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An Empirical Investigation of Discrimination in the Hispanic Mortgage Market.

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ABSTRACT

An Empirical Investigation of Discrimination in the Hispanic Mortgage Market

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This Master's Thesis empirically investigates whether Hispanics are discriminated against in the mortgage market. The use of the 1989 Metropolitan file of the American Housing Survey allows me to test the effects of borrower race and default risk in mortgage lending. The empirical analysis is based on a probit model of whether Hispanics, blacks and non-Hispanic whites households obtain FHA or conventional mortgages. FHA mortgages are fully insured and generally require a lower downpayment, but are typically more expensive. Given a choice between FHA and conventional mortgages, borrowers will prefer the relatively cheaper conventional mortgages. Therefore, households obtaining FHA mortgages will tend to be rationed in the conventional market. After controlling for various socioeconomic

characteristics any remaining race effect in the probit model may be reflective of events unrelated to default risk. Results from this investigation indicate that the likelihood of Hispanics obtaining FHA mortgages is not significantly different from that of white households. However, blacks are more likely to obtain FHA loans than Hispanic and white borrowers. These results suggest that Hispanics are not rationed as are blacks in the conventional mortgage market.

TABLE OF CONTENTS

	Page
Acknowledgements	i
Abstract	ii
I. Introduction	1
II. Background	4
III. Analytical Framework	12
IV. Empirical Model, Data and Variables Definition	19
V. Results	26
VI. Conclusions	30
List of Tables	
Table 1	7
Table 2	8
Table 3	9
List of Figures	
Figure 1	12
Figure 2	16
Appendices	
Appendix 1 Loan Offer Curve Derivation	32
Appendix 2 Variables Description and Statistical Results	39
References	48

I. INTRODUCTION

The Housing Act of 1949 established as a national goal the provision of "a decent home and suitable living environment for every American family." Recent estimates, however, show that Hispanics as a whole are less likely to own homes and pay more for homes of similar quality than do comparable Anglos (Krivo, 1986). Recent studies on Hispanic housing issues also show that mortgages given to Hispanics are on the average more expensive than those given to white households (U.S. Bureau of the Census, 1983). Two competing explanations for these findings come to mind. Hispanic households may be excluded from the conventional mortgage market because of their relatively lower income levels, and/or because mortgage loan officers statistically discriminate against Hispanics because they associate a relative high rate of default to this group.

The literature has mostly studied the housing market discrimination of blacks. For example, economic research on minority home ownership suggests that black households are less likely to obtain conventional financing than whites, even after controlling for various proxies of default risk (Gabriel and Rosenthal, 1991). A recently released study by the Federal Reserve Bank of Boston agrees with this work (Munnell et al.,1992). The studies that have addressed the

problems of Hispanic home ownership have done so assuming that housing market experience of blacks and Hispanics is the same. This assumption is problematic in that it has been found that the market experience of blacks and Hispanics is not necessarily equal, most notably in labor-market discrimination studies (e.g. Reimers, 1983; Cotton, 1988).

The purpose of this Master's thesis is to empirically investigate whether Hispanics are discriminated against in the housing market. Of course, it would appear housing discrimination does exist for Hispanics. But, does this finding hold up after account is taken of non-discrimination factors?

The use of the 1989 Metropolitan file of the American Housing Survey (AHS) will allow me to test the effects of borrower race and default risk in mortgage lending for Hispanics, blacks, and non-Hispanic whites across the nation. Consistent with Gabriel and Rosenthal's (1991) mortgage lending study that used FHA mortgages as a proxy for default risk, the empirical analysis is based on a probit model of whether Hispanics, blacks and non-Hispanic whites borrowers obtain FHA or conventional mortgages[1].

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[1] FHA offers 5% downpayment loans while most conventional lenders require at least 10%. FHA, however, also requires a 3.8% mortgage insurance premium, whereas conventional mortgages with a loan-to-value ratios above 80% generally require less private mortgage insurance, and those loans with ratios below 80% do not require mortgage insurance.

FHA mortgages are fully insured and generally require a lower downpayment, but are typically more expensive. Given a choice between FHA and conventional loans, households will prefer the relatively cheaper conventional loans.

Therefore, Hispanic households obtaining FHA mortgages will tend to be credit constrained in the conventional market. After controlling for various socioeconomic characteristics of Hispanic households, any remaining race effect in the probit model may be reflective of events unrelated to default risk.

The thesis is organized as follows: The relevant literature on housing discrimination is discussed in Chapter I. A statistical background on the Hispanic housing problems is presented in Chapter II. The analytical framework to test for the existence of credit discrimination in the Hispanic mortgage market is given in Chapter III. Data and variables descriptions are given in Chapter IV. Results, and conclusions are presented in Chapters 5 and 6 respectively. Appendix I introduces a theoretical model that explains the impact of collateral requirements on credit rationing. In Appendix II, variables description and statistical results are presented, followed by the references.

II. BACKGROUND

The Federal Housing Administration (FHA) created by the enactment of the National Housing Act of 1934, and the Veterans Administration's (VA) loan programs authorized by the Servicemen's Readjustment Act of 1944 were designed to increase homeownership rates among middle income households. By insuring the mortgages against default, these two federal programs decrease the default risk to a lender thus making mortgages available at lower interest rates, for longer periods of time and with lower monthly payments to the borrower.

FHA loans are available to all households and are fully insured carrying mortgages insurance premiums equal to 3.8% of loan value. Also, the FHA requires a minimum 3% to 5% downpayment, and limits the loan size to a ceiling which varies from $ 67,500 to $ 124,875 for cities with high housing costs. On the other hand, conventional lending institutions normally require mortgage insurance only to loans with less than 20% downpayment (U.S. GPO, 1990).

The VA Loan Guaranty Program provides housing credit only to veterans and service personnel. VA loans are guaranteed to a maximum of $27,500 in the case of default. Additionally, the minimum downpayment ratio required by VA loans in many cases is set to zero. For example in fiscal

year 1981 over 67% of the veterans purchasing a home with a guaranteed loan were able to obtain zero downpayment loans. Also, VA mortgages require mortgage insurance at only 1% of loan value, but entail no other cost to the household (Veterans Administration, 1982).

Consistent with the Stiglitz and Weiss (1981) model of credit rationing, borrowers identified as having a higher probability or cost of default on the basis of race, income, location or wealth, should be subject to tighter credit constraints and hence be more likely to obtain non-conventional mortgages, ceteris paribus. The empirical evidence reveals that the relative number of government insured mortgages increases in periods of increasing default risk, as lenders tighten non-price constraints on conventional loans (Duca and Rosenthal, 1991).

Also, recent studies of racial discrimination in mortgage markets suggest that minority households are disadvantaged in terms of (1) mortgage credit availability (Garza, 1983), (2) the likelihood of minorities owning homes (Krivo, 1986), (3) racial choices in urban residential location (Gabriel and Rosenthal, 1989) and (4) the share of aggregate housing wealth owned by minority households (Long and Caudill, 1992). Race could also have an impact on the credit standards for minority borrowers if the expected default cost for minorities exceed that of white borrowers

(Yinger, 1986)[2].

In addition, extant research suggests that Veterans' Administration (VA) and conventional mortgage holders have a significantly different demand responsiveness for housing; that marginal changes in credit constraints affect housing demand; and that the Federal Housing Administration (FHA) lending mitigates the effect of mortgage constraints (Rosenthal, et al., 1991).

In terms of racial segregation in the urban housing market, the evidence on the effect of household socio-economic and demographic characteristics on residential location indicates that while the location choice of non-Hispanic whites is sensitive to changes in socio-economic and demographic characteristics, blacks' location patterns are little influenced by large simulated changes in household characteristics. This result may reflect the absence of racial discrimination against non-Hispanic white households in the housing market, which would allow for a wider residential location choice for white relative to black families (Gabriel and Rosenthal, 1989).

While FHA loans have helped Hispanics purchase their own homes, the cost associated with it in the form of higher

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[2] Indeed, these housing problems might provide the basis for other forms of segregation, and can mean distress along several fronts such as health, safety and transportation that could lead to disadvantages in employment, educational opportunities and economic stability (López, 1986).

interest rates has been high. The evidence of the impact of the FHA loan program on Hispanic mortgages shows that 64.8 percent of Hispanic families have FHA mortgages secured through federal entities as compared to 40.6 percent of non-Hispanic white households, and the median length of FHA loans made to Hispanics is about equal to that of white households, 30.1 versus 30.2 years (López, 1986).

Table 1. Percent Distribution of Hispanic and Non-Hispanic White First Mortgage Interest Rates by Mortgage Type, 1981.

	Hispanic			Non-Hispanic White		
Interest Rate %	FHA	VA	Conventional	FHA	VA	Conventional
Less than 6.0	15.2	21.5	3.6	34.4	25.8	6.7
6.0 to 7.9	26.8	19.2	18.9	21.4	21.5	24.1
8.0 to 9.9	39.3	52.3	50.6	28.2	38.0	46.4
10.0 to 11.9	11.7	5.2	18.0	11.8	10.8	14.0
12 or more	7.0	1.7	8.9	4.2	3.9	8.8

Source: López, Manuel M., "Su casa no es mi casa...," (1986): 133.

The data in Table 1 reveal that 58% of Hispanics receiving FHA loans paid an interest rate above 8% compared to 44.2% for non-Hispanic whites. The higher mortgage interest rates paid by Hispanic households could be explained if there is price discrimination against Hispanics by conventional lending institutions or Hispanics had a higher demand for mortgages than whites during the late 1970's and early 1980's, a period of volatile interest

rates. However, the data in Table 2 indicate that only 63.3 percent of all FHA mortgages to Hispanic households are post-1970, for non-Hispanic whites this percentage is 82.5 percent.

Table 2. Percent Distribution of Year First Mortgage was Assumed by Hispanics and non-Hispanic Whites by Mortgage Type, 1981.

	Hispanics			Non-Hispanic Whites		
Year Assumed	FHA	VA	Conventional	FHA	VA	Conventional
1975-1981	44.0	54.1	63.8	55.5	61.1	68.3
1970-1974	19.3	16.2	19.4	27.0	11.6	20.2
1965-1969	16.3	11.0	10.2	7.4	14.0	7.2
1960-1964	14.2	10.8	5.7	5.5	9.3	3.1
1959 or earlier	6.2	7.9	0.8	4.7	4.1	1.2

Source: López, Manuel M., "Su casa no es mi casa...," (1986): 134.

In 1980, the Veterans Administration's loan program accounted for 17.0 percent of all Hispanic primary mortgages. The 1980 census shows that VA mortgages have a median life of 30.2 years for Hispanic as well for white households, and data in Table 1 indicate that 14.7 percent of all VA mortgages made to whites and only 6.9 percent for Hispanics have an interest rate above 10 percent. This higher interest rate paid by white households can be explained by the recency of non-Hispanic white's VA mortgages. About 61 percent of all VA mortgages to non-

Hispanic white households were made between 1975 and 1981, when mortgage interest rates averaged 11.3%, for Hispanics this percentage is only 54 percent.

Moreover, the evidence reported by the Census Bureau shows that during the 1970's a larger percentage of non-Hispanic whites than Hispanic households have been able to afford the increasing expense of home ownership. The Hispanics home ownership rate dropped from 46.2 percent in 1970 to 43.3 percent in 1980. The drop in the Hispanic home ownership rate can be explained by the fact that the average cost of new housing increased by 134.1 percent, and that for existing units by 133.0 percent between 1972 and 1982, while Hispanic households income rose by only 77.8 percent as compared to 83.7 for whites (U.S. HUD, 1989).

Table 3. Percent Distribution of Hispanic and non-Hispanic White Price/Income Ratios for Home Purchases 1977-1981 by Mortgage Type.

	Hispanic				Non-Hispanic White			
Price/Income ratio	Total	FHA	VA	Conv	Total	FHA	VA	Conv
Less than 1.0	10.9	8.0	5.1	13.0	11.8	10.4	7.9	11.5
1.0 to 1.9	35.5	26.5	64.4	33.0	45.6	48.2	49.3	47.4
2.0 to 2.9	27.9	32.7	25.4	27.8	26.4	28.6	29.0	26.1
3.0 to 3.9	11.1	18.6	5.1	10.4	9.0	7.1	7.5	9.0
4 or more	14.6	14.2	0.0	15.9	7.2	5.7	6.3	6.0

Source: López, Manuel M., "Su casa no es mi casa...," (1986): 132.

In Table 3, the data show that in the late 1970's, 26 percent of Hispanics households had purchased homes that were priced three or more times greater than their annual income as compare to only 16.2 percent for non-Hispanics white households. This means that either Hispanics were buying larger homes, or that they had to allocate a larger proportion of their annual income to purchase housing units of equal worth.

Most conventional lending institutions do not dispute the existences of a racial gap in mortgage lending. Banks, thrift and mortgage companies attribute this gap to the lending guidelines of the agencies that buy mortgages to be repackaged into securities. For example, the working poor can afford houses only in neighborhoods that lenders fear the secondary mortgage market will regard as *risky*. If so, the lender can not recover the money to lend again. Mortgage size is a similar obstacle. Besides the difficulty of reselling small mortgages, banks find them unappealing because small loans take just as much work as larger ones, yet only manage to put a little of the bank's money to work.

In 1991 the Federal National Mortgage Association (Fannie Mae), a private federally charted corporation, purchased or guaranteed $ 139 billion or 584,000 home mortgages from more than 1,500 mortgage lenders. However,

only 2.5% of these mortgages were originated in neighborhoods in which 80% of the residents were members of minority groups. Moreover, Fannie Mae refused to buy loans in blocks smaller than $ 25,000; most lenders took that to mean they could not sell Fannie Mae an individual loan below $ 25,000. In 1991, Fannie Mae abandoned its minimum loan size requirement (Thomas, 1992).

The data presented in this chapter suggest that Hispanic households are at a disadvantage, relative to non-Hispanic Whites, in terms of home ownership rate, the percentage of their income devoted to housing and in the mortgage interest rate paid. Also, mortgage lending institutions argued that the guidelines of the agencies that buy mortgages to be repacked into securities tend to increase the racial gap in mortgage lending. The analytical framework to address the above issues and to test for the existence of credit rationing in the mortgage market is presented in the following chapter.

III. ANALYTICAL FRAMEWORK TO TEST FOR THE EXISTENCE OF CREDIT RATIONING IN THE BLACK MORTGAGE MARKET

Black households could face tighter credit constraints in the conventional mortgage market because of their relatively lower income levels, housing preferences and/or their perceived relatively high rate of default.

Utility maximization theory suggests that households will maximize their utility by choosing their preferred combination of tenure status and quantity of housing subject to a given set of prices, income and credit constraints. The following model shows how the perceived default risk of a group could displace this group into the FHA market.

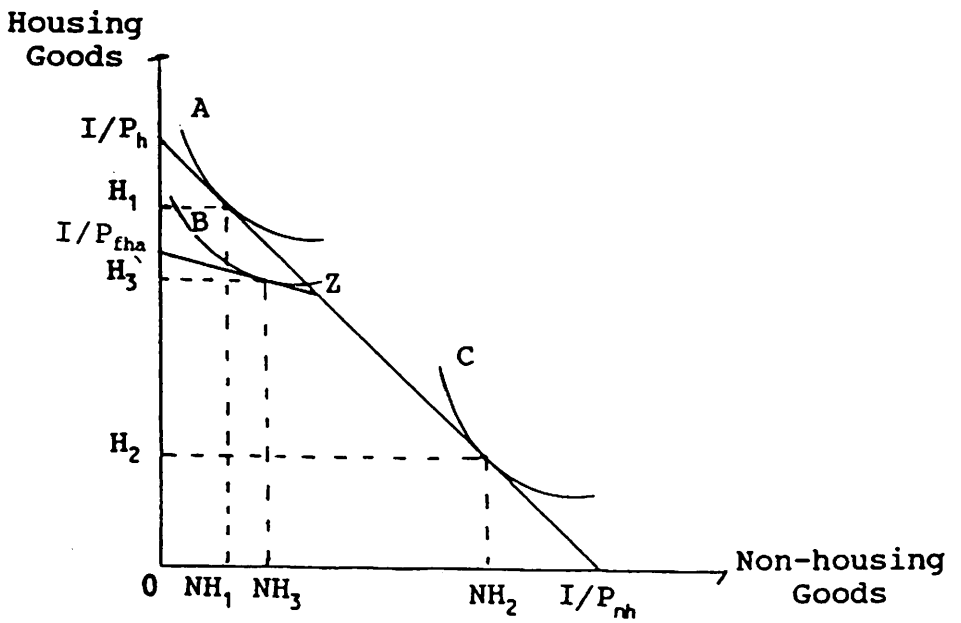

Figure 1. Levels of Housing/Non-housing Goods Consumption Under Credit Rationing.

In figure 1, the budget line shows the different combinations of housing and non-housing consumption levels for a household with income (I). The vertical intercept (I/P_h) and the horizontal intercept (I/P_{nh}) represent the maximum amount of housing and non-housing units that could be obtained if only one of the two alternatives was consumed[3]. If there are no credit constraints, households could freely choose the housing level that would maximize their utility. That is, for households that highly prefer housing to other goods the optimal level of housing and non-housing consumption would be at H_1 and NH_1 where their indifference curve (A) is tangent to the budget constraint; and for household with relatively lower housing preferences (indifference curve C) their optimal level of housing and non-housing consumption would be at point H_2 and NH_2, respectively.

In the presence of credit rationing, however,

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[3] Housing is assumed to be a normal good. That is, as household income increases, the amount of housing units consumed also increases. An indifference curve is a line connecting all combination of housing and non-housing goods that are equally desirable to the household. The indifference curves are assumed to be downward sloping and convex to the origin. The slope of the indifference curves, or the marginal rate of substitution refers to the maximum amount of non-housing units a household is willing to give up in exchange for one more unit of housing which increases at a decreasing rate. As long as the household desires more of housing and non-housing units, every point on a curve farther from the origin will be preferred to any point on a lower indifferent curve.

households with housing preferences above point Z that are perceived by the conventional market as risky investments because of their current income level, their higher housing preferences and/or their race would be displaced into the FHA mortgage market. Given the additional mortgage cost associated with the insurance premium required by the FHA market, households that are displaced into the FHA market would face the budget line represented by I/P_{nh}-Z-I/P_{fha}. The lower vertical intercept I/P_{fha} represents the maximum amount of housing goods that could be obtained, by a credit rationed household, in the FHA market if only housing goods were consumed. Since credit rationed households are also constrained by a maximum share of income that they can spend on housing, they would also be displaced to a lower indifference curve (B) that yields a lower housing consumption level (H_3).

This theoretical development, however, does not explain why banks would ration credit to Hispanics. Basic supply and demand laws tell us that if demand for loans exceeds the supply of loans, interest rates will increase thus reducing the quantity demanded or increasing the supply of loans until demand and supply are equated at a new equilibrium interest rate. According to this principle there is no reason for credit rationing to exist. Several explanations, however, exist. In the short run credit rationing can be

viewed as a temporary disequilibrium caused by an exogenous shock. During this period lagged interest rate adjustments allow for credit rationing (Goodwin, 1986). Long term credit rationing could be explained by government interventions in the mortgage markets such as the imposition of usury laws (Smith, 1983), and in mortgage markets with imperfect information, it is difficult for banks to distinguish low risk borrowers from riskier borrowers, and to do so the banks use a variety of screening devices (Bester, 1985)[4].

That is, the interest rate a borrower agrees to pay and the collateral requirement determined by the banks act as a function of the perceived risk of borrowers. When lending institutions are faced with an excess demand for loans at a given rate, banks could increase the lending rate or increase the collateral requirement to accommodate this excess demand. However, why do banks prefer to ration credit than to increase the lending rate, the supply of funds or the collateral requirement when there is an excess demand for loans?

In figure 2, the loan offer curve for minorities

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[4] "Usury restrictions limit the availability of credit. Studies have found that the average number of loans and the dollar amount of loans are substantially lower in low-ceiling states than in high ceiling states. In states where free market is above the ceiling, the poor, the transient, the young and those with large families are rationed out of the credit market first, since financial institutions must utilize nonprice methods to decrease risk and increase effective yields" (U.S. GPO, 1980).

$L=S(R_c)$ that maximizes the bank's expected profits and the minority's demand for loans curve $L=D(R_c)$ are expressed as a function of the loan rate, R_c. If minorities are perceived as a higher default risk group, then the minorities loan offer would be lower than the overall market offer curve $L=S(R_{cm})$[5].

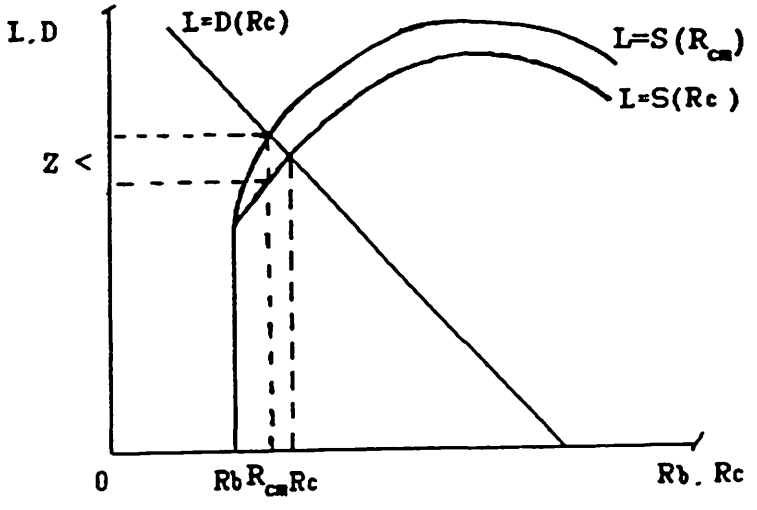

Figure 2. Loan Demand and Loan Offer curves.

The household demand for loans curve $L = D(R_c)$ is

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[5] The loan offer curve is derived in Appendix I. This loan offer function has the following properties: (1) the loan amount (L) equals zero when the return of an alternative investment (R_b) is greater than the loan rate R_c; (2) if $R_c = R_b$, then the bank is indifferent between extending the loan and investing on the alternative investment and (3) the loan amount (L) approaches zero as the contracted (Rc) goes to infinity. That is, the probability of default increases as Rc increases thus reducing the bank's expected profits (Jaffee and Modigliani, 1969).

inversely related to the loan rate. That is, as the interest rate increases the quantity of mortgages demanded decreases. Minority borrowers will be rationed in the amount indicated by (Z) if the optimal market loan rate, say R_{cm}, is less than R_c because the bank's optimum loan offer for minorities lies below the minority's demand curve. Lending institutions would not ration credit if there were not legal restrictions on the loan rate they could charge to different individuals. However, legal restrictions, and considerations of good will and mores, and rate fixing agreements among banks make it almost impossible for lending institutions to charge significantly different rates to different customers.

Why, when faced with excess demand for loans, would not banks increase their collateral requirements thus reducing the demand for funds and the risk of default, and increasing the returns to the bank?

Theoretical models that explain the impact of collateral requirements on credit rationing suggest that in the bank's view an increase in collateral requirements has two effects on the mortgage market: (1) households that decided to stay in the market will choose less expensive homes, and (2) low risk, less wealthy potential home buyers will drop out of the mortgage market. The increased collateral requirement could significantly increase the second effect, thus decreasing the bank's expected returns

(Wette, 1983)[6].

Hispanic borrowers who are denied loans could not obtain a loan even if they indicated a wiliness to pay more than the advertised interest rate, or to put up more collateral than is demanded. If banks increased the interest rate or the collateral requirements, low risk Hispanic home buyers could drop out of the mortgage market. Thus, the risk on the bank's loan portfolio could increase possibly decreasing the bank's expected profits. Moreover, credit rationing would exist if banks limit the number of loans that they will make, rather than limiting the size of each loan, or relating the interest charged to the loan size.

The credit rationing theory presented in this chapter suggests that Hispanic households could be rationed in the conventional credit market because of their relatively lower income levels, higher housing preferences and/or their race. Also, this theory suggests that households that are displaced into the relatively more expensive FHA mortgage market would face a relatively lower housing consumption level. The empirical model needed to investigate whether Hispanics are discriminated against in the housing market is presented in the following chapter.

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[6] The theoretical model is presented in Appendix I.

IV. THE EMPIRICAL MODEL, DATA AND VARIABLES DEFINITION

Data for the analysis are taken from the 1989 Metropolitan file of the American Housing Survey (MAHS), which contains individual respondent records in 11 metropolitan areas[7]. This data set has been widely used in previous housing studies and provides the best detailed housing and socio-economic data on households across the nation. The only shortcoming of using the MAHS data is that it does not provide information on whether the household that holds a FHA secured mortgage had been previously denied a conventional mortgage, or if the household had only applied to FHA mortgages because he/she perceived the conventional mortgage market as being unfriendly.

An alternative source of housing information is the Home Mortgage Disclosure Act (HMDA) data. However, the HMDA data only provides one piece of economic information about the applicant, income. Given the choice in data sets, the MAHS data was selected for this study because its provides a complete socio-economic description of households' characteristics across the nation.

To reduce measurement errors only those households that purchased their homes between 1980 and 1989 and obtained

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[7] The 11 Metropolitan areas are: Boston, Dallas, Detroit, Fort Worth, Los Angeles, Minneapolis, Philadelphia, Phoenix, San Francisco, Tampa and Washington D.C.

newly originated conventional or FHA mortgages were selected. From the original sample of 36,000 records only 3,779 were selected.

The Gabriel and Rosenthal model is used here, augmented by a measure of permanent income and transitory income, because households could borrow against their future income thus spreading housing consumption cost over time according to their expected permanent income. The empirical analysis is based on a probit model of whether Hispanic borrowers obtain fully insured Federal Housing Administration (FHA) or conventional mortgage financing.

Consistent with Stiglitz-Weiss model of credit rationing, Hispanic households perceived as high risk borrowers should be subject to credit constraint and be more likely to obtain FHA financing, ceteris paribus.

The probit model is given by:

$$FHA = \alpha_0 + \alpha_1 \log Y_p + \alpha_2 \log Y_t + \alpha_3 CITY + \alpha_4 HAR + \alpha_5 BLACK + \alpha_6 HISPANIC + \alpha_7 AGE1 + \alpha_8 MAR + \alpha_9 SEX + e_i \quad (1)$$

where: Yp and Yt are measures of permanent and transitory incomes, respectively. CITY is the identifier for central city location; HAR is the housing price appreciation rate; AGE1, BLACK, HISPANIC, MAR and SEX are the age, race, marital status and sex of the household head; and α_0, α_1, α_2, α_3, α_4, α_5, α_6, α_7, α_8 and α_9 are coefficients. The error term

(e_i) is assumed to have a normal distribution and finite variance.

The dependent variable in the probit model equals 1 if the household obtained a FHA loan and 0 if it obtained a conventional loan. Gabriel and Rosenthal used a measure of household wealth (housing downpayment plus all liquid assets) to test for the likelihood of binding conventional downpayment constraints. However, most housing analysts suggest that some form of long-term income variable, which has a wealth component in it, is a principal determinant of housing tenure choice. That is, households look beyond their current income and wealth level in making their housing decisions. Households could borrow against future incomes to spread out housing consumption over time consistent with their expected permanent income (Goodman and Kawai, 1984; Goodman, 1988; Cameron, 1986).

Moreover, mortgage payments-to-income ratios are also an important tool of non-price credit rationing. Given that the preferred budget share of housing declines with household's income, then conventional payments-to-income ratio constraints will be relatively more binding for lower-income families[8]. Since FHA payments-to-income standards are less restrictive than conventional criteria,

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[8] Carliner (1973) finds that the income elasticity for housing demand is less than 1 , which means that the preferred budget share of housing declines with income.

then we can expect that lower-income families will favor FHA financing.

Using the method presented by Goodman and Kawai (1982), the following regression equation was estimated to construct the permanent and transitory components of measured income:

$$Y_i = \alpha_0 + \alpha_1 EDUC + \alpha_2 SEX + + \alpha_3 EXP + \alpha_4 EXP^2 + \alpha_5 MAR + \alpha_6 HISPANIC + \alpha_7 BLACK + W_i \qquad (2)$$

where EDUC and EXP are measures of human wealth. EXP^2 is included to capture nonlinear effects of this variable on permanent income. Sex, marital status (MAR) and race (BLACK or HISPANIC) indicate other human and non-human wealth variables for each household head. These dummy variables equal 1 if the household head is Hispanic or black, female, and married and equal 0 otherwise. W_i is the disturbance term uncorrelated with the explanatory variables so that the OLS estimation procedure provides consistent and efficient estimators.

The signs of the coefficients are expected to be:
$\alpha_1 > 0$, $\alpha_2 < 0$, $\alpha_3 > 0$, $\alpha_4 < 0$, $\alpha_5 > 0$, $\alpha_6 < 0$ and $\alpha_7 < 0$

The predicted value of Y_i can be interpreted as the estimate for permanent income (Y^p), and the predicted value of W_i as the estimate for transitory income (Y^t).

The dummy variable CITY equals 1 if the house is located within the central city of a metropolitan area an 0

otherwise. Central city locations are usually identified with urban decay that may be associated with lower housing appreciation rates. Vandell and Thibodeau (1985) have shown that neighborhood quality is a significant predictor of loan default rate. Therefore, central city location should be positively related to the probability of obtaining FHA mortgage financing.

Lenders expectations of annual home appreciation rate (HAR) also affect lender exposure to default risk, because low rates of home appreciation depress the rate of collateralization on the loan. We can expect that conventional lenders would impose stricter downpayment constraints to households buying in areas with lower appreciation home rates to insure that mortgages are fully collateralized. In comparison, FHA lending procedures prohibit the use of property location as a factor of loan evaluation. This implies that households locating in areas of low housing appreciation rates would be more likely to obtain FHA mortgages. The home appreciation rate (HAR) was entered into the probit model as the house annual rate of appreciation from the time the household purchased the property to the time of the survey (1989)[9].

Households are described by the following demographic

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[9] HAR = $(VALUE/PPRICE)^{1/90-buyyear}$ Where VALUE is the estimated property value in 1989; PPRICE is the price paid for the property and buyyear is the year property was purchased.

variables: (1) Assuming that credit history, credit worthiness and the likelihood of owning increases with age, conventional lenders may apply more flexible credit constraints to older households, increasing their likelihood of obtaining a conventional loan.

(2) Household head race is defined by the HISPANIC and BLACK 0-1 dummy variables and equal 1 if the household head race is Hispanic or black respectively, and 0 otherwise. Generally, minority households are associated with lower levels of income and wealth than white households, and minorities tend to be concentrated in central city locations subject to lower housing appreciation rates. Also, as racial discrimination persists in the labor market, non-whites are more likely to suffer layoffs or other income shocks (Kain and Quingley, 1975; Gabriel and Wolch, 1984).

(3) MAR and (4) SEX are also dummy variables. Both equal 1 if the household head is female and married and 0 otherwise. These two variables are used to account for the possibility that different family types may have different underlying preferences for tenure choice.

These differences suggest that the expected default risk on a mortgage issued to a minority would be greater than for a non-Hispanic white household. Consistent with Stiglitz and Weiss, conventional lenders are expected to apply tighter credit constraints to minority applicants.

Given that various proxies for default risk and cost have been fully integrated into the model, any remaining race effects would reflect one of two possibilities: the proxies for default risk and cost do not fully capture lender evaluations of individuals default risk, or household race is an important factor determining the type of mortgage minority households obtain for reasons other than default risk. The results from the empirical analysis, of the impact of household race and other socio-economic characteristics on the type of mortgage a household obtain, are presented in the next chapter.

V. RESULTS

The permanent and transitory incomes, and the probit model were estimated from the complete sample of 3767 home buyers from 1980 through 1989 in 11 metropolitan areas. The variables used in all the estimations are listed and fully described in Table 1. All variables refer to the head of the household.

The sample data statistics are presented in Table 2. The total sample consists of 3316 non-Hispanic white, 230 black and 221 Hispanic households with a mean age of 39 years. With a mean income of $52,088, households in the sample are well above the 1988 national average household income of $32,191. This limits the study to the upper middle income population excluding those households that are at or below national average, for whom discrimination in the mortgage market could be more intense.

The first column of table 3 reports the coefficients and t-values associated with each variable in the permanent and transitory incomes linear estimation. The second column reports the results from the logarithmic estimates. The t-statistics in parentheses indicates the statistical significance of the coefficient.

All the coefficients in the estimated permanent and transitory incomes function have the expected sign, and are

statistically significant with the exception of the race variables- HISPANIC and BLACK. The education, experience and marital status variables reflect the positive returns to income of each variable. The gender variable, SEX, has the expected negative sign which reflects that females earnings are lower than comparable males. Although, the signs of the coefficients for the race variables are negative, their low t-statistic may be reflective of the higher income and education characteristics of the sample.

In Tables 4 and 5, the regression estimates and the estimates of the probit model for minorities (Hispanics and blacks combined) indicate that variables which proxy for lenders' concern over default risk have the expected effect on the type of loan that minorities obtain. The permanent and transitory income coefficients are negative and statically significant which indicates that as income increases the probability of obtaining an FHA loan decreases.

Similarly, the estimated coefficients of the annual housing appreciation rate (HAR), central city location (CITY) and age (AGE1) are of the expected sign and are statistically significant. These estimates indicate that younger households buying houses located in central city location, characterized by lower appreciation rates, are more likely to obtain FHA mortgages. The marital status

(MAR) and gender (SEX) variables are not statistically significant.

The estimated coefficient for the race (MINORITY) variable is of the expected sign (positive) and is statistically significant (3.86). This indicates that even after controlling for various proxies that control for lender perception of default risk, minorities are relatively more likely to obtain FHA mortgages than comparable non-Hispanic white households.

Despite our choice of a different data source in this study, the results are consistent with Gabriel and Rosenthal's study that finds that the race effect for blacks has an important impact on the type of loan they obtain. However, when blacks and Hispanics are entered separately into the model the estimated impact of the individual race on the type of mortgage obtained is substantially different.

In Tables 6 and 7, the regression estimates and the estimates of the probit model for blacks and for Hispanic households reveal that when the two groups are independently entered into the equations, the race effect increases for black household and for Hispanics it disappears. That is, black households are more likely to face tighter credit constraints in the conventional mortgage market thus increasing their probability of obtaining a FHA mortgage relative to comparable Hispanics and non-Hispanic whites.

Although the estimated coefficients for the HISPANIC variable in these models are negative (-.02), they are not statistically significant (-.52 and -.69 for the liner and logarithmic equations respectively). Therefore, the race variable for Hispanics, relative to non-Hispanic white households, does not have a significant effect on the probability of obtaining an FHA mortgage.

Furthermore, the results presented in Tables 8 and 9, suggest that the impact of black's race on the probability of obtaining a FHA loan, relative to Hispanic households, remains positive and statistically significant.

VI. CONCLUSIONS

The empirical results presented in this Master's thesis suggest that socio-economic variables which proxy for lender's concerns about default risk and cost have an important effect on the type of mortgages borrowers obtain. These results are consistent with previous studies of mortgage lending discrimination that have found that blacks are less likely to obtain conventional financing than whites, even after controlling for socio-economic proxies for default risk (Gabriel and Rosenthal, 1991), and that blacks and Hispanics as a whole face higher denial rates in the conventional mortgage market than comparable non-Hispanic white households (Munnell et al., 1992).

Also, these findings are consistent with the theoretical model of credit rationing developed by Stiglitz and Weiss (1981), and provide one more piece of evidence on the credit rationing behavior -based on perceived differences in borrowers' default risk and cost- of conventional lending institutions.

The results of this study, however, suggest that when the race effect of Hispanic and black households is separately analyzed Hispanic households do not face credit rationing, proxied by the likelihood of obtaining a FHA mortgage, in the conventional mortgage market . These

results in no way suggest that all Hispanic sub-groups are not in disadvantage in terms of conventional mortgage availability, but given that the data used in this study categorized Hispanics of all origins together, a comparison among distinct Hispanic sub-groups could not be made. Further research is recommended to determine if these results hold among various Hispanic groups e.g. Mexican-American, Cuban, Puerto Rican, and others.

Selective policy recommendations could be formulated once research on the Hispanic mortgage market, at the subgroup level, is conducted. For the moment, policy that targets all Hispanics is not recommended because it may not serve those Hispanic subgroups that are presently at a greater disadvantage.

APPENDIX I

Consider Stiglitz and Weiss (1981) investment model with credit rationing to explain why among loan applicants that appear to be identical some receive a loan and others do not; even if (1) the rejected applicants agree to pay a higher interest rate and to put up more collateral than the rate and amount advertised by the bank, and (2) the supply of credit increases to accommodate any excess demand for loans.

Let's assume that a profit maximizing bank has identified two households, a non-Hispanic white and a Hispanic, that (1) want to buy a house costing a predetermined amount of money (**C**), (2) would pay a mortgage rate ($\mathbf{R_c}$) and (3) would get a loan amount (**L**). In the bank's view the riskiness of each mortgage can not be ascertained and to simplify the model a one period mortgage is assumed.

However, the bank perceives non-Hispanic whites as a risk-free group and Hispanics as a members of a risky group. That is, the ability of both households to met all of their mortgage payments ($\bar{\mathbf{x}}$) may take a value between $\underline{\mathbf{x}}$ and $\mathbf{Q}$ with the probabilities indicated in Figure 1 by the bell-shaped curve, and the Hispanic household probability of default indicated by the shaded area.

Since the bank is certain that the non-Hispanic white

borrower will meet all of his/her mortgage payments, the analysis that follows focuses on the bank's lending practices towards Hispanic households that are perceived as risky borrowers.

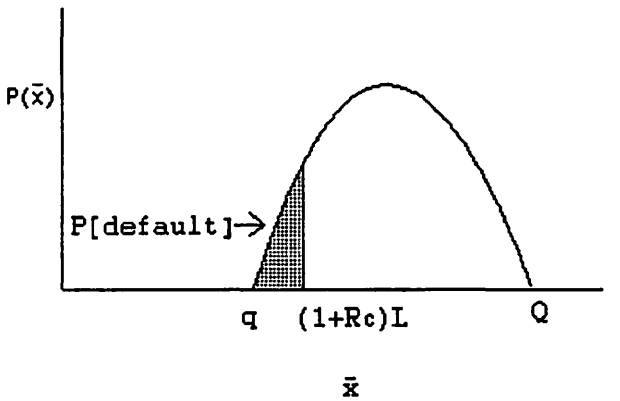

Figure 3 The probability of default and possible proceeds from a venture.

Given a loan amount **L**, the Hispanic borrower owes the bank $(1 + R_c)$ L at the end of the period. If $\bar{x} < (1 + R_c)$ L, then the Hispanic borrower is in partial default, and if the household ability to meet the mortgage payments increases, that is $\bar{x} \geq (1 + R_c)$ L, then the bank gets paid in full and the borrower keeps the difference if any. The bank's expected profits from the loan to the risky borrower are given by:

$$\Pi_e = \int_{q}^{(1+R_c)L} \bar{x}p(\bar{x})\,d\bar{x} + (1+R_c)L \int_{0}^{(1+R_c)L} p(\bar{x})\,d\bar{x} - (1+R_b)L \qquad (3)$$

The first term in Equation (3) is the bank's expected repayment if the Hispanic household is unable to meet its mortgage payments, that is, $\bar{x} \leq (1 + R_c)\ L$. The second term is the contracted repayment times the probability that the repayment ability of the household would be sufficient to repay the loan in full. The last term is the opportunity cost of the loan to the lender, where R_b is the certain rate of return on alternative investments, say, Treasury bills.

The optimal loan size (**L**) to the Hispanic borrower that would maximize the bank's expected profit is calculated by setting the first derivative of the expected profits (Π_e) with respect to (L) equal to zero.

$$\begin{aligned}\frac{d(\Pi_e)}{dL} &= (1+R_c)\,[(1+R_c)Lp((1+R_c)L] \qquad (4)\\ &+ (1+R_c)L[-(1+R_c)p((1+R_c)L)]\\ &+ (1+R_c)\int_{(1+R_c)1}^{q} p(\bar{x})\,d\bar{x} - (1+R_b) = 0\end{aligned}$$

Rearranging gives:

$$\frac{1+R_b}{1+R_c} = \int_{(1+R_c)L}^{Q} p(\bar{x})\,d\bar{x} = 1 - \int_{q}^{(1+R_c)L} p(\bar{x})\,d\bar{x} \qquad (5)$$

and

$$\int_{q}^{(1+R_c)} p(\bar{x})\, d\bar{x} = \frac{R_c - R_b}{1+R_c} = P[default] \qquad (6)$$

In equation (6), the optimal loan size is the amount for which the probability of default equals the present value of the excess of the loan rate over the opportunity cost of the loan. For example, values of $R_c = 0.15$ and $R_b = 0.08$ induce the bank to extend a loan such that P[default] = 0.061. As the return of the contract loan rate (R_c) increases, the bank is induced to accept a higher probability of default.

By taking the second derivative of the expected profits equation (Π_e) with respect to the loan size (L), I can show that equations (5) and (6) are consistent with a profit maximum for all values of L between $q/(1+R_c)$ and $Q/(1+R_c)$.

$$\frac{d^2(\Pi_e)}{dL^2} = -(1 + R_c)^2\, p[(1 + R_c)L] \qquad (7)$$

$$\begin{cases} <0 \text{ for } q \le (1+R_c)L \le Q \\ =0 \text{ otherwise} \end{cases}$$

The optimal loan size to the risky borrower could be expressed as a function of the loan rate by the loan offer curve, $L = S(R_c)$. Let's suppose that the lender believes that the probability that the risky household would meet all of his/her mortgage payments ($\bar{x}$) is uniformly distributed

between q and Q that is:

$$p(\bar{x}) = \begin{cases} \frac{1}{Q - q} & for \quad q \le \bar{x} \le Q \\ 0 & elsewhere \end{cases} \qquad (8)$$

Substituting Equation (8) into Equation (6)

$$\int_{q}^{(1+R_c)L} \frac{1}{Q-q}\, d\bar{x} = \frac{(1+R_c)L - q}{Q - q} = \frac{R_c - R_b}{1 + R_c} \qquad (9)$$
$$= P[default]$$

After rearranging, the loan offer function is given by:

$$L = S(R_c) = \frac{q}{1+R_c} + \frac{(Q-q)(R_c - R_b)}{(1+R_c)^2} \quad for \quad R_c \ge R_b \qquad (10)$$

Given this loan offer function we can observed that[10]:
(1) If $R_c < R_b$; then L = 0 because the bank will not extend risky loans at a contract rate less than the certain return rate on Treasury bills.
(2) If $R_c = R_b$, then $0 \le L \le q / (1 + R_c)$. That is, the bank is indifferent between extending the loan and purchasing of Treasury bills because the loan is certain to be repaid when $L(1 + R_c) \le q$.
(3) The bank will extent a loan if the contracted payment is

[10]These properties are consistent with those described by Stiglitz and Weiss (1981).

smaller or equal than the maximum ability of the household to meet its mortgage payments, that is $L(1 + R_c) \leq Q$.
(4) The loan amount approaches zero as the contract rate (R_c) goes to infinity. That is, the probability that the borrower will not meet the repayment amount increases as R_c increases.
(5) Equation 7 shows that for a given contract rate, the expected profits from the investment decrease as the loan deviates from its optimal size.
(6) Expected profits increase along the loan offer curve as R_c increases up to where the repayment amount $(1 + R_c) L$ approaches the upper limit of the households ability to meet all mortgage payments (Q). Beyond this point, the bank has the incentive to increase R_c while reducing the loan amount (L).

Theoretical models that explain the impact of collateral requirements on credit rationing suggest that in the bank's view an increase in collateral requirements has two effects on the mortgage market: (1) households that decided to stay in the market will choose less expensive homes, and (2) low risk, less wealthy borrowers will drop out of the mortgage market. The increased collateral requirement could significantly increase the second effect, thus decreasing the bank's expected returns (Wette, 1983).

That is, an individual with wealth W_o, and that is

required some amount of collateral (C) and to pay an interest rate of R_c, expects to obtain a level of utility given by:

$$[Max\ U_{\bar{x}}\ (w_o R_b - (1+R_c) + \bar{x})\ p(\bar{x}) \qquad (11)$$

$$+\ U\ ((W_o - C) R_b)\ (1 - p(\bar{x}))] \equiv V(W_o)$$

where: R_b is the return of an alternative investment, $\bar{x}$ are the expected proceeds from the investment and $p(\bar{x})$ is the probability of success. By partially differentiating $V(W_o)$ with respect to the collateral requirement, I can show that this adverse selection more than offset the positive direct effect.

$$dV/dC = -U^1 R_b (1 - p(\bar{x})) < 0 \qquad (12)$$

Hispanics that are perceived as low wealth/high risk individuals an increase in (C) has not adverse selection effect, thus the bank returns are increased. But, low wealth/low risk individuals would drop out of the lending market, thus reducing the bank's expected profits (Stiglitz and Weiss, 1987).

APPENDIX II

Table 1. Definition of Variables

VARIABLE	DEFINITION
INCOME	1989 reported household head income
LnINCOME	Natural log of 1989 reported income
MAR	1 = if household head is married; 0 otherwise
SEX	1 = if household head is male; 0 otherwise
EDUC	household head years of schooling
EXP	= AGE - EDUC - 5
EXP^2	Experience squared
HAR	Annual housing appreciation rate
YP	Permanent income
YT	Transitory income
LnYP	Natural log of permanent income
LnYT	Natural log of transitory income
CITY	1 = if house is located within the central city of a metropolitan area; 0 otherwise
AGE1	Household head age/100
BLACK	1 = if household head is black; 0 otherwise
HISPANIC	1 = if household head is Hispanic; 0 otherwise
MINORITY	1 = if household head is black or Hispanic; 0 otherwise
FHA	1 = if mortgage applicant obtained a FHA loan; 0 otherwise

Table 2. Sample Data Statistics

VARIABLE	MEAN	STANDARD DEVIATION
FHA	.28	.45
INCOME	52,088	29,270
LnIncome	10.70	.61
YP	52,100	13,300
YT	0.00	26,100
LnYP	10.72	.29
LnYT	-.02	.53
EDUC	14.20	2.63
EXP	19.68	11.74
EXP^2	524.92	674.67
MAR	.70	.46
SEX	1.26	.44
AGE1	.39	.11
HAR	1.06	.13
CITY	.16	.36
BLACK	.06	.24
HISPANIC	.06	.24
MINORITY	.12	.33

Table 3. Mincer Earnings Function

VARIABLE	Dependent=Income Coefficients (t-Statistic)	Dependent=LnIncome Coefficients (t-Statistic)
Constant	-22,272.42 (-6.14)***	9.25 (125.97)***
EDUC	3,649.21 (20.48)***	.07 (19.88)***
SEX	-2,725.06 (-2.58)*	-.07 (-3.43)**
EXP	1,307.17 (10.96)***	.03 (11.33)***
EXP^2	-22.02 (-10.63)***	-.0005 (-12.73)***
MAR	17,148.31 (16.79)***	.38 (18.58)***
HISPANIC	-586.38 (-.31)	-.05 (-1.37)
BLACK	-2,813.80 (-1.58)	-.06 (-1.73)*
Adj. R^2	.21	.24
N	3767	3767

***, **, * significant at the 1 percent, 5 percent, and 10 percent levels, respectively.

Table 4. Regression Estimates (Dependent Variable = FHA) Minority (Hispanics + blacks)

VARIABLE	Coefficient (t-Statistic)	Coefficient (t-Statistic)
Constant	1.05 (13.14)***	2.60 (7.06)***
YP	-.35 (-4.99)***	----
YT	-.15 (-5.47)***	----
LnYP	----	-.16 (-4.77)***
LnYT	----	-.05 (-3.53)**
AGE1	-.69 (-10.68)***	-.73 (-11.24)***
SEX	-.003 (-.15)*	-.005 (-.26)*
MAR	.01 (.53)*	.013 (.61)*
CITY	.04 (2.03)**	.04 (1.97)**
HAR	-.32 (-5.73)***	-.32 (-5.73)***
MINORITY	.09 (3.86)***	.09 (3.76)**
NON-HISPANIC WHITES	BASE	BASE
Adj. R^2	.057	.052
N	3,767	3,767

***, **, * significant at the 1 percent, 5 percent, and 10 percent levels, respectively.

Table 5. Estimates of the Probit Model
Minority (Hispanics + blacks)
(Dependent Variable = FHA)

VARIABLE	Coefficients (Standard Errors)	Coefficients (Standard Errors)
Intercept	6.751 (.241)	10.555 (1.003)***
YP	-.891 (.191)**	----
YT	-.433 (.08)***	----
LnYP	----	-.394 (.091)**
LnYT	----	-.119 (.035)**
AGE1	-1.897 (.188)***	-1.992 (.187)***
SEX	-.001 (.046)	-.007 (.046)
MAR	.029 (.053)	.032 (.055)
CITY	.097 (.051)**	.095 (.051)**
HAR	-1.053 (.185)***	-1.049 (.184)***
MINORITY	.217 (.057)**	.213 (.057)**
NON-HISPANIC WHITES	BASE	BASE
χ^2	3,761	3,744
N	3,767	3,767

***, **, * significant at the 1 percent, 5 percent, and 10 percent levels, respectively.

Table 6. Regression Estimates (Dependent Variable = FHA)
Blacks and Hispanics

VARIABLE	Coefficients (t-Statistic)	Coefficients (t-Statistic)
Constant	1.06 (13.29)***	2.86 (7.71)***
YP	-.39 (-5.58)***	———
YT	-.15 (-5.49)***	———
LnYP	----	-.19 (-5.48)***
LnYT	----	-.05 (-3.55)**
AGE1	-.69 (-10.82)***	-.74 (-11.46)***
SEX	-.006 (-.34)	-.009 (-.50)
MAR	.02 (1.12)	.03 (1.30)
CITY	.03 (1.72)*	.03 (1.66)*
HAR	-.31 (-5.52)***	-.31 (-5.52)***
BLACK	.18 (6.08)***	.18 (6.06)***
HISPANIC	-.02 (-.52)	-.02 (-.69)
NON-HISPANIC WHITES	BASE	BASE
Adj. R^2	.062	.058
N	3,767	3,767

***, **, * significant at the 1 percent, 5 percent, and 10 percent levels, respectively.

Table 7. Estimates of the Probit Model Blacks and Hispanics (Dependent Variable = FHA)

VARIABLE	Coefficients (Standard Errors)	Coefficients (Standard Error)
Intercept	6.799 (.243)	11.352 (1.024)
YP	-1.02 (.194)**	----
YT	-.441 (.081)**	----
LnYP	----	-.470 (.093)**
LnYT	----	-.121 (.036)**
AGE1	-1.927 (.188)***	-2.035 (.188)***
SEX	-.011 (.047)	-.019 (.047)
MAR	.063 (.054)*	.073 (.056)*
CITY	.082 (.051)**	.080 (.051)**
HAR	-1.032 (.186)**	-1.03 (.185)**
BLACK	.433 (.073)**	.431 (.073)**
HISPANIC	-.045 (.082)	-.056 (.083)
NON-HISPANIC WHITES	BASE	BASE
χ^2	3,766	3,749
N	3,767	3,767

***, **, * significant at the 1 percent, 5 percent, and 10 percent levels, respectively.

Table 8. Regression Estimates (Dependent Variable = FHA)
Blacks

VARIABLE	Coefficients (t-Statistic)	Coefficients (t-Statistic)
Constant	.97 (4.43)***	2.49 (1.98)**
YP	-.38 (-1.37)	----
YT	-.22 (-2.59)**	----
LnYP	----	-.16 (-1.33)
LnYT	----	-.06 (-1.41)
AGE1	-.64 (-3.08)**	-.65 (-3.11)**
SEX	-.03 (-.54)	-.04 (-.64)
MAR	.08 (1.02)	.08 (1.05)
CITY	-.01 (-.24)	-.008 (-.17)
HAR	-.26 (-1.90)*	-.25 (-1.84)*
BLACK	.22 (4.32)***	.23 (4.25)***
HISPANIC	BASE	BASE
Adj. R^2	.07	.06
N	451	451

***, **, * significant at the 1 percent, 5 percent, and 10 percent levels, respectively.

Table 9. Estimates of the Probit Model
Blacks
(Dependent Variable = FHA)

VARIABLE	Coefficients (Standard Errors)	Coefficients (Standard Errors)
Intercept	6.450 (.611)	10.026 (3.047)
YP	-.967 (.678)**	----
YT	-.617 (.229)**	----
LnYP	----	-.384 (.291)**
LnYT	----	-.134 (.092)**
AGE1	-1.613 (.518)**	-1.590 (.515)**
SEX	-.072 (.130)	-.081 (.130)
MAR	.187 (.173)*	.199 (.183)*
CITY	-.028 (.111)	-.017 (.111)
HAR	-.875 (.436)**	-.842 (.430)**
BLACK	.523 (.122)**	.515 (.124)**
HISPANICS	BASE	BASE
χ^2	443	446
N	451	451

***, **, * significant at the 1 percent, 5 percent, and 10 percent levels, respectively.

REFERENCES

Bester, Helmut. (1985). "Screening vr. Rationing in Credit Markets with Imperfect Information." The American Economic Review 75, 850-445.

Cameron, Trudy A. (1986). "Permanent and Transitory Income in Models of Housing Demand." Journal of Urban Economics 20, 205-210.

Carliner, Geoffrey. (1973). "Income Elasticity of Housing Demand." The Review of Economics and Statistics 55, 528-532.

Cotton, Lindsay. (1988). "A Model and Some Evidence Concerning the Influence of Discrimination on Wages." Economic Inquiry 26, 645-660.

Gabriel, Stuart A., and Stuart S. Rosenthal. (1991). "Credit Rationing, Race, and the Mortgage Market." Journal of Urban Economics 29, 371-379.

---. (1989). "Household Location and Race: Estimates of a Multinomial Logit Model." The Review of Economics and Statistics 71, 240-249.

Gabriel, Stuart A., and J. Wolch. (1984). "Spillover effects of human service facilities in a racially segmented housing market." Journal of Urban Economics 16, 339-350.

Garza, José S. (1983). "Hispanic America: limited housing options," in U.S. Commission on Civil Rights (eds.) A Sheltered Crisis: The State of Fair Housing in the Eighties. Civil Rights Commission: Washington, D.C.

Goodman, Allen C. (1988). "An Econometric Model of Housing Price, Permanent Income, Tenure Choice, and Housing Demand." Journal of Urban Economics 23, 327-353.

Goodman, Allen C., and Masahiro Kawai. (1984). "Estimation and Policy Implications of Rental Housing Demand." Journal of Urban Economics 16, 76-90.

---. (1982). "Permanent Income, Hedonic Prices, and Demand for Housing: New Evidence." Journal of Urban Economics 12, 214-237.

Goodwin, Thomas H. (1986). "The Impact of Credit Rationing on Housing Investment: A Multi-Market Disequilibrium Approach." International Economic Review 27, 445-464.

Jaffee, Dwight M., and Franco Modigliani. (1969). "A Theory and Test of Credit Rationing." American Economic Review 59, 850-872.

Kain, J., and J. Quigley. (1975). Housing Markets and Racial Discrimination. National Bureau of Economic Research.

Krivo, Lauren J. (1986). "Home Ownership Differences between Hispanics and Anglos in the United States." Social Problems 33, 320-333.

Long, James E., and Steven B. Caudill. (1992). "Racial Differences in Home ownership and Housing Wealth, 1970-1986." Economic Inquiry 30, 83-100.

López, Manuel M. "Su casa no es mi casa: Hispanic Housing Conditions in Contemporary America, 1949-1980," in Jamshid A. Momeni (ed.) Race, Ethnicity, and Minority Housing in the United States. Greenwood Press: Connecticut.

Munell, Alice H., Lynn E. Browne, James McEneaney, and Geoffrey M.B. (1992). Mortgage Lending in Boston: Interpreting HMDA Data. Federal Reserve Bank of Boston Working Paper Series, No. 92-7, 1-44.

Reimers, Cordelia W. (1983). "Labor Market Discrimination Against Hispanic and Black Men." Review of Economics and Statistics 65, 570-579

Rosenthal, Stuart, John Duca, and Stuart Gabriel. (1991). "Credit Rationing and the Demand for Owner-Occupied Housing." Journal of Urban Economics 30, 48-63.

Smith, Bruce. (1983). "Limited Information, Credit Rationing, and Optimal Government Lending Policy." The American Economic Review 73, 305-318.

Stiglitz, Joseph E., and Andrew Weiss. (1981). "Credit Rationing in Markets with Imperfect Information." The American Economic Review 71, 393-410.

---. (1987)."Credit Rationing:Reply." The American Economic Review 77, 228-231.

Thomas, Paulette. "Federal Data Detail Pervasive Racial Gap in Mortgage Lending." The Wall Street Journal 31 Mar. 1992: Sec. A: 1-6.

U.S. Bureau of the Census. (1983). Metropolitan Housing Characteristics. 1980 Census of Housing, Volume 2. Washington.

U.S. General Printing Office (GPO). (1992). Recommendations for the Reauthorization of the Cranston-Gonzalez National Affordable Housing Act. Subcommittee on Housing and Urban Affairs. Washington.

---. (1990). Federal Housing Administration: Internal Controls and the 1989 Annual Report. Hearing Before the Subcommittee on Housing and Community Development. Washington.

---. (1980). Cash Discount Act and National Consumer Usury Commission. Hearing Before the Subcommittee on Consumer Affairs. Washington.

U.S. Housing and Urban Development (HUD). (1989). 1988 Statistical Yearbook. Washington: GPO.

Vandell, K., and T. Thibodeau. (1985). "Estimation of mortgage defaults using disaggregate loan history data." Journal of American Real Estate and Urban Economics 13, 192-214.

Veterans Administration. (1982). Annual Report 1981. Washington: GPO.

Wette, Hildegard C. (1983). "Collateral in Credit Rationing in Markets with Imperfect Information: Note. The American Economic Review 73, 442-445.

Yinger, John. (1986). "Measuring Racial Discrimination with Fair Housing Audits: Caught in the Act." The American Economic Review 76, 881-893.