

# The Potential of Downpayment Assistance for Increasing Homeownership Among Minority and Low-Income Households

**Christopher E. Herbert**

Abt Associates Inc.

**Winnie Tsen**

U.S. Government Accountability Office

---

## Abstract

*The purpose of this study is to investigate the potential for downpayment assistance efforts to increase homeownership. The study analyzes data from the 1996 panel of the Survey of Income and Program Participation, which tracks some 11,000 renter households over a 3-year period. The analysis has two stages. In the first stage, a parametric proportional hazard model is estimated of the transition to homeownership based on a variety of demographic and financial characteristics of each household and on economic conditions in the markets in which those households reside. In the second stage, the results of the hazard model are used to simulate the impact of cash grants to households on the probability of their becoming homeowners over time. The simulations are run for all renter households and for subgroups of low-income, African-American, and Hispanic households. Results confirm that liquid financial assets are statistically significant predictors of homeownership. Although the importance of wealth in predicting homeownership is in keeping with the findings of previous research, a somewhat surprising finding is that the largest impact on the probability of homeownership is associated with savings of between \$0 and \$1,000; although savings of between \$1,000 and \$5,000 have a lower marginal impact on this probability, savings of between \$5,000 and \$20,000 add only slightly to the likelihood of buying, and savings above \$20,000 have no statistically significant impact. These results suggest that downpayment assistance programs that provide even modest amounts of assistance can have a significant impact on the number of low-income and minority households that buy homes.*

## Introduction

Research has consistently found that a lack of wealth is among the most important factors limiting households from becoming homeowners (Barakova et al., 2003; Linneman and Wachter, 1989; Listokin et al., 2002; Quercia, McCarthy, and Wachter, 2003). Wealth is needed both to meet mortgage requirements for a downpayment and to pay for closing costs. These referenced studies have found that a lack of wealth is more important in limiting homeownership than either having low income relative to area house prices or poor credit. In recognition of the importance of the wealth constraint in limiting homeownership, the American Dream Downpayment Act was enacted in 2003 to provide downpayment assistance of up to \$10,000 through the HOME Investments Partnerships Program to up to 40,000 households a year.

The purpose of this study is to investigate the potential for downpayment assistance efforts, such as that provided through the American Dream Downpayment Act, to increase homeownership, both overall and among the low-income and minority households that are of special concern to policymakers. This study will add to existing research in several ways.

First, much has changed in the mortgage market since the early 1990s, when policymakers at all levels of government began focusing on the goal of increasing homeownership among low-income and minority households. Both in response to pressure from the federal government and out of recognition of the market potential of low-income households, mortgage lenders began offering products that loosened traditional underwriting guidelines to expand the pool of households that could qualify for a mortgage. In particular, significant growth has occurred in the number of mortgage products available that require downpayment levels of 5 percent or less of the mortgage balance. Many of the studies cited previously relied on data from 1995 or earlier and so may not reflect changes in the importance of the wealth constraint due to changes in the mortgage market. This study makes use of panel data covering a period from 1997 through 2000, a period when many of these low-downpayment products were becoming more widely available.

Second, most existing research has analyzed the tenure choice of a cross-section of households at a point in time and associated the level of wealth at that point in time with the probability of being a homeowner. Several studies, however, have found that household wealth can change rapidly in anticipation of a move to homeownership, either due to increased savings or from gifts (Engelhardt and Mayer, 1998; Haurin, Hendershott, and Wachter, 1996). In addition, examination of panel study data has previously found that some households are able to purchase homes that would have appeared to be out of reach financially (Listokin et al., 2002). Studies that examine a cross-section of households may not adequately capture this dynamic nature of household wealth and movements to homeownership in general. By using a panel of renter households over time, this study is able to track changes in wealth and relate these changes to the likelihood of becoming a homeowner.

Finally, existing studies have examined the potential impact of changes in downpayment requirements on the propensity to own. In contrast, the approach used in this study is intended to model the effects of a downpayment assistance program by simulating the impact of cash grants on a household's propensity to own. This approach will shed more light on the potential for downpayment assistance of different amounts to stimulate homeownership.

The next section presents a brief review of the literature on this topic. The third section describes the data used in this study and presents the methodology for modeling the transition to homeownership. The fourth section presents the modeling results and the fifth section uses these results to simulate the impact of downpayment assistance programs on the propensity of households to become homeowners. The article concludes with a summary of findings and policy implications from the research.

## Literature Review

Over the past 15 years, a series of articles has evaluated the relative importance of various barriers to homeownership and the potential increases in homeownership that might result from relaxing these constraints. Among the earliest of these studies are Linneman and Wachter (1989) and Zorn (1989). Using the 1977 Survey of Consumer Credit and the 1983 Survey of Consumer Finances (SCF), Linneman and Wachter (1989) first estimated a desired house value for each household based on the choices of homeowners deemed to be unconstrained by financial considerations.<sup>1</sup> Next, they calculated the house value that each household could afford to purchase by applying traditional underwriting criteria to the household's income and wealth. Specifically, they assumed that housing payments could not exceed 28 percent of income and that sufficient wealth should be available to support a downpayment of 20 percent of the house value. The desired house value was then compared with the house values that were feasible, given the household income level and, separately, its wealth level. If the ideal house value was more than 10 percent above the value supported by income or wealth, the household was deemed to be highly income constrained and/or wealth constrained. If the ideal house value exceeded the affordable house value by less than 10 percent, the household was considered moderately income and/or wealth constrained. Dummy variables corresponding to the degree of income and wealth constraints were then incorporated into a logit model of tenure choice for recent movers (those who moved within 3 years of the survey date). The study then examined the impact of these financial constraint measures on the probability of homeownership. The findings indicate that income and wealth constraints are important determinants of homeownership, with binding constraints greatly lowering the overall probability of homeownership.

Zorn's (1989) approach is similar, although, rather than estimating separate income and wealth constraints, he used a single measure of the difference between the desired house value and the value derived from the more binding of the two constraints. Based on analysis of a sample of households from 1986, Zorn's (1989) findings are consistent with those of Linneman and Wachter (1989): moving to homeownership is less likely when financial constraints are binding.

Using data from the National Longitudinal Survey of Youth (NLSY), conducted from 1985 through 1990, Haurin, Hendershott, and Wachter (1997) employed a similar methodology as Linneman and Wachter (1989) but improved on their specification in a number of ways, including creating instrumental variables for wealth and allowing for households to choose a loan-to-value ratio higher than 80 percent to avoid this constraint if their income would support larger mortgage payments. Similar to Zorn (1989), however, Haurin, Hendershott, and Wachter (1997) combined income and wealth constraints into a single variable measuring the financial constraint imposed by standard underwriting guidelines, so the results do not shed light on the relative importance

of income and wealth constraints. Their results are also highly consistent with the findings from Linneman and Wachter (1989): these financial constraints are important factors in predicting the probability of homeownership.

Although these studies made an important contribution to the literature by examining the role of financial constraints on tenure choice, none of these studies examined the magnitude of the impact of these constraints on homeownership rates. Several recent studies, however, have adapted this general approach to examine how a reduction in financial and other constraints might contribute to homeownership levels. Using the 1995 American Housing Survey (AHS), Quercia, McCarthy, and Wachter (2003) employed Linneman and Wachter's (1989) approach to identify households that are wealth or income constrained and then incorporate these measures into a general tenure choice model. As in Linneman and Wachter (1989), dummy variables were used to identify households facing income or wealth constraints, assuming a loan requiring a 20-percent downpayment and a 28-percent front-end ratio at then-current market interest rates of 8 percent. These variables were then included in a logit model that predicted the probability of homeownership based on household characteristics (age, race/ethnicity, gender, and marital status) and the relative costs of owning and renting in each household's market area. A principal goal of this analysis was to examine the impact of loosening the constraints on the probability of homeownership for key subgroups of the population. The impact of loosened underwriting criteria was simulated by applying the estimated coefficients of the logit model to household characteristics and by varying the value of the dummy variables for the income and wealth constraints to reflect different underwriting assumptions regarding the maximum percentage of income that is needed for housing costs, the size of the downpayment required as a percentage of the house value, and the mortgage interest rate.

Quercia, McCarthy, and Wachter (2003) presented results for all households and for African-American households, low- and moderate-income households, central-city households, and young households (ages 24 to 29). They examined the potential impact of hypothetical mortgage products with varying loan-to-value ratios, front-end ratios, and mortgage interest rates. They found that the largest impacts on predicted homeownership rates were from reductions in the amount of downpayment required. Specifically, they found that relaxing downpayment requirements to between 3 and 5 percent of the house value is associated with a rise in homeownership rates of between 3 and 6 percentage points across the subgroups examined. The largest impact is associated with a loan product allowing for 0 percent down—essentially eliminating the downpayment constraint. Under this scenario, homeownership rates are estimated to rise by between 7 and 9 percentage points. Quercia, McCarthy, and Wachter (2003) also estimated that the increase in homeownership rates from loosening underwriting requirements would generally be larger for African-American households, low- and moderate-income households, and young households, compared with all households.

One limitation of using the AHS for the purpose of evaluating the impact of wealth constraints on homeownership is that the AHS does not include very good information on household wealth. As a result, Quercia, McCarthy, and Wachter (2003) were forced to construct wealth estimates based by basing them on estimates of housing equity and by applying a capitalization rate to income from sources other than wages. One concern of this approach is that homeowners will accumulate

wealth in the form of housing equity. In this regard, Barakova et al. (2003) improved on the analysis by Quercia, McCarthy, and Wachter (2003) by using the SCF, which includes detailed information on household assets and liabilities. These authors further improved on previous research by including estimates of credit constraints in addition to income and wealth constraints.

Barakova et al. (2003) analyzed the tenure choice of recent movers between the ages of 21 and 50. Reflecting more recent underwriting standards, households are deemed to be wealth constrained if they cannot afford to fund a 10-percent downpayment for their ideal house value and are deemed to be income constrained if 38 percent of their income is not sufficient to meet the costs of a mortgage for 90 percent of the ideal house value. Using data from the 1989, 1995, and 1998 SCFs, the researchers were also able to simulate a credit score for each household, using a model estimated on proprietary credit scores from a national consumer credit reporting agency. Credit-constrained households are those estimated to have a credit score of 620 or lower. The researchers found that income constraints were only marginally important during the period studied while wealth and credit constraints were consistently significant factors in limiting homeownership. This study found that wealth constraint was much more important than credit constraint in limiting homeownership. In 1989, twice as many recent mover households were predicted to own if the wealth constraint were removed; 60 percent of recent movers were predicted to own in the absence of wealth constraints compared with 30 percent of recent movers predicted by the baseline model where households were allowed to be wealth constrained. In comparison, removing the credit constraint increased the baseline homeownership rate by only 2 percentage points; however, over time, the impact of the wealth constraint was found to decline. By 1998, removing the wealth constraint was found to increase the homeownership rate among movers by only 19 percentage points compared with 30 percentage points in 1989. The 1998 impact of the credit constraint was about the same as it was in 1989; removal of this constraint was associated with an increase of 3 percentage points in the predicted homeownership rate.<sup>2</sup>

In short, the literature has consistently found that wealth constraint is a significant factor in limiting homeownership. Recent analysis by Barakova et al. (2003) suggests that wealth constraints may have eased between the late 1980s and the late 1990s, perhaps due to the availability of more generous underwriting from affordable mortgage products. At the same time, however, the researchers also found that, despite this improvement, wealth constraints remain the most important financial constraint on homeownership.

Several observations explain why the existing literature does not shed much light on the issue of how effective it would be in fostering homeownership if different levels of downpayment assistance were available. First of all, almost all the work in this area employs the methodology developed by Linneman and Wachter (1989) that identifies households without sufficient current wealth to meet mortgage underwriting requirements. Although this approach may be appropriate for evaluating the impact of loosening underwriting guidelines on homeownership propensities, it is not appropriate for evaluating the potential impact of cash grants of different amounts as generally provided by downpayment assistance programs, because these cash grants may also ease constraints due to outstanding debts or a lack of cash for closing costs.

Another shortcoming of most existing literature is that these studies in general rely on a cross-sectional analysis of the tenure choice of households at a particular point in time, including

both owner and renter households.<sup>3</sup> There is reason to believe that this approach could overstate the importance of wealth in achieving homeownership. Almost by definition, a large majority of homeowners will have some amount of wealth, both because these households have managed to meet underwriting guidelines for a downpayment and cash reserves and because nominal appreciation in house values will add to their wealth over time. Given the correlation between wealth and homeownership, these models may overstate the amount of wealth that is a prerequisite for achieving homeownership. In fact, a variety of research has found that renters can accumulate wealth rapidly through savings efforts or from gifts. In an analysis of renters tracked by the NLSY over a 6-year period, from 1985 to 1990, Haurin, Hendershott, and Wachter (1996) found that the level of savings among renter households rises rapidly in the year before home purchase. In addition, using survey data collected by the Chicago Title and Trust Company, Mayer and Engelhardt (1996) examined the source of funds used for downpayments and found that, from 1988 through 1993, about one in five first-time buyers received gifts to help fund home purchase; on average, the gifts accounted for about half the downpayments. Listokin et al. (2002) also found that among renters in the 1993 Survey of Income and Program Participation (SIPP) panel who purchased homes by the end of the panel in 1995, 93 percent purchased homes that had values that exceeded the amount that appeared to be affordable to those households in 1993. Furthermore, a large majority of these households purchased housing that was valued at least 50 percent higher than the estimate of what they could afford. In short, there is good reason to believe that the wealth constraint may not be as binding on renters as a cross-sectional assessment of tenure choice would make it appear.

This study is intended to improve on existing research in several ways. First, it will evaluate the potential of downpayment assistance programs to stimulate homeownership by measuring the impact of cash grants on the propensity to own. Second, it will avoid the endogeneity of wealth and homeownership by focusing exclusively on a sample of renter households. Finally, by tracking renter households over time, it will capture the ability of households to accumulate savings, reduce expenses, and/or increase income to achieve homeownership, dynamic aspects of the tenure transition process that are not captured by cross-sectional analysis.

## Data and Methodology

### Data Source

The 1996 panel of the SIPP is the source of data used for this study.<sup>4</sup> The SIPP is a nationally representative, longitudinal survey of households that gathers detailed information about their income and wealth and about other household characteristics. The longitudinal nature of the SIPP provides researchers with an opportunity to observe dynamic aspects of household circumstances over several years. The 1996 panel tracked a sample of some 37,000 households over a 4-year period between December 1995 and February 2000. As with earlier SIPP panels, the 1996 panel oversampled the low-income population to ensure a large sample of households that are eligible for government assistance.

Each household is surveyed every 4 months (or three times a year) over the life of the panel, with each interview referred to as a “wave” of the survey. The 1996 SIPP panel includes 12 waves. In

each wave, a core set of information concerning household composition, labor force participation, income, and participation in government programs is collected. Each wave also includes a topical module that asks detailed questions about a rotating set of topics, such as marital history, education and training, childcare needs, disabilities, medical expenses, use of health care, and so on. Of particular interest for this study, the 1996 SIPP included detailed questions about household assets and liabilities once each year—during the 3rd, 6th, 9th, and 12th waves.

The 1996 SIPP is particularly well suited for investigating the potential for downpayment assistance to increase homeownership. First, by tracking a panel of households over time, it captures the dynamic nature of household financial circumstances that is an important part of the process of making the transition from renting to owning. Second, the time period covered is also of interest because the late 1990s was a time when more liberal mortgage products were becoming more widely available. Third, it provides detailed information on household assets and liabilities on an annual basis. Finally, it has a sufficiently large sample size to provide reliable estimates of the experience of low-income and minority renter households.

Questions about the accuracy of the SIPP's estimates of wealth, however, are important to note. A recent review by Czajka, Jacobson, and Cody (2004) has shown that the SIPP provides consistently lower estimates of wealth than do either the SCF or the Panel Study of Income Dynamics (PSID), two other national surveys that gather detailed information on household wealth. Specifically, the researchers found that the SIPP's estimate of median net wealth is only two-thirds of the median derived from the SCF and 74 percent of the PSID median; however, they attributed most (72 percent) of the underreporting of wealth in the SIPP to underestimates of the assets of wealthy households. Of the remaining portion of underreporting, they attributed 13 percent to assets not captured by the SIPP, including pension plans other than 401(k) and thrift accounts; the cash value of life insurance, annuities, and trusts; and vehicles owned beyond the three captured by the SIPP. Again, much of this missing wealth is concentrated among the wealthy. Business equity, however, is also underreported among the nonwealthy, which accounts for 5 percent of the lower wealth estimates in the SIPP. Other than the underreporting of business equity, underreporting of other assets by the nonwealthy accounts for 10 percent of the shortfall in wealth captured by the SIPP. Perhaps more importantly, Czajka, Jacobson, and Cody (2004) reported that SIPP families underreport the ownership of checking and savings accounts and individual retirement accounts (IRAs) and Keogh accounts.

Nonetheless, Czajka, Jacobson, and Cody (2004) noted that the SIPP provides much larger sample sizes than the apparently more reliable SCF for low-income households. For this population, when the assets not captured by the SIPP are excluded from the SCF estimates, the two surveys provide fairly comparable estimates of wealth. Thus, although concerns arise about underreporting of wealth in the SIPP, these concerns are less important for the low-income population, which is the focus of this study, than they are for the wealthy.

The sample used for this study consists of all renter households from the 3rd wave of the 1996 SIPP. This wave is the first one for which information on assets and liabilities was collected. The heads of these households are then tracked through the final wave to observe changes in their tenure status and financial circumstances.<sup>5</sup> Thus, the tenure choices of renter households from wave 3 are observed for up to 9 periods, corresponding to waves 4 through 12. The time period

covered by these waves is November 1996 through February 2000. Exhibit 1 provides information on this sample. The initial sample consists of 11,357 renter households. The sample includes fairly large numbers of low-income and minority households.<sup>6</sup> Of the renter sample, 8,438 are low income, 2,065 are African American, and 1,493 are Hispanic.<sup>7</sup> Exhibit 1 also shows the transition rates to homeownership of the overall sample and key subgroups. Of the total sample of 11,357 renters, 2,062, or 18.2 percent, become homeowners by wave 12. The key subgroups of interest for this study have a lower rate of transition, with 13.7 percent of low-income households, 10.5 percent of African-American households, and 13.6 percent of Hispanic households becoming owners over the period.

Finally, exhibit 1 also shows the rate of censoring over the period from wave 3 through wave 12. A household is considered censored if it is dropped from the survey before wave 12 and before it is observed to have become a homeowner. A fairly high rate of censoring occurs among the sample, with 27 percent of the initial sample of renter households becoming censored before wave 12. The censoring rates are slightly higher for the subgroups of interest, with 28.8 percent of low-income households, 31.7 percent of African-American households, and 30.9 percent of Hispanic households becoming censored.

**Exhibit 1**

**Sample Sizes, Tenure Transition, and Censoring**

	Wave 3 Renter Household	Households Becoming Homeowners by Wave 12	Share Becoming Homeowners (%)	Households Censored <sup>a</sup> by Wave 12	Share Censored (%)
All households	11,357	2,062	18.2	3,089	27.2
Household income <sup>b</sup>					
Low	8,438	1,160	13.7	2,432	28.8
Low-moderate	1,088	275	25.3	267	24.5
Upper-moderate	650	216	33.2	139	21.4
High	1,181	411	34.8	251	21.3
Race/ethnicity <sup>c</sup>					
White	7,268	1,550	21.3	1,817	25.0
African American	2,065	216	10.5	654	31.7
Hispanic	1,493	203	13.6	461	30.9
Other	531	93	17.5	157	29.6

<sup>a</sup> "Censored" households are those that are dropped from the survey before wave 12 and before a transition to homeownership was observed.

<sup>b</sup> Income categories are defined as follows: Low is less than 80 percent of area median income; Low Moderate is between 80 and 100 percent of area median income; Upper Moderate is between 100 and 120 percent of area median income; and High is above 120 percent of area median income.

<sup>c</sup> The categories White, African American, and Other exclude households of Hispanic origin, while Hispanics may be of any race.

Source: Authors' tabulations of 1996 SIPP panel, waves 3 through 12

## **Methodology**

The analysis has two stages. In the first stage, a parametric proportional hazard model is estimated of the transition to homeownership.<sup>8</sup> In the second stage, the results of the hazard model are used to simulate the impact of cash grants to households on the probability of becoming a homeowner over time.

In modeling the transition to homeownership, we have assumed that the baseline risk of becoming a homeowner can be described by a Weibull distribution.<sup>9</sup> Using maximum likelihood techniques, the following equation is estimated as follows:

$$h(t|x_j) = pt^{p-1} \exp(B_0 + x_j\beta_x)$$

where  $h(t|x_j)$  is the hazard that subject  $j$  will become a homeowner at time  $t$  given subject  $j$ 's characteristics at time  $t$  described by the vector  $x$ . The baseline hazard is given by  $pt^{p-1}$ , with the parameter  $p$  indicating the shape of the distribution. This baseline hazard is shifted for each subject by the term  $x_j\beta_x$ , with  $\beta_x$  being the vector of coefficients corresponding to the independent variables  $x$ . The hazard is the instantaneous rate of failure, with failure in this case defined as a change in housing tenure from renting to homeownership. The hazard indicates the number of failures that would be expected in a given interval of time, conditional on the subject having not failed before the beginning of that interval, divided by the width of the interval. The hazard rate can range from 0 to infinity.

In our analysis of the SIPP data, the period used is the time interval between interviews. This interval is generally a period of 4 months, although in some cases the interval is as short as 2 months or as long as 9 months.<sup>10</sup> The data are organized so that a household's characteristics at the beginning of an interval are used to predict the probability of becoming a homeowner by the end of the period. Thus, wave 3 household characteristics are used to predict the probability of that household becoming a homeowner by the time of the wave 4 interview, wave 4 characteristics are used to predict tenure in wave 5, and so on. As a result, although tenure status in wave 12 is used, household characteristics as of wave 12 are never used as explanatory variables. In the estimated model, time is measured as the period in months from the wave 3 interviews to capture the fact that the sampled households are at risk of becoming homeowners in our analysis from the time we begin tracking them. The analysis is designed to estimate the time until each renter household becomes a homeowner. Once homeownership is achieved, the household is dropped from the data set.<sup>11</sup>

The impact of downpayment assistance on the propensity to purchase a home is simulated by increasing the amount of liquid financial assets held by each household in the sample by the amount of the hypothesized downpayment assistance. The estimated model is then used to predict the probability of moving to homeownership given this higher level of liquid financial assets. The impact of the downpayment assistance is given by the difference between the predicted average cumulative homeownership attainment rate with and without the downpayment assistance. The simulations are run for all renter households and for subgroups of low-income, African-American, and Hispanic households.

## Explanatory Variables

The explanatory variables used in the model are intended to capture the household demographic characteristics, income, wealth, and market conditions associated with the desire and ability to purchase a home. Exhibit 2 presents summary statistics for the independent variables.

### Exhibit 2

#### Summary Statistics

Independent Variables	Mean	Median	Standard Deviation	Minimum	Maximum
<b>Demographic Variable</b>					
Race/Ethnicity:					
White	0.63	1.00	0.48	0	1
African American	0.19	0.00	0.39	0	1
Hispanic	0.13	0.00	0.34	0	1
Other	0.05	0.00	0.21	0	1
Age	44.4	40.0	17.3	15	87
Marital Status:					
Married	0.33	0.00	0.47	0	1
Divorced	0.39	0.00	0.49	0	1
Single	0.29	0.00	0.45	0	1
Presence of Children	0.41	0.00	0.49	0	1
Education Level:					
Less Than High School	0.26	0.00	0.44	0	1
High School	0.29	0.00	0.45	0	1
Some College	0.27	0.00	0.45	0	1
College	0.18	0.00	0.39	0	1
<b>Economic Variable</b>					
Household Income (000s)	30.3	23.0	30.1	-23.7	795.9
Log of Household Income	9.8	10.0	1.6	0.0	13.6
Interest Rate (Percent)	7.40	7.46	0.33	6.86	7.94
Interest Rate Change	-0.02	-0.05	0.26	-1.03	1.11
Area Median House Value (000s)	121.0	109.9	42.2	47.7	329.5
Area Annual House Price Appreciation	0.04	0.04	0.03	-0.09	0.15
Area Ratio of Gross Rent to Owner Costs	0.54	0.54	0.05	0.44	0.71
Area Ratio of Gross Rent to Median House Value	0.09	0.09	0.02	0.04	0.17
<b>Financial Asset Variable</b>					
Liquid Financial Assets	14,590	232	346,534	-478,000	50,100,000
Share With Nonzero Liquid Financial Assets	0.62	1	0.49	0	1
Net Business Equity	3,146	0	53,797	-400,000	3,700,000
Share With Nonzero Net Business Equity	0.06	0.00	0.24	0.00	1.00
Net Real Estate Equity	2,332	0	25,182	-36,000	1,860,000
Share With Nonzero Net Real Estate Equity	0.03	0.00	0.18	0.00	1.00
Net Vehicle Equity	3,113	1,000	5,429	-33,930	63,900
Share With Nonzero Net Vehicle Equity	0.71	1.00	0.18	0.00	1.00
Unsecured Debt	4,417	0	17,831	0	1,212,100
Share With Nonzero unsecured debt	1.00	1.00	0.02	0.00	1.00

Source: Authors' tabulations of 1996 SIPP panel, waves 3 through 11

The specific variables included and their expected associations with the probability of becoming a homeowner are discussed in turn in the following paragraphs.

## **Demographic Characteristics**

**Race/Ethnicity.** The race/ethnicity of the household head is included in the model to account for racial/ethnic differences in the propensity to become a homeowner. The SIPP includes four categories of race (White; African American; American Indian, Aleut, or Eskimo; and Asian or Pacific Islander) and more than 30 country of origin categories. Combining these two SIPP variables, we created indicator variables for the mutually exclusive groups of White, African American, Hispanic, and Other (which includes the categories American Indian, Aleut or Eskimo and Asian or Pacific Islander).<sup>12</sup> Household heads that indicated an origin of Mexican, Mexican-American, Chicano, Puerto Rican, Cuban, Central American, South American, Dominican Republican, or Other Hispanic are categorized as “Hispanic,” regardless of the racial category indicated. Extensive literature has found that African Americans and Hispanics are less likely than Whites, all else being equal, to become homeowners (Herbert et al., 2005). As a result, it is expected that these households will have a lower probability of becoming homeowners.

**Age.** The age of the household head in years is included as an explanatory variable to capture the strong association between age and the likelihood of becoming a homeowner. Homeownership rates rise rapidly as household heads age through their 20s and into their 30s. Homeownership rates continue to rise, although at a slower rate, well into old age before declining slightly. Reflecting this general tendency, we would expect a positive coefficient on the age variable initially to reflect the growing rate of transition into homeownership, followed by a negative coefficient as the probability of moving into homeownership declines for older households. We attempted specifications with age and its square to capture this nonlinear relationship but found that in these specifications age squared was significant but age was not. As a result, we thought that a model including age without its square was more appropriate.

**Marital Status.** Homeownership rates are generally highest for married households. Mutually exclusive indicator variables are created to identify households that are headed by married couples (used as the reference group in the estimated model); previously married people (that is, divorced, separated, or widowed); and single people. The expectation is that those who are married will have a higher likelihood of making the transition to homeownership compared with those who are single or divorced.

**Presence of Children.** Households with children tend to have higher homeownership rates than those without children, perhaps reflecting greater demand for housing services or greater desire for residential stability. To capture this effect, an indicator variable is included to identify households with children under age 18. This variable is expected to be positively associated with the probability of becoming a homeowner.

**Education Level.** Dummy variables are also used to measure the highest education level attained by the household head. A more detailed SIPP education variable is collapsed into four categories: less than a high school graduate, a high school graduate, some college, and a college graduate or more (which is used as the reference category in the estimated model). Households with heads

who have higher levels of education are expected to have higher long-run income and asset levels and, therefore, a higher likelihood of becoming homeowners.

## Household Income

Household income has a strong association with the likelihood of becoming a homeowner. The income measure used is the total household annual income for the current wave, which includes earned income, property income, means-tested cash transfers, and “other” household income. The total household income for each wave is multiplied by 3 to estimate the annual income for that household as of that wave. Because the impact of higher levels of income on the probability of homeownership would be expected to diminish at higher levels of income, income is measured as the log of income.<sup>13</sup>

## Financial Assets and Liabilities

Waves 3, 6, and 9 of the SIPP topical modules include a series of detailed questions on household financial assets and liabilities.<sup>14</sup> One shortcoming of the SIPP for estimating the impact of household financial net wealth on the probability of becoming a homeowner is that the information on financial assets and liabilities is collected only once a year while all other information on the household is available every 4 months. One option for addressing this shortcoming would be to estimate a hazard model based solely on these once-a-year observations on the sampled households. This approach, however, would not take advantage of the additional information on changes in household and market circumstances and tenure choice that is available from the two intervening waves of sample data from each year. Another option would be to include all waves in the model but employ some assumption about the level of financial assets and liabilities in the waves for which this information is not collected. One approach considered was to interpolate values for these variables between the 3rd, 6th, and 9th waves. Due to censoring, however, we do not always observe households in these subsequent waves, so this approach could not be consistently applied to all households. In the end, to preserve as much information on the timing of tenure transitions as possible, we chose to include all waves in the model with the value of the financial asset variables taken from the most recent wave available.<sup>15</sup> Thus, wave 3 wealth measures are also used in waves 4 and 5, wave 6 wealth measures are also used in waves 7 and 8, and wave 9 wealth measures are also used in waves 10 and 11.<sup>16</sup>

To evaluate whether the impact of financial assets may vary by type of asset, separate measures were created for liquid financial assets, which are most commonly tapped to purchase a home, and other asset classes. Each of the asset classes and the measures used to capture them are discussed, in turn, in the following paragraphs.

**Liquid Financial Assets.** The components of the liquid financial assets variable include the following:

- Equity owned in other financial investments.
- The face value of U.S. savings bonds.
- The amount in a joint, noninterest-earning checking account.
- The amount in an individual, noninterest-earning checking account.

- Interest-earning assets held in banking institutions.
- Interest-earning assets held at other institutions.
- Equity in stocks and mutual fund shares.
- Equity in IRAs and Keogh accounts.<sup>17</sup>

These liquid financial assets are expected to be the primary source of wealth used to fund home purchase. Although the financial asset variable itself is continuous, splines are used to account for the possibility that different ranges of financial assets may have different effects on the probability of home purchase.<sup>18</sup> The knots used for the splines are at \$1, \$1,000, \$5,000, and \$20,000; this approach means that slope coefficients are estimated separately for the ranges of liquid financial assets of less than \$1, from \$1 to \$999, from \$1,000 to \$4,999, from \$5,000 to \$19,999, and \$20,000 or greater.<sup>19</sup> Our expectation is that lower levels of wealth will have a greater impact on the probability of buying a home, with less marginal impact from the highest wealth categories.

**Vehicle Wealth.** Vehicle wealth is the total value of all vehicles owned minus the debt on these vehicles. Because it seems unlikely that households would tap vehicle wealth (at least that of primary vehicles) to purchase a home, this subcategory of wealth was separated from financial assets. Various forms of this variable were tried, including a continuous variable and splines; however, these approaches produced generally insignificant coefficients. In the final specification, a series of categorical dummy variables were used to indicate households with negative vehicle wealth, \$0 of vehicle wealth, low levels of vehicle wealth (less than \$20,000), and high levels of vehicle wealth (\$20,000 or more). Although lower levels of vehicle wealth are not expected to be used for homeownership, given the household's need for transportation, it would be expected that higher levels of vehicle wealth would have a positive association with the transition to homeownership because this excess wealth could be channeled into buying a home while leaving sufficient wealth for vehicle ownership.

**Real Estate Wealth.** The SIPP also collects information on the value of real estate owned by other than primary residences and the debts associated with these properties. The SIPP asks separate questions about owner-occupied properties, but, because our sample includes only renter households, no owner-occupied properties are present. Ownership of real estate would be expected to be positively associated with the transition to homeownership, both because of the potential ability to tap this wealth to finance a home purchase and because the household has been shown to be willing to take on the risk associated with investments in real property. This form of wealth, however, may be fairly illiquid and so may be less likely to be tapped to purchase a home. We tried various specifications to capture the impact of real estate wealth on the probability of becoming a homeowner, including a continuous variable, splines, and categorical dummy variables. Most of these specifications were insignificant, perhaps due to the relative rare occurrence (3 percent) of the ownership of real estate. A dummy variable indicating the presence of positive other real estate wealth is included in the model.

**Business Equity.** Business wealth, like real estate wealth, may provide a source of funds for purchasing a home, but the illiquid nature of these funds may also mean they are less likely to be used to fund a home purchase. In addition, households owning a business may choose to invest available funds in the business rather than in home purchase. As with the ownership of other real

estate, very few households in the sample had business equity. Variations of business equity measures were tried in the model, including a continuous variable with splines and dummy variables indicating the presence of positive or negative business wealth; but, because none of the coefficients of alternative specifications proved statistically significant, they were dropped from the final model.

**Unsecured Debt.** The final category of assets and liabilities included in the model is unsecured debt. Unsecured debt includes debts on credit cards, debts for medical expenses, personal loan debts, and student loan debts. It would be expected that higher levels of unsecured debt would lower the likelihood of purchasing a home by making it more difficult for the household to meet mortgage underwriting requirements concerning debt-to-income ratios; however, it is also likely that those who purchase homes will have some amount of unsecured debt. Unsecured debt is included in the model in spline form, with knots at \$2,000, \$5,000, and \$10,000.

### **Market Characteristics**

**Mortgage Interest Rate.** Interest rates for the relevant time period are taken from the Monthly Interest Rate Survey conducted by the Federal Housing Finance Board.<sup>20</sup> The effective interest rate (including points and fees) for a 30-year, fixed-rate mortgage was used to measure fluctuations in interest rates over time. At the beginning of the 4-year period of this SIPP panel, the effective interest rate was 7.8 percent, having fluctuated between 7.2 and 8.2 percent over the previous 2 years. The rate then dropped fairly steadily through late 1998 to about 6.8 percent before rising again fairly steadily to about 8 percent by the beginning of 2000. In short, the study period was one of relatively favorable interest rates. It is expected that lower interest rates would make homeownership more affordable, so a negative association between interest rate levels and the probability of becoming a homeowner. Another possibility is that the move to homeownership may be more closely related with short-run fluctuations in interest rates than in the level of interest rates. That is, households may time their home purchase to take advantage of short-run declines in interest rates, even if the overall level of interest rates is higher than in previous years. Again, declines in interest rates would be expected to be associated with higher rates of homeownership, so the coefficient on this variable should be negative.

To test these different potential impacts of interest rates, three alternative measures were included in the estimated model: (1) the interest rate level at the beginning of the period of observation, (2) the interest rate at the end of the period, and (3) the change in the interest rate during the period. In survival modeling, explanatory variables are generally measured as of the beginning of the period of observation while the outcome is measured as of the end of the period of observation. For example, if the household is observed first in January of a given year and then again 4 months later in May, the household and market characteristics in January would be used to predict the outcome observed in May. Because interest rates do not remain stable during the 4-month period, however, and because fluctuations in interest rates are hypothesized to be an important factor in the specific timing of a home purchase decision, we experimented with different measures of interest rates to capture the hypothesized role of changing interest rates on the timing of the purchase decision. The interest rate levels from both the beginning and end of the period were found to have a positive association with the transition to homeownership—a result that was not consistent with our expectation—while the change in interest rate had the expected negative association. As a result, the interest rate change was used in the final versions of the model.

**Median House Value.** The ability of households to afford to purchase a home varies with the level of housing prices across markets. Higher house prices would be expected to lower the propensity to purchase a home. To capture this factor, the median house value in the market area where the household resided was included as an explanatory variable. The median value is derived from the 2000 Decennial Census but is indexed over time using the house price index from the Office of Federal Housing Enterprise Oversight (OFHEO).<sup>21</sup> The SIPP identifies the specific metropolitan area where the household resides for some 98 metropolitan areas and the state of residence. In cases in which the metropolitan area is identified, we use data for this area. In other cases, we use estimates of the median house value for the state.<sup>22</sup>

**Annual House Price Appreciation Rate.** The decision to purchase a home may be related to trends in house price appreciation. In general, it would be expected that higher levels of appreciation would provide a greater incentive to purchase a home because the rate of return on the investment is high. In addition, renters may be motivated to purchase sooner than they might otherwise be because of concern that it may become more difficult to buy if prices continue to rise. On the other hand, rapidly rising home prices may also make it more difficult for renters to purchase a home. In short, the impact of rising home prices on the propensity to purchase is indeterminate. If the coefficient is positive, it indicates that the increased return on homeownership is motivating individuals to purchase sooner. If the coefficient is negative, it indicates that rising home prices are making attainment of homeownership more difficult for renters. Under the assumption that households derive assumptions about future house price appreciation from recent trends, we measure house price appreciation as the percentage of change in the OFHEO house price index for the relevant market area over the year prior to the interview date.

**Ratio of Renter and Owner Costs.** A common factor included in tenure choice models is some relative measure of the costs of renting and owning. A higher cost of renting relative to owning would be expected to increase the propensity to own. Two approaches were explored to capture the relative costs of renting and owning, both using data from the 2000 Decennial Census. The first measure was the ratio of median gross rent on an annual basis to the median house value. The second measure was the ratio of median monthly gross rent to the median monthly owner-occupied housing cost. This latter measure has the advantage of factoring in differences in property tax and insurance rates across markets but has the drawback of having owner costs determined, in part, by the average amount of equity owners have in their homes and variations in interest rates over time. In practice, we found that the ratio of gross monthly rent to the median house value was generally insignificant, in part, due to a strong correlation with the median house value, which was highly significant. As a result, the ratio of median rent to median owner cost was used in the final model.

## Modeling Results

Exhibit 3 presents modeling results. Overall, the model fits the data well as indicated by the chi-square statistic for the likelihood ratio. The Weibull distribution shape parameter  $p$  is 1.37 and highly significant. A  $p$  value slightly above 1 indicates that the baseline risk of becoming a homeowner rises gradually over time. Given the importance to this study of the subgroups consisting of African Americans, Hispanics, and low-income households, stratified models were also estimated that allowed the baseline hazard to vary across these groups. These tests found that

**Exhibit 3**

**Modeling Results**

Independent Variables	Hazard Ratio	Coefficient	Standard Error	Z Score
<b>Demographic Variable</b>				
Race/Ethnicity:				
African American	0.7436	-0.2190	0.056	-3.91
Hispanic	0.8542	-0.1331	0.067	-1.98
Age	0.9785	-0.0212	0.002	-11.11
Marital Status				
Divorced	0.7498	-0.2135	0.044	-4.89
Single	0.4230	-0.3637	0.029	-12.72
Presence of Children	1.1115	0.1215	0.057	2.12
Education Level:				
Less Than High School	0.8009	-0.1718	0.072	-2.40
High School	0.9513	-0.0398	0.063	-0.63
Some College	0.9211	-0.0722	0.057	-1.26
<b>Economic Variable</b>				
Log of Household Income	1.3475	0.3989	0.048	8.31
Interest Rate Difference	0.6950	-0.2535	0.060	-4.24
Median House Price	0.9970	-0.0031	0.001	-4.24
House Price Appreciation	0.0025	-0.0155	0.003	-5.40
Ratio of Renter to Owner Costs	11.2656	27.0370	6.627	4.08
<b>Financial Assets Variable</b>				
Liquid Financial Assets \$0 or Less	1.0451	0.0453	0.076	0.60
Liquid Financial Assets \$1 to \$999	1.4054	0.4682	0.110	4.25
Liquid Financial Assets \$1,000 or \$4,999	1.0495	0.0513	0.025	2.04
Liquid Financial Assets \$5,000 to 19,999	1.0136	0.0138	0.006	2.19
Liquid Financial Assets \$20,000 or More	0.9989	-0.0001	0.000	-0.71
Has Real Estate Wealth	1.4257	0.4918	0.129	3.82
Has Negative Vehicle Wealth	1.2899	0.3199	0.132	2.43
Has Vehicle Wealth \$1 to \$19,999	1.4625	0.5532	0.112	4.93
Has Vehicle Wealth \$20,000 or more	1.8320	1.1085	0.263	4.22
Unsecured Debt \$0 to 1,999	1.0908	0.5208	0.243	2.14
Unsecured Debt \$2,000 to \$4,999	0.9825	-0.2605	0.543	-0.48
Unsecured Debt \$5,000 to \$19,999	0.9782	-0.2522	0.219	-1.15
Unsecured Debt \$20,000 or More	1.0000	0.0000	0.000	0.00
<b>Weibull Shape Parameter p</b>	1.3723	0.4336	0.029	15.04
Number of Observations	75,512			
Number of Subjects	11,352			
Log Likelihood	-6133.0167			
Likelihood Ratio Chi Squared	1390.52			
Prob > Chi Squared	0.0000			

the baseline hazard does not vary for African Americans or low-income households but it does for Hispanic households; however, it was found that a model that allowed the baseline hazard to vary for Hispanics did a much poorer job of predicting the actual rate of homeownership among the Hispanic sample. As a result, the estimated model did not include a different baseline hazard for Hispanics.<sup>23</sup>

Both the estimated hazard ratio and coefficients are shown in exhibit 3. The hazard ratio is the ratio of the hazard rate with a one-unit change in the variable of interest to the hazard rate before this one-unit change. Hazard ratios of less than 1 indicate that increases in the variable lower the hazard rate, while hazard ratios greater than 1 indicate that an increase in the variable raises the hazard rate. For example, the hazard ratio of 0.7436 on the African-American dummy variable indicates that the probability that a African-American household will become a homeowner is 74.36 percent of the probability that a White household will become a homeowner, all else being equal. (In the case of a dummy variable, a one-unit change in the variable is equivalent to comparing the hazard rate for the dummy category to the base case category.) Because the sample includes multiple observations for individual households over time, a possibility of correlation across these observations exists. To allow for this possibility, robust standard errors are estimated, accounting for the correlation of outcomes across individuals.<sup>24</sup>

In general, the independent variables are highly significant and of the expected sign. Among the demographic characteristics, African Americans and Hispanics are found to have a lower propensity to become owners, all else being equal. Relative to households headed by married couples, both divorced and single-person households are much less likely to purchase a home. The presence of children in the household also increases the likelihood of purchasing a home. Higher levels of education are associated with a higher probability of home purchase, although the only education categorical variable that is statistically significant is for those with less than a high school education. The coefficient on the age variable is negative, indicating that as households age they become less likely to purchase a home. As discussed previously, we had expected the coefficient on age to be positive for younger age groups and negative for older age groups. Given that the baseline hazard is rising over time (as discussed previously, this trend is evidenced by the Weibull distribution shape parameter being greater than 1), the negative coefficient of age counters this effect and produces the expected initial rising and then falling hazard rate as households age. Finally, the coefficient on household income is positive and highly significant.

In terms of market characteristics, the coefficient on the interest rate change is negative, indicating that households are less likely to purchase when interest rates rise. The coefficient on the median house price is also negative, indicating that borrowers are less likely to purchase in higher priced markets. The hazard ratio for the renter-to-owner cost measure is positive, indicating that if rents are high relative to owner costs, households are more likely to purchase a home. Finally, the coefficient on the appreciation rate in home prices is negative, indicating that rising prices decrease the probability of renters purchasing a home.

The wealth measure of most interest for this study is liquid financial assets. This variable was included in the model in a series of splines designed to allow the slope to vary for different ranges of this variable. The first and last splines are not statistically significant, indicating that little association exists between the probability of becoming a homeowner and either negative liquid

wealth or levels of wealth above \$20,000. The middle three splines are all statistically significant. The hazard ratio of the second spline, measuring liquid wealth between \$1 and \$999, is the largest in magnitude, at 1.41. Because liquid wealth is measured in thousands of dollars, this hazard ratio indicates that households with \$1,000 in liquid wealth are 41 percent more likely than households with no liquid wealth to purchase a home. The hazard ratio for the next spline is also greater than 1 but, at 1.05, is much smaller. This hazard ratio indicates that for every \$1,000 in liquid financial assets between \$1,000 and \$5,000, the probability of homeownership increases by 5 percent. Finally, the spline for liquid wealth between \$5,000 and \$19,999 is also positive but is just slightly larger than 1. Thus, for every \$1,000 in liquid assets between \$5,000 and \$20,000, the probability of buying a home increases by a little more than 1 percent. The insignificance of the coefficient on wealth above \$20,000 suggests that, at this level of wealth, households are generally unconstrained by wealth in choosing whether to purchase a home. As a result, additional wealth above \$20,000 has no impact on this decision.

These results suggest that the biggest impact on the probability of becoming a homeowner is from having some initial positive liquid assets.<sup>25</sup> The impact of additional liquid assets, although still positive, is much smaller. One concern with this result, however, is that it may be that the most common reason for a household to begin accumulating savings is because it has decided to pursue homeownership. In that case, households that have decided to purchase a home would be identified by the accumulation of savings. That is, the presence of savings is a flag for a *desire* to be a homeowner as much as it is an indication of an *ability* to overcome a wealth barrier to homeownership.<sup>26</sup> This situation would be problematic for the purpose of simulating the impact of downpayment assistance on the probability of becoming a homeowner because the mere availability of financial assistance would not be expected to create the desire to become a homeowner. Yet, that may be what the addition of liquid assets is in part simulating. Unfortunately, we cannot distinguish these effects in our results.

None of the other classes of financial wealth were found to have as strong a relationship with homeownership as liquid financial wealth. Initial estimates, which included splines for all the other financial wealth variables, resulted in generally insignificant coefficients. As previously described, the measures of business wealth were consistently insignificant and so were dropped from the model. The magnitude of real estate wealth was also not significant, although the presence of this type of wealth (as captured by a dummy variable indicating some positive real estate wealth) was found to have a positive association with homeownership. Households with some real estate wealth were 43 percent more likely to buy than other households were, all else being equal. It may be that the ownership of other real estate indicates individuals who are willing to take on this investment risk and are familiar with real estate transactions and so are more likely to be attracted to owning their own home. Given that the level of real estate wealth was not significant, this indication of willingness to buy property appears to be more important than the amount of wealth in other properties. Similarly, the amount of wealth in vehicles was not statistically significantly associated with the probability of homeownership, but having some nonzero vehicle wealth is significant and positively associated with homeownership. The largest association is with high levels of positive vehicle wealth and the smallest with negative vehicle wealth. It may be that the presence of vehicle wealth is an indication of an ability to accrue savings as needed. Finally, unsecured liabilities are found to have a generally weak association with homeownership. The main result is that low

levels of unsecured liabilities are associated with a greater likelihood of home purchase, perhaps indicating that these households are active but reasonable users of credit and so represent good credit risks. Levels of unsecured debt above \$2,000 begin to lower the probability of ownership, but the magnitude is small and the coefficients are not statistically significant.

Given the importance of the financial variables for this study and to shed some light on the role of liquid financial assets and wealth generally in the transition to homeownership, exhibit 4 presents summary information on these variables at the time of wave 3 for households that subsequently purchased a home and those that were not observed to buy. A fairly substantial difference is present in the average liquid assets as of wave 3 between buyers and nonbuyers, with buyers having 40 percent more liquid assets on average; however, the average masks the fact that a large share of both buyers and nonbuyers has limited amounts of liquid assets. The median level of liquid assets is only \$928 for buyers and \$160 for nonbuyers. In fact, 71 percent of buyers had less than \$5,000 in liquid assets as of wave 3. The largest difference between the two groups in terms of the distribution of liquid assets is the share with no positive liquid assets, which amounts to 43 percent of nonbuyers and 23 percent of buyers. Given the generally low level of liquid financial assets among buyers and the large difference in the share with some financial assets, it is not surprising that the statistical model finds that low levels of liquid assets are the most critical factor in predicting which households will become owners.

Exhibit 4 also presents information on the average and distribution of net wealth for buyers and nonbuyers. Net wealth is a comprehensive measure of each household's financial holdings, including the value of all financial, real estate, business, and vehicle wealth less all debt. This

#### **Exhibit 4**

##### **Comparison of Liquid Financial Assets and Net Worth of Buyers and Nonbuyers**

<b>Liquid Financial Assets</b>	<b>Nonbuyers</b>	<b>Buyers</b>
Average	\$10,884	\$15,270
Median	\$160	\$928
Distribution of households by liquid financial assets		
\$0 or less	43%	23%
\$1 to \$999	27%	28%
\$1,000 to \$4,999	13%	20%
\$5,000 to \$19,999	9%	15%
\$20,000 and higher	8%	14%
<b>Net Wealth</b>	<b>Nonbuyers</b>	<b>Buyers</b>
Average	\$14,500	\$25,454
Median	\$750	\$4,104
Distribution of households by net wealth		
\$0 or less	40%	30%
\$1 to \$999	11%	6%
\$1,000 to \$4,999	17%	17%
\$5,000 to \$19,999	20%	25%
\$20,000 and higher	12%	22%

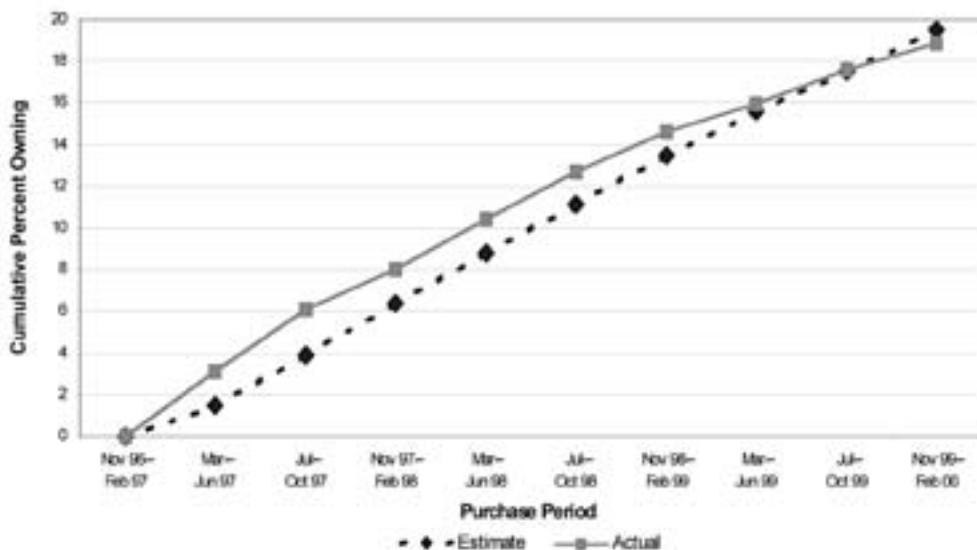
*Source: Authors' tabulations of 1996 SIPP panel, wave 3*

information is meant to shed light on whether there might be more substantial differences in the ownership of other assets between buyers and nonbuyers, suggesting that liquid financial assets may be too restrictive a category of wealth for predicting ownership. In general, however, the differences in net wealth between buyers and nonbuyers are similar to those observed for liquid financial assets. A somewhat larger disparity is present in net wealth between buyers and nonbuyers; the average net wealth of buyers is 75 percent higher than the average net wealth of nonbuyers. The disparity in the medians for net wealth is also larger than the disparity in the medians for liquid financial assets; the median net wealth of buyers is \$4,104 and the median net wealth of nonbuyers is \$750. Yet, many buyers are still found to have little or no wealth; 30 percent have zero or negative net wealth and 6 percent have net wealth of only \$1 to \$999. Furthermore, for many households, much of their net wealth is based on their net equity in vehicles. When vehicle net wealth is excluded from total net wealth, the median net wealth of both buyers and nonbuyers is \$0. In fact, 61 percent of buyers have net wealth of less than \$1,000 (excluding vehicle wealth). In short, although a greater difference is present in buyers and nonbuyers in terms of net wealth, much of this difference is due to net vehicle wealth, which seems unlikely to be a source of savings for homeownership.

As a final test of the goodness of fit of the estimated model, exhibits 5a through 5d compare the actual and estimate cumulative probability of homeownership for the entire sample of renter households and for low-income, African-American, and Hispanic households.<sup>27</sup> The estimated cumulative probability is the weighted average of the cumulative probability for each individual household.<sup>28</sup> In general, the predicted level of homeownership attainment comes fairly close to the actual share by the end of the 3-year period over which households are tracked. In all cases, however, the actual attainment of homeownership is more rapid than predicted and a decline

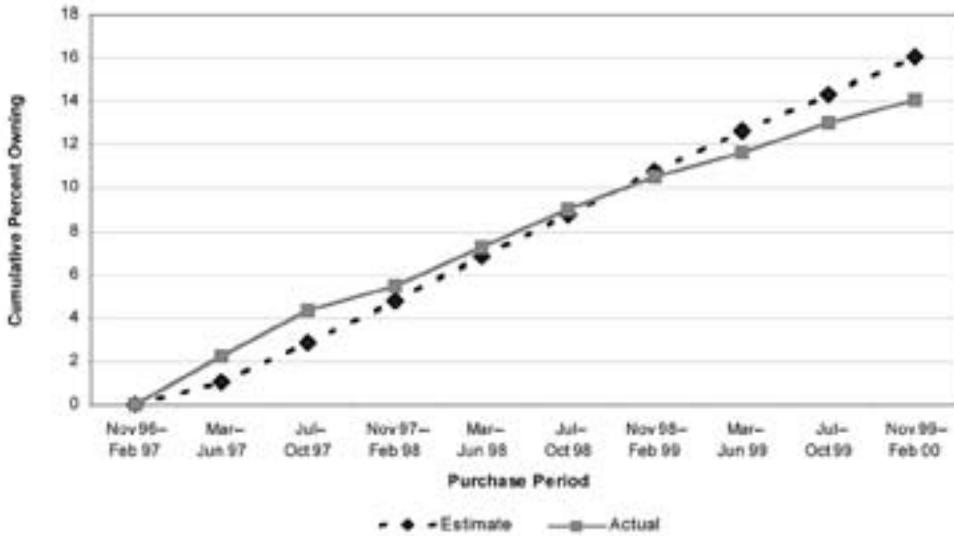
**Exhibit 5a**

**Comparison of Actual and Estimated Cumulative Purchase Rates for All Renter Households**



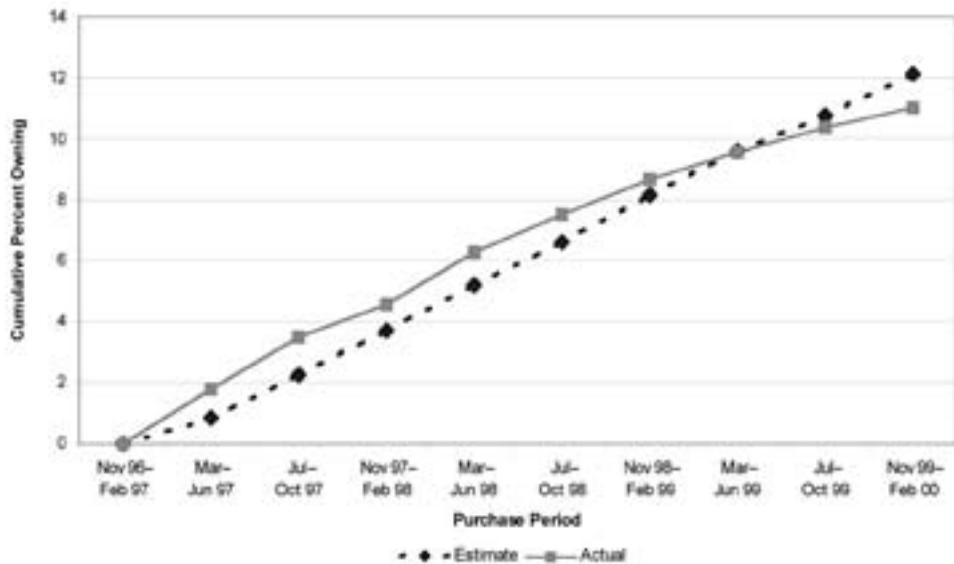
**Exhibit 5b**

Comparison of Actual and Estimated Cumulative Purchase Rates for Low-Income Renter Households



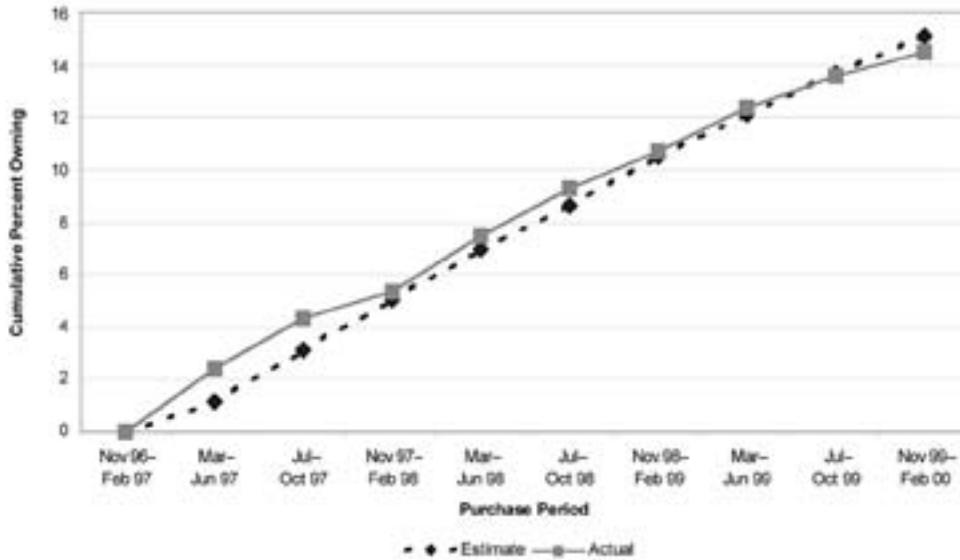
**Exhibit 5c**

Comparison of Actual and Estimated Cumulative Purchase Rates for African-American Renter Households



**Exhibit 5d**

**Comparison of Actual and Estimated Cumulative Purchase Rates for Hispanic Renter Households**



in the actual transition to homeownership over time is greater than predicted. The result is that the predicted level of homeownership lags the actual level over most of the initial waves but, by the end of the period, the predicted level of homeownership slightly exceeds the actual level. Given the difficulties in predicting the exact timing of homeownership over the 3-year period, the simulations will focus on the share of households estimated to attain homeownership by the end of the 3-year period rather than the exact timing of homeownership attainment. Also, given the slight variation between the actual level of homeownership attainment and the level estimated by the model, the impact of downpayment assistance will be derived by comparing the baseline estimate of homeownership attainment with an estimate derived by increasing each household's level of liquid financial assets. The simulation approach and results are discussed in detail in the next section.

### Simulating Downpayment Assistance

Exhibit 6 summarizes the results of simulations in which households are provided grants of \$1,000, \$5,000, and \$10,000.<sup>29</sup> The baseline estimates indicate that over the 3-year tracking period, 6.3 million renter households would become homeowners, including 3.8 million low-income renters, 0.7 million African-American renters, and 0.6 million Hispanic renters. When renters' liquid assets are increased by \$1,000, simulating the provision of this amount of downpayment assistance, the number of homebuyers is estimated to increase by 943,000 overall, including 708,000 low-income buyers, 152,000 African-American buyers, and 143,000 Hispanic buyers. This expansion of the number of homebuyers represents increases of 15 to 22

## Exhibit 6

### Simulated Impact of Downpayment Assistance on the Number of Homeowners and Estimated Program Costs

	All Households	Low Income	African American	Hispanic
<b>Initial renter households</b>	32,037,380	23,533,749	5,651,290	4,283,615
<b>Baseline estimate of homeowners</b>	6,248,337	3,784,410	684,857	647,008
<b>Simulated homeowners under alternative levels of downpayment assistance</b>				
\$1,000	7,191,107	4,492,016	837,106	789,734
\$5,000	8,021,048	5,089,272	963,534	906,714
\$10,000	8,393,399	5,348,779	1,018,647	956,280
<b>Percent increase in homeowners from downpayment assistance</b>				
\$1,000	15%	19%	22%	22%
\$5,000	28%	34%	41%	40%
\$10,000	34%	41%	49%	48%
<b>Net gain in homebuyers from downpayment assistance</b>				
\$1,000	942,770	707,606	152,249	142,727
\$5,000	1,772,712	1,304,862	278,677	259,706
\$10,000	2,145,063	1,564,368	333,791	309,272
<b>Estimated program cost if only net new homebuyers are subsidized (\$ millions)</b>				
\$1,000	\$943	\$708	\$152	\$143
\$5,000	\$8,864	\$6,524	\$1,393	\$1,299
\$10,000	\$21,451	\$15,644	\$3,338	\$3,093
<b>Estimated program cost if all homebuyers are subsidized (\$ millions)</b>				
\$1,000	\$7,191	\$4,492	\$837	\$790
\$5,000	\$40,105	\$25,446	\$4,818	\$4,534
\$10,000	\$83,934	\$53,488	\$10,186	\$9,563

Note: Estimates are of number of renter households that become homeowners during the 3-year period of observation.

percent above the baseline estimates of the number of homebuyers. The provision of \$5,000 in downpayment assistance is simulated to produce an increase of 1.8 million additional homebuyers over the period, including 1.3 million low-income buyers, 279,000 African-American buyers, and 260,000 Hispanic buyers. Finally, given simulated downpayment assistance of \$10,000, the number of homebuyers is estimated to increase by 2.1 million, including 1.6 million low-income homebuyers, 334,000 African-American homebuyers, and 309,000 Hispanic buyers.

In comparing the impact of \$1,000 in downpayment assistance with \$5,000 in assistance, note that despite the fact that the level of downpayment assistance was increased fivefold, the estimated number of additional homebuyers increases by less than a factor of 2. This result can be traced back to the magnitude of the coefficients on the liquid financial asset splines. As previously noted, the largest impact is associated with financial assets of between \$1 and \$999. Increases in liquid financial assets of between \$1,000 and \$5,000 have a much smaller impact on the probability of

homeownership, and the impact of increases beyond \$5,000 are smaller still. Thus, when \$10,000 in downpayment assistance is simulated, the number of renter households estimated to achieve homeownership over the 3-year period is only a little more than twice the increase associated with downpayment assistance of \$1,000—or one-tenth the level of assistance. These results suggest that a small amount of financial assistance can go a long way toward enabling homeownership.<sup>30</sup>

One downside of the effectiveness of even modest amounts of downpayment assistance is that if this assistance were universally available, the cost of such a program would be quite high. As shown in exhibit 6, assuming that only low-income households would be eligible for assistance, the simulation results indicate that under the assumption of \$1,000 in downpayment assistance, 4.5 million renter households would become homeowners over the 3-year period. If all these households took advantage of available assistance, the cost of the program would be \$4.5 billion; however, because a large majority of these households would be expected to become owners even without the availability of downpayment assistance, many households would be unnecessarily subsidized. If it were somehow possible to identify only those households that would purchase only with assistance, the cost of the program over 3 years would be \$708 million, an amount close to the maximum of \$200 million a year allowed under the American Dream Downpayment Initiative.<sup>31</sup> If the \$5,000-grant program (the average amount assumed by the American Dream Downpayment Initiative) were implemented, the total number of low-income homebuyers is estimated at 5.1 million, including 1.3 million more than would be expected without this level of assistance. The cost of this program would \$25.4 billion if all buyers receive assistance and \$6.5 billion if only those who need assistance to purchase could be identified.

## Summary of Findings and Policy Implications

This study has focused on evaluating the importance of liquid financial wealth for enabling homeownership. Survival analysis of data from the 1996 Survey of Income and Program Participation panel found that liquid financial assets are statistically significant predictors of homeownership. Although the importance of wealth in predicting homeownership is in keeping with the findings of previous research, a somewhat surprising finding of this analysis was that initial savings are most strongly associated with the probability of becoming a homeowner. Specifically, savings in the neighborhood of \$1,000 were found to provide the strongest indication of the likelihood of a transition from renting to owning, while savings of between \$1,000 and \$5,000 only moderately increased this probability and savings of between \$5,000 and \$20,000 added only slightly to the likelihood.

The pattern is somewhat surprising because \$1,000 would appear to be a trivial amount of money compared with the cost of buying a home. With a median house value of about \$120,000 in the markets studied, it would be expected that several thousand dollars in savings would be the minimum amount needed to purchase a home, yet about half of the homebuyers observed over the 3-year period had less than \$1,000 in liquid assets at the start of the period. What might account for this pattern? One possibility is that, given the growing availability of low-downpayment mortgages, relatively little wealth is, in fact, needed to purchase a home. Another possibility is that the act of savings signals the desire on the part of a household to become a homeowner. Although the level of liquid financial assets is low when we observe it, households may be able to accumulate savings fairly rapidly in the months leading up to home purchase, a runup that may not be captured by

the once-a-year wealth estimates provided by the SIPP. It is also possible that households rely on gifts from family members, which is a source of funds that is not captured by the survey. Finally, it is also possible that the SIPP does not provide an accurate estimate of household wealth. Although recent analysis of the SIPP does find shortcomings in this area, most of the undercounting is among wealthy households and so should not affect the wealth estimates of the low-income and low-wealth households of interest for this study.

Given the importance of low levels of liquid financial assets on the probability of homeownership in the estimated model, the simulations suggest that small amounts of downpayment assistance can be very effective at stimulating fairly large numbers of renter households to become homeowners. Downpayment assistance of as little as \$1,000 is simulated to entice 700,000 additional low-income households to purchase a home, a 19-percent increase from the baseline estimate of the number of homebuyers absent any assistance. Reflecting the finding from the survival model that there is a diminishing impact of higher levels of savings on the probability of buying a home, higher levels of assistance do not have as large a marginal impact on the number of homebuyers. Assistance of \$5,000 per household is simulated to increase the number of low-income homeowners by an additional 15 percent beyond the gain from \$1,000 in assistance, while assistance of \$10,000 is simulated to increase the number of buyers by an additional 7 percentage points beyond the gain associated with \$5,000 in assistance.

Although the simulation results are encouraging about the efficacy of downpayment assistance, if \$1,000 in downpayment assistance were made available to all low-income households, the cost of such a program could be quite high. If all low-income households were eligible for assistance, the cost would be as high as \$4.5 billion over 3 years. But, if assistance could be limited to only those households that could purchase only with assistance, the cost would be a more reasonable \$700 million over 3 years, a level that is in keeping with the American Dream Downpayment Initiative that authorizes expenditures of up to \$200 million a year.

In interpreting the findings from these simulations it is important to bear in mind two important caveats. First, these results are based on analysis of a sample of households from a 3-year period between 1997 and 2000. It is not known whether the same homeownership propensities will be evident in future periods. Second, it may well be that the existence of a small amount of savings is commonly associated with a decision by a renter household to pursue homeownership. That is, households may choose to not accumulate any savings until they have made a decision to pursue some goal requiring savings, such as starting a business, returning to school, or purchasing a home. Because the pursuit of homeownership may be the most common motivation for beginning to save, the presence of savings may be an indication that the household has decided to attempt to buy a home. If that is the case, the model may be overstating the importance of the savings itself as a predictor of homeownership. It may well be that the availability of downpayment assistance will not stimulate the desire to become a homeowner that is evident in these renter households in the SIPP.

This interpretation suggests an alternative policy approach for stimulating homeownership. Initial savings activity may predict homeownership in part because it indicates that households have enough control over their financial circumstances to begin accumulating savings. In addition, the household may well be motivated to begin saving in the belief that homeownership, or some other financial goal, is attainable. Based on this scenario, another policy approach, aside from downpayment

assistance, that might spur homeownership is to support savings efforts by households to accumulate the funds needed to buy a home, such as through individual development accounts. Such savings incentives could also be coupled with support for financial management training to help households develop the skills needed to manage their finances to the point where they can accumulate savings. The findings from this analysis suggest that a little savings can go a long way toward enabling homeownership.

## Acknowledgments

The authors gratefully acknowledge financial support from the Office of Policy Development and Research, U.S. Department of Housing and Urban Development (HUD). The authors also thank Harold L. Bunce and William J. Reeder of HUD and David Rodda of Abt Associates Inc., for their careful and thoughtful review of the article.

## Authors

Christopher E. Herbert is a senior associate in the Social and Economic Policy Division of Abt Associates Inc.

Winnie Tsen is an analyst with the U.S. Government Accountability Office.

## Notes

1. A two-step process identifies unconstrained households. First, for each household, two estimates are made for the house value that it could possibly afford: one assuming that the household is constrained by its income level and another assuming that the household is constrained by its wealth level. For the income constraint, the maximum affordable house value is derived by assuming that the household can only spend 28 percent of its income on a mortgage covering 80 percent of the house value at an assumed market interest rate. For the wealth constraint, it is assumed that the household can afford a house with a value that is five times the household's wealth (that is, wealth is used to provide a 20-percent downpayment). Unconstrained households are those whose observed house value is 85 percent or less of both of these maximum house values. In the second step, a model is estimated to predict the chosen house values of these unconstrained households based on household characteristics. This model is then applied to all households to estimate the ideal house value for each household.
2. Another recent study that focuses on the role of credit constraints on homeownership attainment is Rosenthal (2002). Using data from the 1998 Survey of Consumer Finances, Rosenthal identified credit-constrained households using survey questions that identified whether, at any time in the past 5 years, the household had a loan request denied, had a loan request only partially granted, or considered applying for credit but then chose not to apply because of an expectation of being rejected; however, he did not include any direct measures of wealth because this is expected to be an aspect of the presence of borrowing constraints.

3. An exception is a study by Galster, Laudan, and Reeder (1999), which modeled the probability that renter households in the 1990 Survey of Income and Program Participation panel would become owner households by the end of that panel 18 months later. This study did not evaluate the impact of wealth constraints on the probability of homeownership, however; instead, it focused on the combined importance of discrimination, informational barriers, and housing market conditions on homeownership propensities of households other than White suburbanites.
4. See U.S. Department of Commerce (2001) for a detailed description of the Survey of Income and Program Participation.
5. The head continues to be tracked even if he or she joins another household as a nonhead (for example, moves in with his or her parents). Thus, the tracked individuals can have three tenure statuses over time: renter, owner, or nonhead. The Survey of Income and Program Participation follows all members of the originally sampled households, but we do not track nonheads from the original sample who split off either to form their own household or to join another household.
6. Low-income households are those with incomes of 80 percent or less of area median income (AMI). AMI is based on estimates by the U.S. Department of Housing and Urban Development (HUD) for each federal fiscal year for metropolitan areas, nonmetropolitan counties, and metropolitan and nonmetropolitan portions of states. (See <http://www.huduser.org/datasets/il.html> for detailed information on these estimates.) HUD's estimates are linked to the Survey of Income and Program Participation (SIPP), using information from the SIPP on the metropolitan area, state, and metropolitan status of each observation.
7. Throughout this study, the terms "White" and "African American" are used to refer to non-Hispanic households in these racial groups, while Hispanics may be of any race.
8. A parametric model is used rather than the more flexible approach of using a semiparametric model such as the Cox proportional model because parametric models can more readily be used to simulate the probability of transition to homeownership. See Kalbfleisch and Prentice (2002) for a detailed discussion of approaches for estimating of hazard models.
9. Other functional forms were investigated in developing the model. The Weibull model was found to provide the best fit of the data.
10. Intervals of more than 4 months are possible because households may miss a wave of interviews and not be dropped from the survey but households missing more than one wave are no longer tracked.
11. It should be noted that we are not modeling time until *first* homeownership because we do not know whether the subjects previously owned a home. Rather, we are modeling the time until next homeownership, which, for many households, may be their first experience with homeownership.
12. The "Other" race category is not a focus of analysis due to both the relatively small sample size and the diverse nature of this grouping.

13. Negative and \$0 in income are recoded as 1 so that the log of income is defined as 0.
14. The financial asset and liability questions are also gathered in the 12th wave, but, because we do not observe the household's tenure subsequent to wave 12, this information is not used in the model.
15. It is not clear how this lag in the availability of information on financial assets would affect the estimated coefficients for these variables. On the one hand, household wealth is known to increase rapidly in the period immediately prior to purchasing a home (Haurin, Hendershott, and Wachter, 1996). In this case, it might be expected that small amounts of savings would be estimated to have a large impact on the probability of owning because the savings level of future buyers represents only a portion of the amount ultimately accumulated prior to purchase. Thus, for example, every \$1,000 saved may be representative of some larger amount of money ultimately saved before purchase. On the other hand, the lag between the collection of information on assets and liabilities and switches in tenure may weaken the association between wealth levels and this decision.
16. As described previously, the survival model uses information from wave 3 to predict tenure choice in wave 4, information from wave 4 to predict tenure choice in wave 5, and so on. Because we do not observe tenure choice after wave 12, information on wealth collected in this wave is not used in the analysis.
17. IRA and Keogh accounts are less liquid than other forms of savings due to the limitations on the ability to withdraw these funds; however, owners of these assets can tap them, either by paying penalties and taxes or by borrowing against these funds.
18. See Greene (1993) for a discussion of the use of spline functions in regression analysis.
19. The knots were chosen based on a comparison of results from alternative locations for the knots. The chosen knots were found to provide higher levels of statistical significance on the estimated coefficients.
20. See the Federal Housing Finance website for a description of these data: <http://www.fhfb.gov/MIRS/MIRS.htm>.
21. For information on the derivation of this price index, see the Office of Federal Housing Enterprise Oversight website: <http://www.ofheo.gov/HPI.asp>.
22. Due to the small sample size in some areas, the Survey of Income and Program Participation combines Maine and Vermont into one state grouping and North Dakota, South Dakota, and Wyoming into another grouping. In these cases, we created a weighted average of the median house values for the individual states using the number of owner-occupied housing units as the weights.
23. The models do, however, include dummy variables for African Americans and Hispanics. The dummy variables will shift the baseline hazard but will not alter its shape.
24. A further test of the correlation of outcomes for an individual is to allow for shared frailty, which is the survival-data equivalent of a random-effects model. The Stata® software package

provides tests for the evidence of shared frailty in the data. The results suggested that shared frailty was evident but only when a Weibull distribution was assumed. For other forms for the baseline hazard, shared frailty was not evident. A comparison of results using a Weibull model with and without shared frailty showed that the model without shared frailty did a better job of recreating the actual rates of homeownership attainment. As a result, the preferred model did not incorporate estimates for shared frailty.

25. A large share of the sample (39 percent) did not have any positive financial assets as of wave 3.
26. Households that are beginning to accumulate savings may also benefit from assistance from family in purchasing a home. Mayer and Engelhardt (1996) showed that about 1 in 10 first-time buyers benefit from gifts when purchasing a home. Because these gifts are likely to be received at the time of closing on the purchase, they are not captured in our wealth measures at the beginning of the period when homeownership occurs.
27. Low-income households are defined as those with incomes of 80 percent or less of area median income (AMI) at the time of wave 3. See note 4 for more details on how AMI is defined.
28. Wave 3 sample weights are used to create these weighted averages. Weights are used in these exhibits because the simulations will employ weights to provide estimates of the number of households that could be induced to purchase a home through downpayment assistance. Previous exhibits have not employed weights because the estimated model did not use weights and these exhibits were intended to shed light on the observations used to estimate the model.
29. Simulations were also run with grants of 1, 5, and 10 percent of the area median house price. The results were very similar to those using fixed dollar amounts because the average median house price is \$115,500 and thus these percentage grants are on average quite similar to \$1,000, \$5,000, and \$10,000 grants. Although there may well be differences in the geographic impact of these two approaches to downpayment assistance, given the small sample sizes in specific market areas it is not possible to evaluate these differences. As a result, the results presented here are exclusively for the fixed dollar amount grants.
30. It is also important to consider that the levels of wealth needed to achieve homeownership are understated by the data available in the Survey of Income and Program Participation (SIPP). Those seeking to purchase a home may accumulate savings rapidly in the months prior to buying. Because the data on wealth is captured by the SIPP only every 12 months, some amount of wealth accumulation may not be captured by the data. In addition, households may benefit from gifts from family members at the time of purchase, which would also not be captured here. For these reasons, the analysis may understate the importance of wealth.
31. One way to try to ensure that assistance is targeted to those who truly need help to become a homeowner would be to impose some costs on the use of government assistance. But, because these buyers will be facing financial hurdles in qualifying to buy a home, the payment of these costs would probably have to be deferred until some years after the initial purchase. Among the approaches that could be used would be some form of equity sharing at the time of resale of the property in proportion to the percentage of the original price that was financed with government assistance or a loan that did not begin to require payments until 5 or 10 years after purchase.

## References

- Barakova, Irina, Raphael W. Bostic, Paul S. Calem, and Susan M. Wachter. 2003. "Does Credit Quality Matter for Homeownership?" *Journal of Housing Economics* 12: 318–336.
- Czajka, John L., Jonathan E. Jacobson, and Scott Cody. 2004. "Survey Estimates of Wealth: A Comparative Analysis and Review of the Survey of Income and Program Participation," *Social Security Bulletin* 65 (1): 63–69.
- Engelhardt, Gary, and Christopher Mayer. 1998. "Intergenerational Transfers, Borrowing Constraints, and Saving Behavior: Evidence from the Housing Market," *Journal of Urban Economics* 44 (1): 135–57.
- Galster, George, Aron Laudan, and William Reeder. 1999. "Encouraging Mortgage Lending in 'Underserved' Areas: The Potential for Expanding Home Ownership in the US," *Housing Studies* 14 (6): 777–801.
- Greene, William H. 1993. *Econometric Analysis*, 2<sup>nd</sup> ed. New York: Macmillan Publishing Company.
- Haurin, Donald R., Patric H. Hendershott, and Susan M. Wachter. 1997. "Borrowing Constraints and the Tenure Choice of Young Households," *Journal of Housing Research* 8 (2): 137–154.
- . 1996. "Wealth Accumulation and Housing Choices of Young Households: An Exploratory Investigation," *Journal of Housing Research* 7 (1): 33–57.
- Herbert, Christopher E., Donald R. Haurin, Stuart S. Rosenthal, and Mark Duda. 2005. *Homeownership Gaps Among Low-Income and Minority Borrowers and Neighborhoods*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.
- Kalbfleisch, John D., and Ross L. Prentice. 2002. *The Statistical Analysis of Failure Time Data*. New York: John Wiley & Sons.
- Linneman, Peter, and Susan Wachter. 1989. "The Impact of Borrowing Constraints on Homeownership," *AREUEA Journal* 17 (4): 389–402.
- Listokin, David, Elvin K. Wyly, Brian Schmitt, and Ioan Voicu. 2002. *The Potential and Limitations of Mortgage Innovation in Fostering Homeownership in the United States*. Washington, DC: Fannie Mae Foundation.
- Mayer, Christopher J., and Gary V. Engelhardt. 1996. "Gifts, Down Payments, and Housing Affordability," *Journal of Housing Research* 7 (1): 59–77.
- Quercia, Roberto G., George W. McCarthy, and Susan M. Wachter. 2003. "The Impacts of Affordable Lending Efforts on Homeownership Rates," *Journal of Housing Economics* 12: 29–59.
- Rosenthal, Stuart S. 2002. "Eliminating Credit Barriers: How Far Can We Go?" In *Low-Income Homeownership: Examining the Unexamined Goal*, edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: The Brookings Institution: 111–145.

U.S. Department of Commerce. 2001. *Survey of Income and Program Participation Users' Guide*, 3<sup>rd</sup> ed. Washington, DC: U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau.

Zorn, Peter. 1989. "Mobility-Tenure Decisions and Financial Credit: Do Mortgage Qualification Requirements Constrain Homeownership?" *AREUEA Journal* 17 (4): 1–16.

## **Additional Reading**

Cleves, Mario A., William W. Gould, and Roberto G. Gutierrez. 2004. *An Introduction to Survival Analysis Using Stata*<sup>®</sup>. College Station, TX: Stata Press.

