -0.1048, the additive effect of the two variables is -0.0021, a small negative. Since this result is so small, these variables essentially have an offsetting effect rather than the negative effect on the probability of home ownership as

suggested by the theory. To illustrate this point, consider a family that increases from three to four members. The effect of this change is β_6 . However, when a family size increase from six to seven members, the effect, $\beta_6 + \beta_7$ ($0.1027 + - 0.1048$), is approximately zero. Therefore, once the size of the family reaches five members, an increase in family size has essentially no effect on the probability of home ownership. Thus, the family size theory used in Model B accounts for the insignificance of FAMSIZE in Model A.

Even though the adjusted variables perform better in Model B, overall both models perform similarly when used to predict home ownership. To obtain the error rate for Models A and B, I use each model's respective coefficients and the actual values for the variables representing each respondent's characteristics to estimate the probability of home ownership for each respondent. If the estimate is greater than or equal to 0.50, this denotes a value of one, which predicts a homeowner. Likewise, when the estimate is less than 0.50, this represents a zero value and a non-home owner. When this procedure is carried out through for each respondent, each models' predictions are correct approximately 74 percent of the time which signifies a 26 percent error rate.

Simulation Results

Since I use a logistic model in this study, the results determined in the regression are not slopes of a line as in the standard OLS model and, therefore, can not be interpreted in the same manner. Instead, the results will be interpreted by conducting a set of simulations. Each simulation assumes a specific set of characteristics for a hypothetical individual and then uses the estimated logistic equation to estimate the probability of home ownership for

that individual. In this study, the mean values of each determinant are used except in the case of dummy variables, where a specific value is assigned (1 or 0). By using simulations, I can demonstrate the effect of a change in one variable on the probability of home ownership. Table 2 provides the coefficient and mean for each variable which aid in the interpretation of the results. By substituting the respective coefficients and means for each variable, the effects of each variable are interpreted.

The first four simulations look at the differences in probability of home ownership among four groups: married white males single white males married black males and single black males. The simulation values used for the first four hypothetical individuals are displayed in Table 3. In the first two simulations, a married, white male with a college degree and the age, family income, family size and father's education equal to the sample mean has almost a 32 percentage point greater probability of owning a house than his single counterpart. Simulations 3 and 4 reveal that a black male with the same

**TABLE 3:
SIMULATION RESULTS: MARRIAGE AND RACE**

VARIABLE	COEFFICIENT (β_i)	MEAN	SIM. 1 Married, white male	SIM. 2 Single, white male	SIM. 3 Married, black male	SIM. 4 Single, black male
WHITE	0.8901	0.58	1	1	0	0
MALE	0.2405	0.50	1	1	1	1
EDUCATION	0.1074	13.33	16	16	16	16
AGE	0.0763	34.61	34.61	34.61	34.61	34.61
MARRIED	1.7165	0.61	1	0	1	0
FAMSIZE	0.1027	3.22	3.22	3.22	3.22	3.22
FAMSIZE5	-0.1048	5.608	0	0	0	0
FAMINCOME	2.53×10^{-6}	65444.51	65444.51	65444.51	65444.1	65444.1
PARENT	-0.0369	11.00	11	11	11	11
PROBABILITY	~	~	87.65%	56.05%	74.45%	34.37%

characteristics has a 41 percentage point increase in the probability of owning a home if he is married rather than single. Although not displayed in the table, I also look at the effects of marriage on females. A single, black female with a college degree and no children, and the age, family income and father's education equal to the sample mean experiences a 40 percentage point increase in the probability of home ownership just by getting married. Because of these results, I can conclude that marital status is very important in determining the probability of home ownership.

A comparison of the four simulations in Table 3 also explores the difference in probability of home ownership according to race. Simulations 1 and 3 indicate that a white, married male is 13 percentage points more likely to own a home than a black married male while the second and fourth simulations denote that a single, white male has a 22 percentage point greater probability of home ownership than his minority counterpart.

Although not displayed in the table, I also run simulations that look at changes in income and its effect on home ownership. By varying the mean income of several different hypothetical individuals, I discover that even a rather large change in income had a small effect on the probability of home ownership. For example, a married, black female, with all other variables equal to the sample mean, experienced a one percentage point increase in her probability of home ownership when her income increased by \$20,000. Similarly, a \$20,000 decrease in her income decreased her probability by one percentage point. These changes in family income had comparable results for all hypothetical individuals used in this simulation.

VI. CONCLUSION

This paper examines the determinants of home ownership. Most of the results of this paper are consistent with the findings of previous studies as well as my theory. The results of each variable generally support past research with two exceptions, family size and parental home ownership. Race, gender, education, age and marital status proved to have significant and positive effects. Therefore, a married, white male with two children has a strong probability of home ownership. Increasing age, income and education further increase this individual's home ownership prospects.

The major contribution of this study is the refinement of the relationship between family size and home ownership in the original model. The insignificance of the family size variable led to the exploration of an alternate theory concerning its impact on home ownership. This theory states that the probability of home ownership increases as family size increases up to a certain level at which the probability remains at approximately the same level as family size continues to increase. In this study, the change occurred as families grew from four to five people. Up to four people, increases in family size increase the probability of home ownership. After this point, increases in family size have no effect on home ownership.

An unexpected result in this study is the negative yet significant coefficient of the proxy for parental home ownership in the original model. However, after exploration of the indirect effects of this variable in Appendix A, PARENT proves to have little effect on the home ownership decision rather than the counterintuitive effect suggested by the regression results of this variable.

However, the results of this study, namely the 26% error rate, leave plenty of room for future research. First of all, this model may be lacking important variables. Perhaps a location variable (urban or rural) or a cost of housing measure could decrease the error rate. Because of the cost of urban living, many city dwellers may be lifetime renters because they are unable to meet the initial cost of home ownership. However, those who live in rural areas may be able to afford a home at a fairly young age because of the low cost of ownership. Second, it would be beneficial to find another proxy for parental home ownership- or perhaps the measure itself. The significant, negative coefficient did not act according to theory. Appendix A shows that the father's level of educational attainment was not the appropriate proxy for this measure. Also, constraints are very important to this model. It would be interesting to look at various wealth constraints and their effects on the model. Finally, since this study looked at the microeconomic aspect of home ownership, it would be interesting to employ these results in a macroeconomic aspect of housing. The effect of the determinants of home ownership on the housing markets and the wider economy may be a starting point.

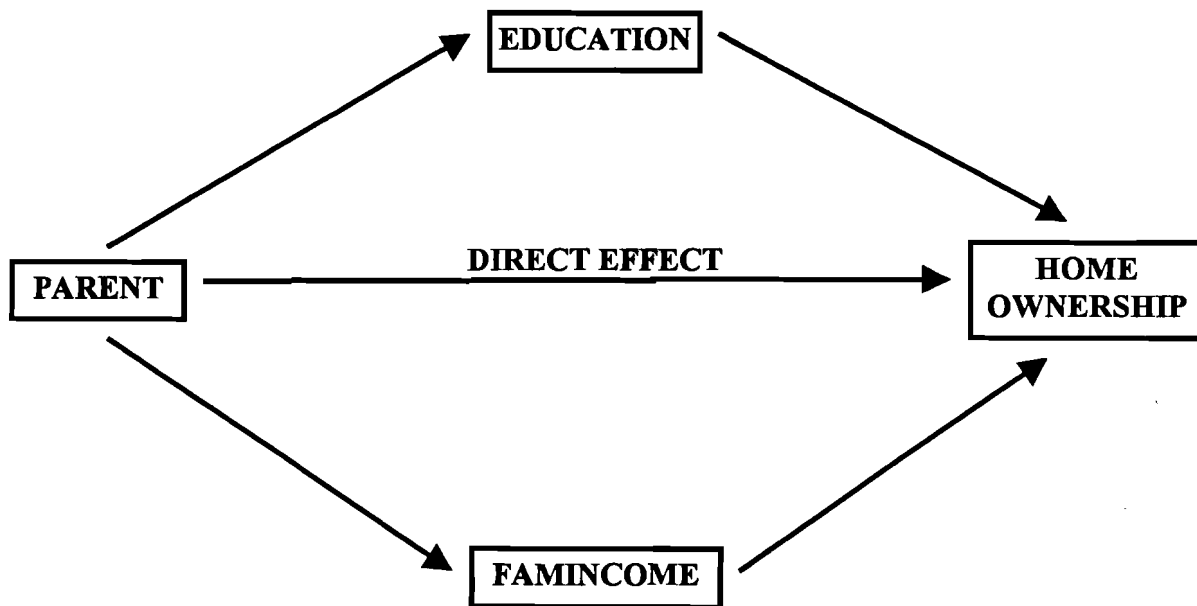
As far as policy implications are concerned, I can only suggest housing loan programs that cater to these variables. More specifically, loans that assist minority as well as large families would be beneficial. From past literature and as proven by this paper, it is apparent that minority families may need assistance due to the lack of intergenerational transfers. Because of high initial costs of home ownership, minority families may have a difficult time meeting the wealth constraint without the assistance of intergenerational transfers or a housing loan. From this study, it is evident that large families would benefit from home ownership assistance as well. As families become larger and larger, many are

unable to meet the wealth constraint of home ownership due to increasing family costs. However, because of the size of the family, these families often have a high level of net benefits for home ownership. Therefore, with loan assistance, these families would be able to meet the wealth constraint for home ownership and obtain their expected level of net benefits of ownership.

APPENDIX A

The effects of father's education, the proxy for parental home ownership, on the probability of home ownership are explored in this section. For the analysis of this variable, three paths are explored. These paths are shown schematically in Figure 2.

**FIGURE 2:
EFFECTS OF PARENT VARIABLE**



The first path is the direct effect of father's education on the probability of home ownership. This is the effect of the father's level of educational attainment when measured as a determinant of home ownership. As a factor in Models A and B, this proxy proves to be negative yet significant. This suggests that the respondent's probability for home ownership actually decreases as the level of the father's education increases. The

next step is to explore the indirect paths of between father's education on home ownership must be explored. It could be that the unexpected direct effect of this variable is offset by its indirect effects.

The first indirect path measures father's education effect on the probability of home ownership through the respondent's education (the top portion of Figure 2). As the father's level of education increases, the respondent's own education increases. Model C in Table 4 displays the OLS regression performed between these two variables and reveals a highly significant coefficient of 0.258. This means that as the father's level of educational attainment increases by one year, his child's education increases by 0.258 years. In turn, a 0.258 increase in the child's education has a positive effect on the probability of home ownership.

**TABLE 4:
INTERVENING VARIABLE REGRESSION RESULTS**

INDEPENDENT VARIABLE	MODEL C Dependent = EDUCATION	MODEL D Dependent = FAMINCOME
PARENT	0.258***	5685.494***
Constant	10.382	2920.504
R Square	0.171	0.024
N	5884	5884

*** Significant at .00005 level

The indirect effect of father's education on the probability of home ownership also is measured through the net family income. This effect looks into the idea that as the father's level of educational attainment increases, his child's family income will increase as well. An OLS regression (Model D in Table 4) reveals that father's education and the

respondent's net family income also are significantly related. As the father's level of educational attainment increases by one year, his child's net family income increases by \$5685.49. When this additional \$5685.49 is applied to the respondent's income, it increases his probability of home ownership.

Because of the strong relationships between father's education and the respondent's education as well as father's education and the respondent's net family income, PARENT is more closely associated with EDUCATION and FAMINCOME than the probability of home ownership. Therefore, PARENT may be an insufficient proxy for parental home ownership. I use the simulation process to look at the combined direct and indirect effects of PARENT on the probability of home ownership.

To combine the three effects, I use the values in Models C and D as well as the original coefficients from Model B in the simulation. Using the mean values for each determinant to create a hypothetical individual, the simulation using only the coefficients from Model B finds that this hypothetical individual has a 62.47% probability of owning a home. However, to analyze the indirect effects of PARENT, the new values must be integrated into the simulation. Therefore, the new coefficients of EDUCATION and FAMINCOME are added to the means. The simulation is monitoring the effects of a one year increase in the father's education so one year will be added to the mean value of father's education, increasing it from 11 to 12 years. Since a one year increase in PARENT increases EDUCATION by 0.258 years, 0.258 must be added to the mean value of EDUCATION. Likewise, a one year increase in PARENT leads to a \$5685.49 increase in FAMINCOME and therefore, \$5685.49 must be added to the mean value of FAMINCOME. When the simulation is reevaluated with the new values, the hypothetical

individual has a 62.59% probability of owning a home. However, this value is essentially the same as the 62.47% probability found in the first simulation. This means that there is an offsetting effect between the direct and indirect effects. This effects essentially cancel each other out. Therefore, because of the offsetting effects between the direct and indirect paths, PARENT has very little overall effect on the probability of home ownership.

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