

# ELIMINATING CREDIT BARRIERS TO INCREASE HOMEOWNERSHIP

## How Far Can We Go?



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# **ELIMINATING CREDIT BARRIERS TO INCREASE HOMEOWNERSHIP**

*How Far Can We Go?*

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## SUMMARY AND IMPLICATIONS: THE INSTITUTE PERSPECTIVE

A simple question led to this study: What is the business potential of the underserved mortgage market? The 1990s saw record homeownership rates and major strides in closing the gap between majority and minority homeownership. Lenders also made inroads in increasing low-income homeownership. New marketing techniques and aggressive outreach certainly contributed to these gains, but a major factor was the availability of loans with increasingly higher loan-to-value ratios. Armed with more sophisticated underwriting standards, new product types, and a mandate for experimentation, the housing finance industry attacked downpayment and credit standards that constrained borrowing for many families on the margin of homeownership.

The increasingly leveraged character of lending to traditionally underserved borrowers raises a number of fundamental issues. How much higher can we raise homeownership rates by further attacking downpayment and other borrowing constraints? Do borrowing constraints truly exclude borrowers from homeownership, or do they merely serve to delay people from buying a home while they take the necessary steps to qualify financially?

To shed light on these issues, Dr. Stuart Rosenthal asks the following two questions. What happens to homeownership rates if we remove all borrowing constraints? And how do borrowing constraints affect a renter's expectation of becoming a homeowner?

The answer to the first question suggests that removing all borrowing constraints could increase the national homeownership rate by as much as 4 percentage points (67.4 percent to 71.4 percent). Dr. Rosenthal's research also suggests that, absent borrowing constraints, the percentage of renters who expect to become homeowners in the next five to ten years will increase by 7.6 percentage points (34.3 percent with no constraints versus 26.7 percent with constraints). The comparatively large increase in renters expecting to own may seem, on the surface, to explain the 4 percentage point increase in the national homeownership rate. However, renters only account for about one-third of the population. Thus, a 7.6 percentage point increase in renters expecting to own translates into only a 2½ percentage point increase in the national homeownership rate.

Dr. Rosenthal suggests that this difference in estimates—a 4 versus a 2½ percentage point increase in homeownership—provides indirect evidence on the frequency with which borrowing constraints serve to delay versus exclude families from homeownership. In the case of renter expectations, the 2½ percentage point estimate reflects families that would anticipate homeownership in the absence of borrowing constraints but that would otherwise be excluded from owning under present market conditions. The balance between the 4 and 2½ percentage point estimates, in contrast, may reflect renters who would simply speed up their purchases in response to easier access to financing. Breaking out households by race and ethnicity, the results suggest that borrowing constraints restrict access to homeownership at least in part by delaying home purchase for whites and Hispanics, while primarily excluding African Americans. This suggests that lenders can make further progress in closing the majority/minority homeownership gap by continuing product and pricing innovation.

Dr. Rosenthal's research may also point to progress. With continuing concerns about discrimination, we might expect African American and Hispanic renters to have less confidence in their ability to become homeowners. Surprisingly, Dr. Rosenthal finds that minority and majority renters have comparably optimistic expectations about becoming homeowners, ranging from 23 to 27 percent. Removing borrowing constraints does not change this similarity in expectations (32 to 35 percent).

These results may indicate that the last decade of outreach and innovation has had an effect on minorities' expectations of owning a home, a hypothesis to be tested by further research. Sophisticated marketing techniques, more sensitive to differences in how people shop for mortgages, can help lenders capitalize on this optimism.

Other findings of this study suggest a way to make more fundamental progress in closing the homeownership gap. Dr. Rosenthal identifies economic and social stability as especially critical in explaining differences between majority and minority homeownership rates. This finding echoes other Institute research, such as Working Paper No. 00-02, *The Decision to Own: The Impact of Race, Ethnicity and Immigrant Status*. Whereas *The Decision to Own* found educational and employment opportunities to be directly important, Dr. Rosenthal identifies what may be the *outcomes* of more educational and employment opportunity as critical to closing homeownership rate gaps. Stability in such factors as health, marriage, and employment all—not surprisingly—give rise to a stronger preference to own.

We can derive three implications from this finding. First, policies that promote educational and employment opportunity can increase household stability, and therefore homeownership. Obviously, this is a broad policy agenda, and one beyond just the mortgage finance industry.

More significantly for lenders, this finding points to two possible courses of action to increase business opportunity. Further efforts to reduce borrowing constraints can lead more prospective homeowners to borrow sooner than they planned. However, this simply speeds up business that would have already occurred.

If we are to expand the market, we must reach those families now truly excluded by borrowing constraints. Lenders must develop a new generation of products addressing the realities faced by consumers who now, perhaps quite rationally, do not expect to own. For instance, significantly reducing closing costs can make homeownership a more rational choice for the mobile worker. Product innovations such as portable mortgages, under development by a number of major lenders, may reach households with no current expectations of homeownership.

We may be able to change the homeownership equation substantially by removing borrowing constraints. Nevertheless, even after lifting all borrowing constraints most renters (65.7 percent) do not expect to purchase a home. Dr. Rosenthal's research reminds us not to lose sight of the fact that many renters want to be renters.

Steven P. Hornburg  
Executive Director  
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## ABSTRACT

Using data from the 1998 Survey of Consumer Finances (SCF), this paper estimates homeownership rates that would prevail in the United States if borrowing constraints were eliminated. These estimates are obtained by first identifying a group of unconstrained households in the SCF based on a unique set of survey questions. Housing tenure preferences are then estimated over unconstrained households controlling for sample selection effects, and results are used to forecast owner-occupancy rates that would prevail in the absence of borrowing constraints. If all borrowing constraints were removed, *ceteris paribus*, the owner-occupancy rate among nonfarm families in the United States would increase just over 4 percentage points. In contrast, borrowing constraints have a comparatively small effect on the number of current renters who expect to own a home in the next ten years. This pattern suggests that borrowing constraints depress owner-occupancy rates in part by delaying homeownership rather than by permanently excluding families from owner-occupied housing. Additional analysis confirms that household social and financial stability, ability to care for a property, and wealth are all very important determinants of whether families prefer to own. On balance, therefore, evidence suggests that there is room for further relaxation of borrowing constraints to expand access to homeownership. However, such efforts are likely to be more fruitful if attention is given to mortgage products that alleviate borrowing constraints in the early years of the mortgage and if mortgage product innovation is coupled with policies designed to enhance the social and financial stability of families.

## I. INTRODUCTION

Few symbols of personal economic success loom larger in the minds of Americans than owning one's own home. Norms favoring homeownership have been further buttressed by the belief that because homeownership is a site-specific investment homeowners take better care of their neighborhoods and, therefore, make good citizens (e.g., Rohe, McCarthy, and Van Zandt 2000; DiPasquale and Glaeser 1999).<sup>1</sup> Although evidence on whether homeowners make better neighbors is still tentative, it is certain that as a society we value homeownership for both personal and social reasons.<sup>2</sup> This is clear from a long history of tax policies that encourage homeownership by reducing the cost of housing for owner-occupiers (e.g., Rosen 1979, 1985). In addition, the last decade has witnessed a series of government and industry efforts designed to reduce mortgage borrowing constraints for low-income families and other disadvantaged groups. These efforts have focused primarily on relaxing wealth requirements and have culminated in the recent introduction of zero and near-zero down payment mortgages for eligible borrowers.<sup>3</sup>

Innovations in affordable mortgage lending—along with the dramatic economic expansion of the 1990s—have helped raise U.S. homeownership rates to historic levels, from 64 percent in 1989 to just over 67 percent by 2000. Against that backdrop, an important question for both government and the financial industry is as follows: To what extent can further relaxation of borrowing constraints boost homeownership rates, both for the U.S. population overall and for families of different age, race, ethnicity, and financial status? This paper seeks to answer that question by estimating homeownership rates that would prevail for various subgroups of the population if all borrowing constraints were eliminated but households otherwise abide by their budget constraints.

Addressing these issues is difficult because of three fundamental problems that all studies on the impact of borrowing constraints face. Researchers must identify which families are credit constrained; they must evaluate how those families would behave if borrowing constraints were relaxed, *ceteris paribus*; and they must control for the myriad possible constraints that lenders impose on prospective borrowers. In the context of homeownership, such constraints include down payment standards, as well as house payment-to-income and total debt payment-to-income ratios, and the various ways these standards are applied for different types of loans (e.g., fixed versus variable rate mortgages). In addition, to the extent that nonmortgage debt such as auto and consumer loans can be used as substitutes for mortgage debt, borrowing constraints outside of the mortgage market potentially affect housing tenure decisions as well.

The solution to these problems offered here is to apply sample selection methods to unusually rich data from the 1998 Survey of Consumer Finances (SCF).<sup>4</sup> At the core of the estimation strategy is a unique set of survey questions that enable one to identify a priori a group of households that almost certainly hold as much mortgage debt as they would like given prevailing market rates and the menu of existing mortgage products. These families are characterized as not credit constrained (unconstrained) in the analysis to come, while all other households are characterized as *possibly* credit constrained for reasons that will become apparent later in the paper. Housing tenure preferences—to own or to rent—are then estimated over just the unconstrained families, controlling for the endogenous selection of families into the unconstrained group through a three-celled bivariate probit model. The resulting housing tenure coefficients reflect the impact of household demographic and financial characteristics on preferences for owning when families are subject to their budget constraints but not subject to binding borrowing constraints. Those coefficients are used to predict homeownership rates that would prevail for the entire population—unconstrained and possibly credit-constrained families. Comparing predicted with actual homeownership rates permits one to evaluate how much higher homeownership rates would likely rise if all borrowing constraints were eliminated, *ceteris paribus*.

Is there opportunity for industry and government to expand homeownership through further relaxation of borrowing constraints? Results from the analysis suggest a qualified

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yes. If all borrowing constraints were suddenly removed, *ceteris paribus*, and all households could instantly change their housing tenure if they so chose, the owner-occupancy rate among nonfarm families in the United States would increase by just over 4 percentage points. Not surprisingly, these impacts are distributed unequally across different subgroups of the population. Borrowing constraints have far more impact on homeownership rates among low-income families than any other group, roughly 10 percentage points. Opportunities to expand homeownership also exist among young and middle-aged families for whom elimination of borrowing constraints would boost homeownership rates by roughly 7 percentage points. In addition, borrowing constraints appear to have more impact on Hispanic homeownership rates relative to whites, while the evidence is mixed with regard to effects on African Americans.

To further explore these findings, two modifications are made to the model to shed light on a different but related question: To what extent do borrowing constraints serve to delay—as opposed to permanently exclude—access to owner-occupied housing? To examine this question, current housing tenure status is replaced with a survey question that asks whether families *expect* to own a home in the next five to ten years. In addition, the model is estimated only over current renters. If borrowing constraints have no effect on renter expectations of future owner-occupancy status, then families that currently rent because of borrowing constraints must expect to overcome those constraints within a decade.

Results indicate that the percentage of renters who expect to own in the next decade rises by 7.56 percentage points with the elimination of borrowing constraints. Assuming renter expectations are fully realized, that figure translates into a 2.47 percentage point increase in the share of current households (owners and renters combined) that *eventually* attain homeownership, since renters account for one-third of all families. In contrast, elimination of borrowing constraints increases owner-occupancy rates by 4 percentage points as discussed above. The comparatively small effect on renter expectations suggests that borrowing constraints depress current owner-occupancy rates at least in part by delaying access to owner-occupied housing, consistent with recent findings by Goodman and Nichols (1997). Government and industry efforts to expand homeownership therefore may want to focus on mortgage product designs that alleviate borrowing constraints primarily in the early years of a mortgage to encourage earlier access to owner-occupied housing.<sup>5</sup>

The remainder of the paper is organized as follows. The next section reviews selected portions of the literature that bear on discussions of the impact of borrowing constraints on homeownership. That literature is placed in the context of recent policy debates that have affected the operation of the mortgage market during the 1990s. As will become apparent, those debates also influenced the direction of academic research in this area. Section III describes the empirical model. Section IV presents the data, and



sections V and VI present the results from the bivariate probit analyses and simulations. Section VII concludes.

## **II. LITERATURE REVIEW AND POLICY CONTEXT: THE IMPACT OF BORROWING CONSTRAINTS ON HOMEOWNERSHIP**

### **Why Lenders Ration Credit with Down Payments and Other Constraints**

Before proceeding further, it is useful to clarify why lenders would choose to ration credit through down payments and other underwriting criteria as opposed to simply using the loan rate to clear the market. Imperfect competition coupled with racial discrimination is certainly one motivation for such behavior. More generally though, Stiglitz and Weiss (1981) provide much of the theoretical foundation for why competitive lenders would choose to ration credit through terms other than the loan rate. They argue that moral hazard, adverse selection, and asymmetric information between borrowers and lenders regarding credit risk can give rise to equilibrium credit rationing in which loan rates may be set at below-market clearing levels. Such an outcome arises because information is costly and lenders have an imperfect ability to classify borrowers according to default risk. Under such conditions, lenders price loans based on the expected return on the loan portfolio rather than the expected return on the individual loans. The expected return on the pool of loans, however, depends both on interest earnings on loan payments and on expected default costs, each of which rises with the loan rate. In the latter case, as the loan rate increases borrowers have an incentive to invest in riskier projects (moral hazard) with higher expected returns. In addition, as loan rates rise, prospective borrowers with strong aversions to default tend to drop out of the applicant pool first (adverse selection), raising the average propensity to default of the remaining pool of borrowers. Competitive lenders respond to such effects by setting interest rates lower than would occur in the absence of moral hazard and adverse selection effects. Under such conditions, Stiglitz and Weiss (1981) show that it is possible that the competitive equilibrium will occur at below-market clearing interest rates.<sup>6</sup>

In an extension of the initial model, Stiglitz and Weiss (1981, part IV) further describe a redlining model in which lenders vary loan rates across borrowers on the basis of observable differences in credit risk—a model that more closely fits mortgage markets in practice. That model still allows for an equilibrium in which sufficiently high-risk loan applicants may be credit constrained because of adverse selection and moral hazard. Duca and Rosenthal (1994b) extend that model further and argue that regulatory restraints such as fair lending laws may have had the unintended effect of increasing

the degree to which lenders use nonrate terms to control for perceived differences in applicant credit risk. This could arise if lenders choose to offer the same mortgage rates to borrowers of different risk attributes to reduce the likelihood of costly discrimination suits.<sup>7</sup> Under such conditions, lenders would have an incentive to control for perceived differences in credit risk through less visible means, such as nonprice constraints like down payment standards.

One implication of these arguments is that as information becomes increasingly plentiful and inexpensive to obtain, lenders will be increasingly able to adjust individual loans—either through interest rate or nonrate terms—to meet the characteristics of individual applicants. This suggests that with the information technology revolution, we should expect the degree to which lenders rely on nonrate terms to diminish, which is what appears to have occurred in the mortgage market throughout the 1990s.

### **The Early Empirical Literature on Credit Rationing**

The earliest empirical work that has direct bearing on the design of the present paper comes from research testing the robustness of the life-cycle permanent income hypothesis (LCPIH). That literature includes a number of important cross-sectional and panel data analyses, such as those by Hall and Mishkin (1982), Hayashi (1985), and Zeldes (1989). These papers provide evidence that the time path of consumption expenditures for households that are *not* credit constrained differs from that of families for which borrowing constraints *may* be binding. Based on these findings, authors argued that borrowing constraints were binding for many people, a violation of the LCPIH. A limitation of these studies, however, is that the data used do not directly identify credit-constrained and unconstrained families. Instead, the studies above assume that families with either high wealth-to-income ratios or high savings rates are not credit constrained. Given that the demand for debt increases with wealth and income in response to increased demand for consumer durables such as housing, high-income and high-wealth families could still be credit constrained.<sup>8</sup> This concern has raised questions about whether the analyses above suffered from coding errors when splitting the sample on the basis of who is not credit constrained.

In response, several studies in the early 1990s drew on the Federal Reserve's Survey of Consumer Finances. That survey allows the researcher to directly identify families that have recently been turned down for credit, received smaller than desired loans, or have been dissuaded from applying for credit. Using the SCF, Jappelli (1990) investigated the characteristics of credit-constrained families, and Cox and Jappelli (1993) estimated the extent to which borrowing constraints reduced the levels of debt held by such families.<sup>9</sup> These two studies, however, did not control for a number of variables used by lenders in evaluating loan applications, including credit history in the case of Jappelli and both credit history and wealth in the case of Cox and Jappelli.

The importance of controlling for wealth and credit history when analyzing household access to credit has been underscored by a vigorous debate over the last decade about whether racial discrimination restricts the ability of minority households to obtain credit. Although that controversy dates back at least to the 1970s when a wave of fair lending legislation was enacted, the debate became especially sharp following the publication of several sets of studies in the late 1980s. The first of these were newspaper articles that focused attention on the fact that minority populations had much more limited access to mortgage credit than majority white loan applicants, in part because of discrimination.<sup>10</sup> Numerous press reports shortly thereafter focused attention on data from the Home Mortgage Disclosure Act (HMDA).<sup>11</sup> Those data showed that mortgage application rejection rates for African Americans in 1990 were 2.4 times as large as those for white families with similar income (see Canner and Smith 1991 for a detailed description of the HMDA data).

As noted by Rehm (1991b), evidence from HMDA prompted House Banking Committee chairman Henry Gonzalez to ask “top regulators for an ‘immediate’ report on what their agencies plan to do ‘to correct the lending problems revealed [by the HMDA data].’” However, the HMDA data do not include household credit history or wealth, in addition to other important variables that appear on loan application forms. As a result, many other individuals in government, the banking industry, and academia questioned whether the HMDA data implied that lenders discriminate against minority loan applicants.<sup>12</sup> Partly in response to that debate, the Federal Reserve Bank of Boston conducted a landmark study of mortgage application denial rates in Boston (Munnell et al. 1996) using a much wider range of loan applicant characteristics than previously analyzed. An important finding of the study was that allowing for differences in loan applicant wealth and credit history reduced but did not eliminate race-related differences in mortgage denial rates. Subsequent exhaustive analyses have largely supported these claims (e.g., Turner et al. 1999; Turner and Skidmore 1999).<sup>13</sup>

### **Who Chooses to Own Versus Who Has the Ability to Own?**

Recently, the literature on the impact of borrowing constraints on homeownership appears to have split along two lines that address related but different questions: Who would *choose* to own a home under different underwriting criteria, and who would have the *ability* to purchase a home under different underwriting criteria? Studies focusing on the former question have their beginnings with papers by Linneman and Wachter (1989) and Zorn (1989). These studies identified credit-constrained households by assuming that prospective homeowners with more than a 28 percent house payment-to-income ratio were credit constrained.<sup>14</sup> However, many lenders in the 1980s had house payment-to-income limits of more than 28 percent, while families with a bad credit history were likely to face tighter than average credit standards (e.g.,

Boyes, Hoffman, and Low 1989; Trans Data Corporation 1986).<sup>15</sup> Nevertheless, an important finding from Linneman and Wachter (1989) is that down payment constraints appear to restrict access to homeownership with greater frequency than income does. More recently, papers by Quercia, McCarthy, and Wachter (1998) and Haurin, Hendershott, and Wachter (1997) have become quite sophisticated in the manner in which the sample is stratified into constrained and unconstrained households, and the degree to which the models examine the impact of a wide range of different possible underwriting criteria. An important finding from these studies is that borrowing constraints continue to impede homeownership for underserved groups in the population, including younger families, minorities, and low-income households.<sup>16</sup>

In contrast to these papers, housing “affordability” studies by Savage (1999), Listokin et al. (1999), and others have focused more on the question of who has the ability to own a home.<sup>17</sup> As a broad characterization, these studies proceed by first specifying a reference value home for each family in the sample. The reference home is most often specified as a function of the distribution of owner-occupied house values in the household’s region of the country (e.g., the 10th or 25th percentile).<sup>18</sup> Next, data are examined to determine whether individual families have sufficient income and wealth to satisfy underwriting guidelines for a range of prospective mortgage products. Based on that exercise, the percentage of renters capable of buying the reference home under different underwriting criteria is determined.<sup>19</sup>

The housing affordability approach has made an important contribution, and the Census Bureau affordability tables are a valuable resource for housing analysts. That said, in the context of the present paper, it is important to bear in mind that mortgage market constraints are but one of a number of important factors governing whether families would choose to own a home. Perhaps the most general framework in this regard is the theoretical model of Henderson and Ioannides (1983), and subsequent empirical support for the model in Ioannides and Rosenthal (1994). In that model, families have both a consumption and investment demand for housing. Consumption demand is sensitive to the demand for shelter. Investment demand is driven by portfolio considerations. If investment demand exceeds consumption demand, the family could choose to own a home equal to investment demand and rent out the unwanted space: In this case, the family is better off if it owns. Alternatively, if consumption demand exceeds investment demand, the family would not want to purchase housing up to the level of consumption demand since that would constitute a bad investment: In this case, the family is better off if it satisfies its consumption demand by choosing to rent its principal residence.

The Henderson-Ioannides model, while stylized, offers considerable guidance on how we might want to think about the question of who prefers to own a home in the absence of binding borrowing constraints. It is well documented that moving from owner-occupied housing is far more expensive than moving from rental housing because of Realtor fees, legal fees, and taxes (e.g., Rosenthal 1988). For that reason, families that

do not expect to move soon are more likely to prefer to own because they can spread the high transactions costs of moving to and from owner-occupied housing over a longer time. Consider, however, that family and financial instability both increase the frequency with which a family moves, reducing the return on owner-occupied housing. In the context of the Henderson-Ioannides model, such instability lowers the investment demand for housing. For these families, owning a home could be a bad investment, and many such families may prefer to rent.

As also argued by Henderson and Ioannides (1983), there is a tendency for individuals who have a taste for maintaining their dwellings to be undercompensated for such behavior in the rental market. Thus, for families that are good at maintaining their homes, owner-occupied housing may be a better investment, causing investment demand to be high: these families may prefer to own. Finally, Fu (1991) modifies the Henderson-Ioannides model to evaluate how household wealth affects preferences for owning. Suppose that housing consumption is a normal good and absolute risk aversion declines with wealth. Then, since owner-occupied housing is a risky investment, housing investment demand likely increases faster with wealth than housing consumption demand. As a result, wealthy families are more likely to prefer owner-occupied housing even in a setting free of taxes and financing issues.<sup>20</sup>

Given that the goal of this paper is to estimate the homeownership rate that would prevail if borrowing constraints were eliminated, it is essential to take into account all the determinants of whether a family would choose to own a home. The discussion above suggests that household social and financial stability—important determinants of household mobility—are factors that must be considered. In addition, the family's ability to maintain its home and the family's level of wealth—an important determinant of the level of risk the family is willing to accept—are important as well. Finally, to the extent that owning a home has become a societal norm, this suggests that households value owning a home for reasons unrelated to financial gain (in contrast to the Henderson-Ioannides model). Thus, anything that might enhance the degree to which owning a home directly affects a family's sense of well-being also belongs in models of housing tenure preferences. These principles will guide the variable selection in the empirical work to follow.

### **III. EMPIRICAL MODEL**

#### **Overview**

In the most general setting, families choose their housing tenure to maximize utility subject to two sets of constraints: (1) their intertemporal budget constraint and (2) borrowing constraints imposed by lenders. Although the budget constraint is binding

for all families provided that savings and bequests are treated as future consumption, borrowing constraints are binding only for a subset of households as the previous section outlined. The focus of this paper, of course, is to determine housing tenure preferences and homeownership rates subject only to the household's budget constraint. To pursue that goal, the model below is developed in a manner that is tailored to the characteristics of the Survey of Consumer Finances, three features of which are important to emphasize here.

First, the SCF is a cross section of individual households. In that regard, all families face the same macroeconomic conditions, though access to different mortgage products varies with household demographic and financial characteristics. Second, the SCF permits a priori identification of a group of households for which borrowing constraints are not binding, taking into account all possible credit constraints within and outside of the mortgage market. These families are referred to as *unconstrained* for the remainder of this paper. All other families may or may not face binding borrowing constraints, for reasons that will be clarified in section IV. These families are referred to as *possibly constrained* for the remainder of this paper. Third, survey questions in the SCF permit examination of two different variables that shed light on housing tenure preferences: whether families currently own or rent, and whether current renters expect to own in the next five to ten years. When analyzing current housing tenure, all households are included in the sample. When analyzing whether renters expect to own, only renters are included in the sample. Apart from those differences, as will become apparent, the structure of the analysis is identical in both cases. For that reason, the model below is developed only in the context of current housing tenure status, but the reader should keep in mind that this model is also used to estimate whether current renters expect to own as well.

### **Housing Tenure Preferences When Borrowing Constraints Are Not Binding**

Define an unobservable index  $I_{\text{own}}$  that represents the difference in utility between owning and renting when families are subject only to their budget constraints,

$$I_{\text{own}} = xa_x + Ma_m + e_{\text{own}} . \tag{3.1}$$

This equation determines a family's preferred tenure status *in the absence of binding borrowing constraints*. Elements of  $x$  include all demographic and financial characteristics of the household that influence tenure preferences as described in section II. In addition, elements of  $M$  include characteristics of the preferred mortgage product that the household would choose if it were to own, such as fixed versus variable rate, loan rate, amortization period, down payment ratio, etc.

What determines  $a_m$ ? Macroeconomic conditions that are identical for all households given the cross-sectional nature of the data, and household characteristics that influence a family's preferred form of financing. Accordingly,  $M$  is a choice variable that depends on  $x$  and can be expressed as

$$M = h(x),$$

where the role of macroeconomic conditions is suppressed to simplify notation.<sup>21</sup> Substituting into (3.1),

$$I_{\text{own}} = xt + e_{\text{own}}. \quad (3.2)$$

Equation (3.2) is a reduced form expression that captures both the direct and indirect effect of household characteristics on housing tenure preferences in the absence of borrowing constraints. However, because  $I_{\text{own}}$  is unobserved, the analysis below focuses on the observable discrete housing tenure decisions (OWN) corresponding to (3.2),

$$I_{\text{own}} > 0 \longrightarrow \text{OWN} = 1, \text{ own home} \quad (3.3)$$

$$I_{\text{own}} < 0 \longrightarrow \text{OWN} = 0, \text{ rent home}$$

where OWN equals 1 if the family owns and 0 if the family rents.

Denote now a second unobservable index that governs whether a family belongs to the unconstrained group or the possibly constrained group,  $I_{\text{NotCC}}$ ,

$$I_{\text{NotCC}} = xc + e_{\text{NotCC}}. \quad (3.4)$$

The discrete observable realizations corresponding to (3.4) are given by

$$I_{\text{NotCC}} > 0 \longrightarrow \text{NotCC} = 1, \text{ unconstrained} \quad (3.5)$$

$$I_{\text{NotCC}} < 0 \longrightarrow \text{NotCC} = 0, \text{ possibly constrained}$$

where NotCC equals 1 if the family belongs to the unconstrained group and 0 if the family belongs to the possibly constrained group.

In viewing expressions (3.1) to (3.5), it is important to recognize that whereas NotCC is observed regardless of whether OWN takes on a value of 1 or 0, housing tenure preferences *free of borrowing constraints* are observed only for families belonging to the unconstrained group: NotCC equals 1. As is well established in the discrete choice literature (e.g., Maddala 1983), if  $e_{\text{own}}$  and  $e_{\text{NotCC}}$  are uncorrelated, observing OWN only for NotCC equals 1 presents few difficulties. Assuming  $e_{\text{own}}$  follows a unit normal distribution, one could obtain unbiased and consistent estimates of  $t$ —the housing tenure preferences in (3.2)—by running a univariate probit model over just that portion of the sample for which NotCC equals 1.<sup>22</sup> More generally, however, common omitted

variables that influence both the likelihood that NotCC equals 1 and the likelihood that OWN equals 1 would cause estimates of  $t$  to suffer from sample selection bias owing to the endogenous character of the sample selection procedure. To allow for this possibility, a more general estimation procedure is needed.

### **The Bivariate Probit Model with Three Cells**

To avoid sample selection bias, it is necessary to control for correlation between the error terms in the two latent indexes,  $e_{\text{NotCC}}$  and  $e_{\text{own}}$ . If (3.2) could be estimated directly, a common approach would be to use well-known Heckman two-step procedures by augmenting (3.2) with a Mills ratio term based on first-stage probit estimates of (3.5). Subject to identification conditions and functional form, including the Mills ratio enables one to obtain consistent estimates of  $t$ . In the present context, however,  $I_{\text{own}}$  is not directly observable. Instead, the discrete variable OWN is observed. In this case, a nonlinear analogue of the Heckman procedure is to estimate a bivariate probit model over (3.3) and (3.5) with just three cells, where OWN is observed only for NotCC equals 1 as noted above.

More formally, assume that  $e_{\text{NotCC}}$  and  $e_{\text{own}}$  follow a bivariate standard normal distribution with mean zero and covariance  $\sigma_{\text{NotCC,own}}$ .<sup>23</sup> Then the log likelihood function ( $L$ ) for this model is given by

$$L = \sum \{ (1 - \text{NotCC}) \cdot \log[F(-xc)] + \text{NotCC} \cdot \text{OWN} \cdot \log[G(xt, xc, \sigma_{\text{NotCC,own}})] + \text{NotCC} \cdot (1 - \text{OWN}) \cdot \log[G(-xt, xc, -\sigma_{\text{NotCC,own}})] \} \quad (3.6)$$

where  $F(\cdot)$  and  $G(\cdot)$  are the standard unit and bivariate normal distributions, respectively, and the log likelihood function is evaluated separately for all observations in the entire sample,  $i = 1, \dots, I$ .<sup>24</sup> Note, however, that whereas each observation in the sample contributes to the identification of  $c$ , the parameters governing whether a family belongs to the unconstrained group, only those families for which NotCC is equal to 1 contribute to identification of  $t$ , the parameters governing housing tenure preferences. In addition, sample selection effects are controlled for because the covariance between  $e_{\text{NotCC}}$  and  $e_{\text{own}}$  appears in the last two bracketed terms of (3.6) and is simultaneously estimated along with  $t$  and  $c$ . Thus, (3.6) provides unbiased and consistent estimates of  $t$ .<sup>25</sup>

### **Simulating Owner-Occupancy Rates in the Absence of Borrowing Constraints**

Estimates of  $t$  obtained from (3.6) reflect the impact of household financial and demographic characteristics on housing tenure preferences in the absence of borrowing constraints. Given such estimates, it is possible to simulate the percentage of the



population that would choose to own by computing the mean of  $F(xt)$  over the entire sample, where  $F(\cdot)$  is the unit normal distribution function as previously noted. Comparing that estimate to the actual frequency of owner-occupiers gives an estimate of the impact of borrowing constraints on homeownership rates. Repeating the simulation exercise for various subsets of the population permits evaluation of the impact of borrowing constraints on different subgroups by race, income, age, etc.

#### IV. DATA

The data used to estimate the model are taken from the 1998 Survey of Consumer Finances, a household-level survey designed to provide unusually rich information on the financial characteristics of households. In total, the SCF provides data on roughly 4,300 households.<sup>26</sup> Of these, roughly 2,800 are selected so as to be representative of the entire United States, while the remaining households overrepresent wealthy families and are drawn from tax files. To protect confidentiality, the public use version of the 1998 SCF does not allow the analyst to separately identify the representative and tax-based samples. However, sampling weights provided with the data permit weighting so that results are representative of the entire United States. In the work to follow, the bivariate probit model was estimated using unweighted data to obtain the parameter estimates on the assumption that all the covariates in the model are exogenous. The simulations, in contrast, were calculated using the sampling weights to ensure that the simulation results are representative of the United States.<sup>27</sup>

A special feature of the SCF is that households were asked if they had a request for credit turned down by a particular lender or creditor in the past five years or had been unable to get as much credit as they applied for. Households were also asked if there had been any time in the past five years that a person (or the person's spouse) had *thought* about applying for credit at a particular place, but changed his or her mind because the household thought it might be turned down. Based on these questions, a household was classified as possibly credit constrained (NotCC = 0) if at least one of the following three conditions held: (1) the household had a loan request turned down, (2) the household had a loan request only partially granted, or (3) the household initially considered applying for credit but then chose not to because it thought that it would be turned down. If instead *none of the three conditions above* held, then the family was classified as not credit constrained (NotCC = 1).<sup>28</sup>

A further strength of the 1998 SCF is the rich information included on the determinants of household wealth, credit history, and expectations. Thus, in addition to the usual battery of demographic characteristics, a number of household attributes not typically found in most major surveys are included in the model, such as expected income growth, inheritances, gifts and settlements, credit history attributes, and indicators of

employment stability. The main limitation of the SCF is that it does not provide information on household location because of strict rules governing confidentiality. However, the SCF provides information on the density of development in the household's neighborhood, and that information serves as an excellent proxy for central city/suburban status.<sup>29</sup> To facilitate review, a description of the principal variables in the model is provided in the tables (see appendix).

A final point concerns sample composition and use of the SCF relative to other data sets. The most widely cited homeownership rates are those from the U.S. Census Bureau. Those estimates are based on the Consumer Population Survey (CPS) for the entire United States including both the farm and nonfarm sectors. However, the housing needs and opportunities of individuals living on farms—both farm owners and employees—are arguably rather different than for the nonfarm sector. In addition, much of the policy focus with regard to the creation and marketing of affordable mortgage products has centered on urban areas. For these reasons, the analysis in this paper is based just on the nonfarm portion of the 1998 SCF in order to provide a sharper picture of the nonfarm sector. Estimates in this study, therefore, could potentially differ from published Census Bureau reports for two reasons: use of the SCF data and focus on nonfarm populations. Before proceeding, it is important to clarify the possible effect of these differences.

Table 1a compares the racial distribution of the population using the CPS and SCF based on samples that are representative of the entire U.S. farm and nonfarm population for the years 1989, 1992, 1995, and 1998. Table 1b makes a similar comparison of homeownership rates by race.<sup>30</sup> In addition, the last column in both tables reports values for the 1998 SCF based only on the nonfarm population. Bear in mind that all the SCF data are weighted to ensure that they represent their respective populations as discussed earlier.

As is apparent in the tables, differences in the reported values between the CPS and SCF data are small and likely reflect differences in the manner in which certain questions are asked regarding homeownership status and race (see Kennickell 1999 for a discussion of this point). This indicates that the sampling weights for the SCF do an excellent job of matching the CPS and that weighted data from the SCF are representative of the United States. A more substantive difference arises when comparing the combined farm plus nonfarm populations to just that of the nonfarm population for 1998 using just the SCF. On the one hand, the racial distribution of the population is little different in the last two columns of table 1a. On the other hand, for each subset of the population other than Hispanic (for which there is little difference), the homeownership rate in table 1b is more than 1 percentage point higher for the nonfarm population than for the combined farm plus nonfarm population. Those differences boost the overall homeownership rate from 66.1 percent in 1998 for the farm plus nonfarm sector to 67.4 percent for the nonfarm sector. It is important to bear in mind,

therefore, that the base homeownership rate for the study group in this paper is 1.3 percentage points higher than is commonly cited in the U.S. Census reports.

## V. RESULTS

### Summary Statistics

Summary statistics of all the variables included in the bivariate probit regressions are provided in table 2 for the full sample and for various subsets of the population. As before, all values are weighted to ensure that they are representative of the United States in 1998.

In the top row of the table, observe that homeownership rates vary widely not just across race, but also with income, age, and location. Among families whose total household income is in the first decile, just 34.4 percent own their homes, rising to 60.2 percent for families whose incomes fall within the 25th to 50th percentiles. Only 40.7 percent of families with household heads under age 35 own their homes. Among families living in densely developed areas (areas where the nearby buildings are within 21 feet of each other), only 54.4 percent own their homes.

The second row in table 2 reports the percentage of families that currently rent but expect to buy a home in the next five to ten years. Overall, 8.7 percent of U.S. families belong to this category. Not surprisingly, such families are disproportionately found among households under age 35; 22.1 percent of this group are renters that expect to own in the next decade. African American and Hispanic families also include a higher share of renters that expect to own in the coming decade, but this arises because of the greater frequency of renters among these populations. As will become apparent shortly (in table 4), among renters, the frequency of families that anticipate owning in the next ten years is similar for whites, African Americans, and Hispanics.

### Interpreting Estimates from the Bivariate Probit Models

Table 3 presents estimates for the two versions of the bivariate probit model discussed earlier, first for both renters and owners with *current owner-occupancy status* as the housing tenure variable, and then again for just renters with *expect to own in the next five to ten years* as the tenure variable. Because of the nonlinearity of the bivariate probit model, coefficient estimates from the model can be used only to evaluate the sign of the estimated relationship. To facilitate interpretation, therefore, table 3 presents

estimates of the partial derivatives for the covariates instead of the original model coefficients. Those derivatives are calculated as

$$\theta_{\text{partial}} = \theta \cdot [\sum w_i \cdot f(x_i \theta)] / \sum w_i,$$

where  $\theta$  is the vector of probit model coefficients for the tenure and NotCC equations ( $\theta = t, c$ ),  $f(x_i \theta)$  is the unit normal density function evaluated at  $x_i \theta$ ,  $w_i$  is the sampling weight for observation  $i$ , and  $\sum w_i$  is the sample size (appropriately weighted). Calculating  $\theta_{\text{partial}}$  in this manner ensures that the partial effects are representative of the United States while permitting interpretation of the partials as for a linear probability model.<sup>31</sup>

### **The Credit Constraint Equation**

Recall that the credit constraint equation is included in the model primarily to control for sample selection effects. In that regard, results from the NotCC equation are of secondary importance. Accordingly, discussion of the NotCC results below is brief and focuses on certain key variables that help ensure that the NotCC equation serves the function for which it is intended.<sup>32</sup>

At the bottom of table 3, observe that a past history of bankruptcy and having made loan payments more than two months late in the previous year both have no influence on preferences for current owner-occupancy status (column 3). On the other hand, those credit variables have highly significant, large negative effects on the likelihood that a family belongs to the unconstrained group. These results indicate that lenders impose tighter underwriting standards on loan applicants with a bad credit history, but that credit history has little effect on housing tenure preferences per se. As such, the credit variables serve as strong exclusion restrictions: They belong in the credit model but do not influence tenure preferences. Such exclusion restrictions reduce collinearity problems that would otherwise limit the ability of the model to control for sample selection effects.

### **Current Owner-Occupancy Status**

Focus now on estimates of the current owner-occupancy equation (column 3) and recall that these estimates measure the impact of household attributes on preferences for living in owner-occupied housing in the absence of binding borrowing constraints, *ceteris paribus*. As discussed earlier, the desire to live in owner-occupied housing is influenced by family and financial stability (which affect expected mobility), ability to care for the home, wealth (which affects risk aversion), and other attributes that contribute to a family's intrinsic taste for homeownership.

Consider first the role of family stability. Because couples invariably enter into marriage with the expectation of maintaining a stable family, one would expect married families to be more likely to own a home. Indeed, of all the demographic factors, marital status is by far the most important determinant of homeownership: Married couples are 20.7 percentage points more likely to prefer to own a home than nonmarried families, *ceteris paribus*.<sup>33</sup> Similarly, it is well documented that young households are more mobile. For these families owner-occupied housing could prove expensive relative to renting. Estimates from the model support that argument. Each additional year of age (for the household head) has little effect on the desire to own up until age 35. After that, however, older households are increasingly likely to prefer to own. An analogous argument can be made with respect to family size. Because it is more traumatic and expensive to move larger families, larger families tend to be less mobile and should, therefore, be more likely to prefer owner-occupied housing. Again, estimates support this argument. With each additional person in the household, families are 2.2 percentage points more likely to prefer to own.

Consider next financial stability. Families in which the head works full time have more secure income than those in which the head does not work full time. Of the financial variables in the model, this turns out to be the most important determinant of homeownership. Among families with a head working full time, the likelihood that the family prefers to own is 9.96 percentage points higher than if the head was not working full time. Moreover, after controlling for the employment status of the head (and spouse), total household income has no effect on preferences for owning. Similarly, if the household usually knows what its income will be next year, the family is 5.8 percentage points more likely to want to own. Conversely, as the number of full-time jobs the head has previously held increases—after having already controlled for age of the head—the family is less likely to want to own. The interpretation of this result is that frequent job changes reflect financial uncertainty and increase the likelihood of moving, both of which reduce the appeal of homeownership.

Also, observe that an increase in real income in the previous five years has a positive effect on preferences for owning but is only marginally significant, while expectations that real income will increase in the next five years have a *negative* and significant effect on preferences for owning. The former result may signal increased financial security as the family's income status improves. The latter result could reflect option-type effects. Because housing demand increases with income and moving from owner-occupied housing is costly, if income might increase substantially in the next few years it would make sense to wait before buying until the future income is better known.

Owner-occupied housing also requires more care from the occupant than rental housing. For that reason, one might expect that families in bad health would be less likely to want to live in owner-occupied housing. Results here are intriguing. If the head is in bad health, that has little effect on preferences for living in owner-occupied housing. However, if the spouse is in bad health, that reduces the likelihood that the family

prefers to live in owner-occupied housing by 15.6 percentage points. More research is required to sort out exactly what this pattern reflects. One possibility, though, is that the spouse is the principal family member to maintain the home. If the spouse is in poor health and the head is occupied elsewhere (at work, for example), then the family may find that rental housing becomes relatively more attractive.

Owner-occupied housing is a risky, site-specific investment. Because risk aversion tends to diminish with wealth, one would expect that wealthy individuals would be more interested in owning a home (e.g., Henderson and Ioannides 1983, Fu 1991, Ioannides and Rosenthal 1994).<sup>34</sup> Several variables serve as proxy for household wealth and yield results largely supportive of that argument. Families with more highly educated heads are more likely to prefer to own: Holding a college degree or more raises the likelihood of owning by 4½ percentage points relative to a high school degree, while holding less than a high school degree lowers the rate by 8.8 percentage points. Similarly, families that have received at least one inheritance, gift, or settlement since 1980 are 7.1 percentage points more likely to prefer to own—although, interestingly, the dollar value of such receipts has no influence on preferences for ownership. Families living in expensive areas must lever up further to purchase a home for any given level of family wealth. Such investment strategies are risky. In keeping with this argument, families living in neighborhoods where nearby buildings are more than 21 feet apart (characteristic of suburban and rural neighborhoods) are roughly 12 percentage points more likely to prefer owning than if they were living in areas in which nearby buildings were within 21 feet of each other (characteristic of central city environments).<sup>35</sup>

A last set of variables requires some attention. Recall that white homeownership rates are roughly 25 percentage points higher than for African American and Hispanic families. The model variables discussed above account for most of those differences, reducing the race effects to 8.03 and 8.83 percentage points for the African American and Hispanic categories, respectively. Nevertheless, one has to question why even these sizable race effects remain. In the case of Hispanics, one possibility is that many of the Hispanic families are recent immigrants, a variable not included in the model (see Coulson 1999, for example). More generally, the estimated race effects likely reflect the influence of omitted determinants of financial and family stability, ability to care for the home, wealth, and discriminatory treatment, all of which are correlated with race and ethnicity.<sup>36</sup>

### **Expect to Own in the Next Five to Ten Years**<sup>37</sup>

Results from the bivariate probit model governing whether current renters expect to own in the next five to ten years differ substantially from the current owner-occupancy model. Most striking, the race-related coefficients are all insignificant, indicating that we cannot reject the hypothesis that minority and white renters have similar

expectations of future home purchase after controlling for the influence of credit barriers and demographic and financial factors. Current marital status also has little influence on renter expectations, but older renters are significantly less likely to anticipate future homeownership, opposite from the impact of old age on preferred current housing tenure. Presumably, this latter result reflects selection effects: Older families with the strongest tendency to own would already have transited out of renting. Spouse working full time and expectations of future increase in income both have positive and significant impacts on renter expectations, whereas these variables have insignificant and negative effects in the preferred current housing tenure model. This likely indicates that the ability to accumulate future wealth positively affects renter expectations of future homeownership. Receiving an inheritance also has a sharply positive impact on renter expectations of owning, but central city/suburban status has little effect. The former result is similar to the preferred current tenure model, but the latter differs in that individuals living in less densely developed areas are more likely to prefer to own their current home. This difference could again reflect selection effects in that families with strong tastes for owning their current home may have already gravitated to the suburbs.

## **VI. THE IMPACT OF BORROWING CONSTRAINTS ON OWNER-OCCUPANCY RATES**

In table 4, the first two columns report the sample share for which NotCC equals 0, labeled *Possibly Credit Constrained* in the table, and the sample share for which NotCC equals 0 and families currently rent, labeled *Possibly Credit Constrained AND Renting*. For the full sample of owners plus renters, 14.2 percent of families currently rent and are possibly credit constrained. That estimate provides an upper bound on the impact of borrowing constraints on owner-occupancy rates.

The next three columns compare actual with predicted owner-occupancy rates that would prevail in the absence of borrowing constraints. Observe that eliminating borrowing constraints would have raised the 1998 owner-occupancy rate by 4.03 percentage points. Not surprisingly, borrowing constraints have the greatest impact on the homeownership rates of lower-income families: roughly 11 percentage points among families with total household income in the first decile, roughly 6.75 percentage points among families with income between the 10th and 50th percentiles, and little effect thereafter. Effects are also more pronounced among young (under age 35) and middle-aged families (between 35 and 55 years), raising homeownership rates for both groups by roughly 6½ percentage points, with no effect on older families. Looking across racial and ethnic lines, homeownership rates rise most for Hispanics (6.7 percent) and least for African American families (1.3 percentage points).

An additional perspective is obtained by comparing the predicted share of current owners across races. Observe that removing the influence of borrowing constraints does little to reduce the gap in owner-occupancy rates between white and nonwhite families. In contrast, in table 2, the difference in the frequency of married families between white and African American households is 26.8 percentage points. Multiplying that value by the marital status partial in table 3 for the currently own regression yields 0.0555. Thus, if one were to raise the African American marital status rate to that of the white population, *ceteris paribus*, the African American owner-occupancy rate would increase by 5.55 percentage points. This suggests that policymakers and industry officials seeking to narrow the homeownership gap between African American and white households may need to look farther than just the elimination of borrowing constraints.

Do credit barriers depress owner-occupancy rates by delaying access to owner-occupied housing or by permanently excluding some families from owning? The last three columns of table 4 shed light on this question by examining renter expectations of future homeownership. Results indicate that the percentage of renters who expect to own in the next decade rises by 7.56 percentage points with the elimination of borrowing constraints. Assuming such expectations are realized, multiplying that figure by the current frequency of renters yields a 2.47 percentage point increase in the *eventual* attainment of owner-occupancy for the present total population of owners and renters ( $.0247 = .0756(1-.6738)$ , where .6738 is the frequency of owners and 1-.6738 is the frequency of renters). In contrast, as noted above, elimination of borrowing constraints would increase owner-occupancy rates by 4 percentage points. Thus, the impact of borrowing constraints on renter expectations of future homeownership is small relative to the effect on the overall rate of homeownership. This suggests eliminating borrowing constraints accelerates the realization of renter expectations of owning a home. Equivalently, borrowing constraints depress current owner-occupancy rates in part by delaying access to homeownership as opposed to permanently excluding families from owning a home, consistent with results from Goodman and Nichols (1997).

Breaking out these last results by race yields a sharper picture. For whites, removing credit barriers increases renter expectations of future homeownership by 7.83 percentage points. This translates into an increase in the eventual attainment of homeownership among white families of 2.12 percentage points.<sup>38</sup> For African American and Hispanic households, comparable calculations yield estimates of an increase in eventual attainment of homeownership of 3.28 and 5.18 percentage points, respectively. In contrast, the current housing tenure model predicts that with the removal of credit barriers, homeownership rates would increase 4.11, 1.31, and 6.72 percentage points for whites, African Americans, and Hispanics. Thus, although borrowing constraints appear to depress white and Hispanic homeownership rates at least in part by delaying renter access to homeownership (2.12 is well below 4.11), results for African Americans are more consistent with the view that credit barriers depress homeownership rates by permanently discouraging some renters from owning a home.



## VII. CONCLUSIONS

Recent dramatic innovations in affordable mortgage lending along with the economic expansion of the 1990s have helped raise U.S. homeownership rates to historic levels, from 64 percent in 1989 to 67 percent by 2000. Against that backdrop, this paper has sought to evaluate the extent to which the elimination of borrowing constraints would further expand opportunities for homeownership. This question is evaluated by applying discrete choice sample selection methods to unusually rich data from the 1998 Survey of Consumer Finances. A key feature of the SCF, upon which the estimation strategy is based, is that survey questions identify a group of households for whom borrowing constraints are not binding, *a priori*.

Is there opportunity for industry and government to expand homeownership through further relaxation of borrowing constraints? Results from the analysis suggest a qualified yes. If all borrowing constraints were suddenly removed, *ceteris paribus*, and all households could instantly change their housing tenure if they so chose, the owner-occupancy rate among nonfarm families in the United States would increase by just over 4 percentage points. Not surprisingly, these effects are distributed unequally across different subgroups of the population. Borrowing constraints have far more impact on homeownership rates among low-income families than any other group. Sizable opportunities to expand homeownership also exist among young and middle-aged families.

Further analysis suggests that for white and Hispanic households, borrowing constraints depress current owner-occupancy rates in part by delaying rather than by permanently excluding access to homeownership. That result is consistent with evidence from Goodman and Nichols (1997) and suggests that government and industry officials seeking to expand homeownership opportunities may want to consider mortgage products that alleviate borrowing constraints primarily in the early years of a mortgage. On the other hand, analogous estimates for African American families are suggestive that credit barriers depress owner-occupancy rates for these families by permanently discouraging some renters from homeownership. Because the approach used to identify these effects is indirect, these findings should be viewed with some caution. Nevertheless, the results here suggest that the degree to which borrowing constraints delay access to homeownership versus permanently exclude access to owning warrants further research.

Finally, model estimates also confirm that even in an environment free of borrowing constraints, household family and financial stability are very important determinants of whether families prefer to own: Instability favors renting, while stability favors homeownership. In addition, families in better health, and therefore more able to care for their properties, are more likely to prefer to own, as are higher-wealth families which are more capable of absorbing financial risk. As an example of the potential impact of such effects on owner-occupancy rates, African American marriage rates are

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roughly 25 percentage points below those of the white population. That difference alone is predicted to reduce the owner-occupancy rate of African American families by roughly 5½ percentage points relative to the white population. Estimates such as these suggest that government and industry efforts to expand access to homeownership will be more fruitful if they include broad-based initiatives designed to enhance the social and financial stability of families, in addition to ensuring that affordable mortgage products are available.

### **A U T H O R**

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### **A C K N O W L E D G M E N T S**

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## NOTES

1. A growing literature on social capital has examined whether homeowners invest in social capital that would serve to enhance the vitality of their neighborhoods (e.g., Rohe, McCarthy, and Van Zandt 2000; DiPasquale and Glaeser 1999). For example, do homeowners vote more often than renters, do they donate more of their time to community functions, do they take better care of their homes? All such behavior imparts positive benefits on the neighborhood and society in general.
2. It is difficult to show that homeowners make good neighbors because of a strong simultaneity problem. Families that have a taste for investing in their local neighborhoods likely expect to remain in their community for an extended time. Yet the cost of owner-occupied housing declines with length of stay because the high costs of moving to and from owner-occupied housing can be spread out over a longer period (e.g., Rosenthal 1988). For that reason, families intending to remain stationary for a long time are more likely to own their home, *ceteris paribus*, and, for the same reason, are more likely to invest in a variety of forms of neighborhood social capital.
3. For example, Zero Down™ is an affordable mortgage product offered by Bank of America; it is available in 23 states and Washington, D.C. It is a conventional mortgage that requires zero down payment. In addition, closing costs can come from a gift or the seller, or can be financed (see Bank of America 1998). These loans and other affordable mortgage products are typically issued only to individuals with low or moderate income relative to the areas in which they live. Moreover, as a broad characterization, the more relaxed the underwriting standards, the more strict the eligibility criteria with regard to credit risk that govern whether a prospective borrower would have access to the mortgage product.
4. The principal limitation of the SCF is that strict regulations designed to protect confidentiality do not allow the researcher to observe any information related to the geographic location of the household. However, as will become apparent, the density of development in the household's neighborhood is available, and this variable acts as an excellent proxy for central city status. Additional details on the SCF data are provided later in this paper.
5. For example, graduate payment mortgages and price-level-adjusted mortgages reduce tilt problems by allowing for increasing nominal payments over the life of the mortgage.
6. Duca and Rosenthal (1991) provide empirical support for these ideas.
7. Using 1983 SCF data, Duca and Rosenthal (1994b) found no evidence that lenders vary loan rates across borrowers on the basis of observable differences in risk attributes.
8. Jappelli (1990) and Duca and Rosenthal (1993) provide evidence on this point.
9. See also Duca and Rosenthal (1993, 1994a).
10. In May 1988, the *Atlanta Constitution* published a four-part series, "The Color of Money," while the *Detroit Free Press* published a similar series in July 1988.
11. Beginning in 1990, lenders were required by HMDA to report the location of residential loans made along with the income, race, and gender of loan applicants and whether the loan application was withdrawn (by the applicant), approved, or denied. See Rehm (1991a,b) and Munnell et al. (1996) for further discussion of the HMDA data.
12. For example, Rehm (1991b) notes that although Governor LaWare of the Federal Reserve described the HMDA data as "very worrisome," he indicated that more information was needed. Similarly,

Rehm (1991b) reports that “Leading industry groups, such as the American Bankers Association, have maintained that the Fed data do not take into account information crucial to credit decisions, such as a loan applicant’s credit history, other debts, or employment.”

13. In response to these findings and related community pressure, the Federal Reserve Board approved several large bank mergers conditional on the requirement that merger applicants meet lending goals in minority neighborhoods (see, for example, the description of Bank of America’s merger with Security Pacific in Thomas 1992, p. A6). In addition, Fannie Mae and Freddie Mac, the dominant players in the secondary mortgage market, established new low down payment loan programs designed to reduce credit barriers for underserved populations (e.g., Reuters 1991). Private industry responded to these programs by originating new mortgage products targeted at previously underserved groups knowing that they could then sell such products to the secondary market. See Listokin and Wyly (2000) for a careful review of affordable mortgage products currently available on the market and the history of how those products came to be.
  14. This assumption derives, presumably, from secondary mortgage market criteria at the time that generally prohibited the securitization of mortgages with house payment-to-income ratios of more than 28 percent.
  15. Trans Data Corporation data on official credit standards for primary mortgage lenders across the United States (in 1986) indicated that many lenders had house payment-to-income limits above 28 percent.
  16. Mayer and Engelhardt (1996) provide additional evidence that many new homebuyers receive gifts of one sort or another in the few years prior to purchase of the first home, especially among families likely to be credit constrained. See also Haurin, Hendershott, and Wachter (1996) for a related discussion.
  17. The housing affordability approach is also explicit in the National Association of Home Builders’ housing opportunity index and the National Association of Realtors’ housing affordability index.
  18. Listokin et al. (1999) also estimate the preferred house value for individual households and then compare the application of that reference house to reference values based on a percentile of the house value distribution as described above.
  19. Studies by Savage (1999), Listokin et al. (1999), and affordability tables at the Census Bureau web site (<http://www.census.gov/hhes/www/hsgaffrd.html>) have all been based on data from the Survey of Income Program Participation.
  20. Ioannides and Rosenthal (1994) provide empirical support for the idea that housing investment demand is indeed more sensitive to wealth than consumption demand.
  21. Macroeconomic conditions common to all households are captured in the model’s constant term.
  22. Note that when  $e_{\text{NotCC}}$  is independent of  $e_{\text{own}}$ , the expected value of  $I_{\text{own}}$  is  $xt$  since  $E[e_{\text{own}} | e_{\text{NotCC}}] = 0$ , and consistent estimates of  $t$  can be obtained by running a univariate probit model on (3.3) using only unconstrained families.
  23. The variances of  $e_{\text{NotCC}}$  and  $e_{\text{own}}$  are normalized to 1 because the parameters of the bivariate probit model can be estimated only up to a scale factor. See Maddala (1983) for further discussion.
  24. Boyes, Hoffman, and Low (1989) estimate a similar three-celled bivariate probit model for the credit card market.
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25. An issue of identification does remain. Selection models such as the one above provide more reliable results when there are variables included in the selection equation (equation [3.5] in this case) that do not belong in the equation of interest (equation [3.3]). In the work to follow, as will become apparent, there appear to be several natural exclusion restrictions, most notably a set of credit history variables that clearly belong in the credit model but that have zero coefficients in the tenure preference model. For a more detailed discussion of bivariate probit models with censoring, see Maddala (1983) or Tunali (1986).
26. The SCF data are imputed five times to control for missing values and also to protect the confidentiality of some respondents with especially unusual and highly visible characteristics (such as very high wealth). When estimating the bivariate probit models, all five implicates totaling over 21,000 records were used and the standard errors were divided by the square root of 5 to adjust for the “true” sample size. See the 1998 SCF manual and Kennickell (1998) for details.
27. See Kennickell (1999) for a careful discussion of the SCF sampling weights.
28. This is a more demanding definition of who is not credit constrained than was used by Duca and Rosenthal (1994a). In that paper, families that successfully reapplied upon having a loan application rejected or only partially accepted were considered not credit constrained. Classifying such families as NotCC equals 0 reduces the efficiency of the estimated housing tenure preferences but increases the likelihood of obtaining unbiased and consistent estimates. The reason is that the three-celled probit model outlined in the previous section requires that one identify a subset of the sample that is clearly not credit constrained. In contrast, the model does not require that everyone in the alternate category be credit constrained. Instead such families *may* be credit constrained, analogous to studies testing the LCPIH by Zeldes (1989) and others.
29. The SCF reports whether nearby buildings are less than 21 feet apart, 21 to 100 feet apart, or more than 100 feet apart.
30. The combined farm plus nonfarm values are taken from Kennickell (1999).
31. As an example, the probability that a family wants to own is 3½ percentage points higher if the household head is male, as seen in the second column and first row of table 3.
32. Interpreting many of the coefficients in the NotCC equation is difficult because households belong to the unconstrained group if they prefer to hold less debt than lenders are willing to allow (e.g., Duca and Rosenthal 1993). As such, the NotCC coefficients reflect the impact of household attributes on the maximum amount of debt lenders are willing to issue *relative* to a family’s demand for debt. For example, receipt of an inheritance (gift or settlement), the dollar value of such a receipt, and the dollar value of future such receipts all have zero effect on the likelihood that a family belongs to the unconstrained group. That result is consistent with Duca and Rosenthal (1993) who found that wealth does not affect the likelihood of being credit constrained based on 1983 SCF data. This does not, however, imply that lenders care little about loan applicant wealth. Rather, it indicates that the willingness of lenders to issue more debt as household wealth increases is roughly offset by an increase in demand for debt.
33. Divorced families are also more likely to prefer owning. This may reflect that owning one’s home is habit forming. In addition, capital gains tax provisions still in place in 1998 created financial incentives for individuals to remain owner-occupiers once the first home had been bought (e.g., Hoyt and Rosenthal 1990, 1992).
34. The SCF contains very detailed information on household assets and debts and permits one to do an excellent job of calculating net wealth. However, owner-occupied housing is an important asset and, as such, influences the family’s portfolio and its wealth. Wealth, therefore, is endogenous and

cannot be directly included in the model (see Haurin, Hendershott, and Wachter 1997 for a careful discussion of this point). Because the primary goal of this paper is to forecast homeownership rates that would prevail in the absence of borrowing constraints, exogenous determinants of wealth are included directly in the model rather than attempting to use a two-stage least squares type procedure to include wealth directly in the regression. The reduced form approach taken here is more robust relative to the goals of the paper because no restrictions are placed on the exogenous determinants of wealth.

35. Whether the head or spouse has been previously married was also included in the model because the dissolution of past marriages could reduce an individual's current wealth. Although these variables have some impact in the NotCC equation, they have no impact on housing tenure preferences.
36. The "Other" race category includes people of Asian descent, Native Americans, and other less populous groups. Because it is not possible to separate these groups, results for the "Other" category are not discussed.
37. The model below restricts the sample to only renters. This greatly reduced the sample size making it difficult for the maximum likelihood model to converge. To address that problem, *Less than high school* and the *Previous marriages* variables were dropped from both the NotCC and the "Expect to Own..." equations. In addition, the *Financial problems* variables were also dropped from the "Expect to Own..." equation.
38. Note that  $0.212 = .0783(1-.7295)$ , where .0783 is the impact of borrowing constraints on white renter expectations of owning and .7295 is the actual frequency of owner-occupiers in the white population.

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## APPENDIX

Tables 2 and 3 report the variable descriptions in each row to facilitate review. While most descriptions are complete, some require additional clarification. Under *Household head's race*, "Other" includes people of Asian descent, Native Americans, and other less populous groups. Because it is not possible to separate these groups into their own categories, results for the Other category are largely not discussed in the paper. Under *Stable income and employment*, "Know next yr income" equals 1 if the family usually knows what its income will be one year ahead. In the same category, "H # FT jobs > 1 yr" is the number of full-time jobs lasting at least one year previously held by the head of household. Under *Inheritances, gifts, etc.*, "Received at least 1 since 80" equals 1 if the head of household or spouse has ever received an inheritance, major gift, or settlement. "\$ val of inher/gift since 95" is the dollar value of all inheritances, etc., received from 1995 on. "\$ val expect inher/gift" is the dollar value of all inheritances, etc., that the household expects to receive in the future. Under *Central city/suburb*, "Ngh Bldg < 21 ft" equals 1 if the neighborhood buildings are within 21 feet of each other. A similar interpretation applies to the remaining variables in this category except "Density not known" for which the local density of development was not reported. That variable was included in the probit regressions, but results are not reported to conserve space. Under *Financial problems*, "H or S ever bankrupt" equals 1 if the head of household or spouse has ever filed for bankruptcy, while "Loan pays 2 mnth late" equals 1 if in the last year the family made any loan payments more than two months late.

**Table 1a. Percentage Race in the CPS and SCF for Various Years**

	Farm Plus Nonfarm Populations								Nonfarm Only
	1989		1992		1995		1998		1998
	CPS	SCF	CPS	SCF	CPS	SCF	CPS	SCF	SCF
White	0.785	0.746	0.776	0.752	0.774	0.777	0.750	0.773	0.777
African Am.	0.112	0.129	0.114	0.127	0.116	0.128	0.119	0.121	0.119
Hispanic	0.077	0.080	0.081	0.075	0.082	0.057	0.094	0.074	0.072
Other	0.026	0.046	0.029	0.046	0.028	0.039	0.036	0.032	0.031

**Table 1b. Homeownership Rates in the CPS and SCF for Various Years**

	Farm Plus Nonfarm Populations								Nonfarm Only
	1989		1992		1995		1998		1998
	CPS	SCF	CPS	SCF	CPS	SCF	CPS	SCF	SCF
White	0.693	0.703	0.695	0.701	0.709	0.705	0.723	0.717	0.730
African Am.	0.419	0.420	0.425	0.431	0.422	0.426	0.466	0.459	0.473
Hispanic	0.456	0.449	0.447	0.449	0.433	0.436	0.472	0.458	0.455
Other	0.506	0.536	0.520	0.542	0.505	0.517	0.535	0.540	0.558
Total	0.639	0.639	0.639	0.640	0.647	0.647	0.661	0.661	0.674

**Table 2. Sample Means of Probit Model Variables for the Full Sample and for Selected Subgroups<sup>a</sup>**

	Full Sample	Income Percentile				Age < 21 ft. apart				
		0-10	10-25	25-50	Age < 35					
<b>DEPENDENT VARIABLES</b>										
Own home	0.674	0.730	0.473	0.455	0.558	0.344	0.494	0.602	0.407	0.544
Rent but expect to own	0.087	0.074	0.137	0.128	0.137	0.079	0.063	0.112	0.221	0.126
“Not” credit constrained	0.717	0.750	0.551	0.630	0.715	0.668	0.720	0.662	0.511	0.663
<b>INDEPENDENT VARIABLES</b>										
<i>Household head's gender</i>										
Male	0.722	0.744	0.517	0.800	0.773	0.416	0.467	0.675	0.744	0.678
<i>Household head's race</i>										
White	0.777	1.000	-	-	-	0.582	0.708	0.749	0.691	0.678
African American	0.119	-	1.000	-	-	0.297	0.167	0.121	0.136	0.166
Hispanic	0.072	-	-	1.000	-	0.081	0.101	0.108	0.127	0.116
Other	0.031	-	-	-	1.000	0.040	0.025	0.022	0.045	0.040
<i>Head's current marital status</i>										
Married	0.525	0.551	0.283	0.588	0.653	0.172	0.266	0.420	0.449	0.435
Divorced	0.127	0.132	0.140	0.082	0.070	0.160	0.166	0.168	0.065	0.148
<i>Household head's age</i>										
Age	48.841	50.199	46.240	40.861	43.369	49.278	53.074	49.190	27.964	46.720
Under 35 years	0.229	0.203	0.261	0.404	0.334	0.333	0.264	0.250	1.000	0.283
35 to 55 years	0.426	0.422	0.440	0.432	0.477	0.253	0.248	0.371	-	0.423
Over 55 years	0.345	0.375	0.300	0.164	0.189	0.413	0.488	0.379	-	0.294
<i>Size of household</i>										
# in household	2.589	2.475	2.639	3.475	3.183	2.100	2.243	2.389	2.822	2.526
<i>Current emp. status</i>										
Head works full time	0.637	0.634	0.565	0.733	0.759	0.216	0.368	0.623	0.804	0.645
Spouse works full time	0.284	0.289	0.219	0.276	0.416	0.070	0.084	0.191	0.322	0.251
Spouse works part time	0.076	0.081	0.032	0.085	0.083	0.038	0.037	0.060	0.082	0.064
<i>Current, past, and exp. income</i>										
Total family inc in 97	5.29E+04	5.85E+04	2.87E+04	3.17E+04	5.49E+04	4.28E+03	1.24E+04	2.48E+04	3.64E+04	4.31E+04
Real inc rose last 5 yr	0.203	0.208	0.184	0.189	0.182	0.095	0.063	0.140	0.293	0.207
Real inc exp to rise next 5 yr	0.234	0.213	0.295	0.333	0.298	0.256	0.202	0.207	0.412	0.264

**Table 2. Sample Means of Probit Model Variables for the Full Sample and for Selected Subgroups<sup>a</sup> (continued)**

INDEPENDENT VARIABLES (continued)	Full Sample	Income Percentile				Age<35	Bld <21 ft. apart			
		White	African Amer.	Hispanic	Other			0-10	10-25	25-50
<i>Stable inc and emp</i>										
Usually know next yr income	0.722	0.757	0.586	0.570	0.729	0.536	0.568	0.709	0.614	0.685
H # of FT jobs > 1 yr	2.324	2.371	1.949	2.498	2.174	0.590	1.460	2.308	2.170	2.392
<i>Health status</i>										
Head in bad health	0.051	0.046	0.086	0.052	0.057	0.138	0.109	0.051	0.009	0.060
Spouse in bad health	0.021	0.025	0.008	0.018	0.000	0.020	0.032	0.027	0.010	0.025
<i>Household head's education</i>										
Less than high school	0.187	0.149	0.270	0.474	0.161	0.445	0.373	0.206	0.162	0.187
High school	0.291	0.294	0.341	0.241	0.157	0.275	0.334	0.348	0.285	0.272
Some college	0.238	0.240	0.238	0.164	0.351	0.179	0.182	0.262	0.275	0.255
College degree	0.165	0.181	0.115	0.074	0.165	0.075	0.082	0.136	0.197	0.179
Graduate degree	0.119	0.136	0.036	0.047	0.166	0.025	0.030	0.048	0.081	0.108
<i>Inheritances, gifts, etc.</i>										
Received at least 1 since 80	0.203	0.237	0.109	0.044	0.077	0.119	0.172	0.208	0.121	0.165
\$ val of inher/gift since 95	8.06E+03	9.15E+03	5.34E+03	1.87E+03	5.32E+03	2.57E+03	3.64E+03	4.79E+03	4.87E+03	5.20E+03
\$ val expect inher/gift	2.86E+04	3.29E+04	2.03E+03	8.46E+03	7.03E+04	4.94E+03	2.27E+04	1.35E+04	4.43E+04	2.46E+04
<i>Central city/suburb</i>										
Ngh bldg < 21 ft	0.464	0.405	0.647	0.746	0.592	0.534	0.506	0.523	0.574	1.000
Ngh bldg 21 to 100 ft	0.380	0.411	0.298	0.205	0.321	0.322	0.362	0.340	0.332	—
Ngh bldg > 100 ft	0.127	0.153	0.041	0.030	0.054	0.111	0.112	0.115	0.062	—
Density not known	0.029	0.032	0.014	0.019	0.033	0.033	0.020	0.023	0.032	—
<i>Previous marriages</i>										
Head prev. married	0.175	0.191	0.136	0.106	0.080	0.147	0.125	0.172	0.043	0.159
Spouse prev. married	0.120	0.133	0.069	0.067	0.109	0.030	0.052	0.102	0.049	0.091
<i>Financial problems</i>										
H or S ever bankrupt	0.084	0.086	0.102	0.046	0.069	0.065	0.078	0.091	0.065	0.091
Loan pays 2 mnth late	0.060	0.051	0.121	0.049	0.071	0.059	0.080	0.088	0.091	0.070

<sup>a</sup>All values are calculated with sampling weights to be representative of the United States.

**Table 3. Three-Celled Bivariate Probit Model Estimates of Who Prefers to Own in the Absence of Borrowing Constraints<sup>a</sup>**

	Preferred Current Housing Tenure (Sample includes owners and renters)				Expect to Own in the Next 5-10 Years (Sample includes renters only)			
	Not Credit Constrained		Prefer to Own If Not Credit Constrained		Not Credit Constrained		Prefer to Own If Not Credit Constrained	
	Partial <sup>b</sup>	t-ratio	Partial <sup>b</sup>	t-ratio	Partial <sup>b</sup>	t-ratio	Partial <sup>b</sup>	t-ratio
<i>Household head's gender</i>								
Male	0.00619	0.346	0.03501	1.704	0.00476	0.163	0.05042	1.116
<i>Household head's race</i>								
African American	-0.09242	-4.899	-0.08034	-2.883	-0.06556	-2.147	0.05478	1.069
Hispanic	-0.00859	-0.362	-0.08830	-2.841	0.01504	0.397	-0.01226	-0.212
Other	-0.01454	-0.471	-0.11590	-3.108	0.02314	0.412	-0.02290	-0.294
<i>Head's current marital status</i>								
Married	0.06254	3.414	0.20706	8.336	0.01514	0.453	0.02782	0.553
Divorced	-0.03166	-1.555	0.06118	2.669	-0.02737	-0.761	0.07032	1.293
<i>Household head's age</i>								
Age if under 35 years	0.00766	4.698	0.00132	0.667	0.00567	1.886	-0.00915	-1.947
Age if 35 to 55 years	0.00781	7.475	0.00521	3.804	0.00559	2.842	-0.00726	-2.376
Age if over 55 years	0.00731	9.680	0.00468	4.676	0.00748	5.478	-0.00909	-3.868
<i>Size of household</i>								
# in househld	-0.01238	-2.589	0.02213	3.213	-0.01764	-2.001	0.00247	0.156
<i>Current emp. status</i>								
Head works full time	-0.01839	-1.044	0.09961	4.347	-0.02714	-0.868	0.12318	2.624
Spouse wk full time	-0.02766	-1.816	0.02438	1.165	-0.02736	-0.834	0.15079	3.189
Spouse wk part time	-0.00189	-0.083	0.01020	0.320	-0.06885	-1.190	0.13940	1.633
<i>Current, past, and exp. income</i>								
Tot. family inc in 97	2.12E-08	2.128	2.78E-09	0.485	0.00000	1.771	0.00000	-0.773
Real inc rose last 5yr	0.02190	1.476	0.03383	1.696	0.01213	0.383	-0.00114	-0.025
Real inc exp to rise nxt 5yr	-0.01174	-0.849	-0.03966	-2.059	-0.01379	-0.535	0.07507	1.948
<i>Stable income and emp.</i>								
Usually know next yr inc	0.02628	2.069	0.05811	3.539	0.00826	0.349	0.06148	1.649
H # of FT jobs>1 yr	-0.00802	-4.032	-0.00839	-2.728	-0.00431	-1.169	0.00005	0.010
<i>Health status</i>								
Head in bad health	-0.01792	-0.543	-0.04065	-1.247	-0.06602	-1.275	-0.05565	-0.504
Spouse in bad health	-0.14029	-3.234	-0.15615	-3.029	-0.09405	-1.114	0.10787	0.832
<i>Household head's education</i>								
Less than high school	-0.04920	-2.501	-0.08793	-3.755	-	-	-	-
Some college	-0.03143	-1.889	0.01313	0.611	-0.00200	-0.069	0.03656	0.817
College degree	0.00822	0.450	0.04483	1.979	-0.01398	-0.393	0.13902	2.533
Graduate degree	0.03248	1.609	0.04603	1.862	0.03270	0.689	0.12635	1.834

**Table 3. Three-Celled Bivariate Probit Model Estimates of Who Prefers to Own in the Absence of Borrowing Constraints<sup>a</sup> (continued)**

	Preferred Current Housing Tenure (Sample includes owners and renters)				Expect to Own in the Next 5-10 Years (Sample includes renters only)			
	Not Credit Constrained		Prefer to Own If Not Credit Constrained		Not Credit Constrained		Prefer to Own If Not Credit Constrained	
	Partial <sup>b</sup>	t-ratio	Partial <sup>b</sup>	t-ratio	Partial <sup>b</sup>	t-ratio	Partial <sup>b</sup>	t-ratio
<i>Inheritances, gifts, etc.</i>								
Received at least 1 since 80	-0.01092	-0.713	0.07099	3.584	-0.04535	-1.174	0.15652	2.749
\$ val. of inher/gift since 95	9.55E-09	0.448	9.48E-08	0.709	0.00000	-0.012	0.00000	0.467
\$ val. expect inher/gift	3.52E-09	0.435	5.16E-08	1.330	0.00000	-0.392	0.00000	1.329
<i>Central city/suburb</i>								
Ngh bldg 21 to 100 ft	0.03151	2.364	0.11531	6.649	-0.00028	-0.011	-0.03000	-0.727
Ngh bldg > 100 ft	0.06530	3.208	0.12327	5.023	0.11614	1.983	0.03488	0.429
<i>Previous marriages</i>								
Head prev. married	-0.03289	-1.910	-0.00480	-0.222	-	-	-	-
Spouse prev. married	-0.02333	-1.175	-0.00959	-0.348	-	-	-	-
<i>Financial problems</i>								
H or S ever bankrupt	-0.20573	-10.013	0.00601	0.149	-0.22033	-4.888	-	-
Loan pays 2 mnth late	-0.21752	-8.548	-0.06431	-1.148	-0.18617	-4.548	-	-
<i>Constant</i>								
$\sigma_{\text{NotCC,Own}}$	-0.12303	-2.395	-0.36955	-4.558	-0.08667	-0.981	-0.09983	-0.512
			-0.3484	-1.807			-0.4531	-2.059
Total observations		4,142		4,142		1,189		1,189
Censored observations		0		984		0		505
Uncensored observs.		4,142		3,158		1,189		684

<sup>a</sup>Controls for sample selection are based on who is not versus who may be credit constrained. Partial derivatives are presented to facilitate interpretation.

<sup>b</sup>Partial derivatives were calculated by forming  $t_{\text{partial}} = t \cdot [\sum w_i f(x_i t)] / \sum w_i$ , where  $t$  is the probit model coefficient for the tenure equation,  $f(x_i t)$  is the unit normal density function,  $w_i$  is the sampling weight for observation  $i$ , and  $\sum w_i$  is the sample size (appropriately weighted). See the text for additional details.

**Table 4. 1998 Actual and Predicted Owner-Occupancy Rates (%)<sup>a,b</sup>**

	Upper Bound Impact of Credit Constraints (Sample includes owners and renters)		Preferred Current Housing Tenure (Sample includes owners and renters)			Expect to Own in the Next 5-10 Yrs (Sample includes renters only)		
	Possibly Credit Constrained	Possibly Credit Constrained AND Renting	Actual Percent Own	Predicted <sup>c</sup> Percent Own	Actual-Predicted Percent Own <sup>c</sup>	Actual Expect to Own	Predicted <sup>c</sup> Expect to Own	Actual-Predicted Expect to Own <sup>c</sup>
<i>Total</i>	28.33	14.20	67.38	71.42	4.03	26.72	34.28	7.56
<i>By race</i>								
White	24.99	11.20	72.95	77.07	4.11	27.25	35.08	7.83
Afr Am.	44.86	27.18	47.31	48.62	1.31	26.01	32.24	6.23
Hispan.	36.96	24.26	45.49	52.22	6.72	23.48	32.99	9.51
Other	28.52	15.97	55.79	62.14	6.35	31.09	34.92	3.83
<i>By income percentile</i>								
0-10	33.17	26.93	34.41	45.51	11.10	12.01	22.20	10.19
10-25	28.02	19.08	49.43	56.55	7.13	12.36	25.52	13.16
25-50	33.81	18.52	60.20	66.85	6.65	28.18	36.22	8.04
50-75	32.81	13.24	74.29	77.25	2.97	46.08	46.44	0.03
75-90	19.03	4.43	88.63	86.89	-1.74	52.12	51.49	-0.63
90-100	14.07	1.51	93.64	91.36	-2.28	57.63	59.47	1.84
<i>By age</i>								
<35 yrs	48.85	32.23	40.72	47.07	6.35	37.28	45.93	8.65
35-55	32.62	13.72	71.47	78.00	6.53	27.74	37.45	9.71
>55 yrs	9.44	2.84	80.00	79.41	-0.59	4.90	5.82	1.63
<i>By distance between buildings</i>								
<20 ft	33.68	20.19	54.42	59.28	4.86	27.62	35.75	8.13
21-100	25.56	10.24	77.43	80.72	3.28	25.46	32.85	7.39
>100 ft	15.85	3.30	85.68	87.15	1.47	29.00	29.76	0.76

<sup>a</sup>All figures were weighted using the modified 1998 SCF weight x42001 to ensure that the values are representative of the United States for the respective subsample (see Kennickell 1991 for details).

<sup>b</sup>Sample excludes farms. Mobile home occupants are counted as owners if they own either the land, the unit, or both.

<sup>c</sup>Coefficients from the owner-occupancy/expected owner equations in table 3 were used to calculate the predicted values.



