Wealth Accumulation and Homeownership: Evidence for Low-Income Households

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Abstract

A primary motivation for promoting homeownership is the concept that owner-occupied housing can be an important means of wealth accumulation, particularly for those lower income and minority households that are able to purchase homes. With given data issues, however, it is difficult to assess the importance of housing and nonhousing sources of wealth accumulation. Examining this difficulty serves as the purpose of this article. The results of this analysis support public policies aimed at both increasing homeownership opportunities in general and those policies that focus on homeownership for lower income households. Even though homeownership is not a guarantee of successful wealth accumulation, household wealth generally appears to be positively affected by homeownership, a conclusion reinforced with comparisons to accumulation of nonhousing wealth. One troubling observation is that owners often make the transition back to renting and, particularly among low-income minority households, do not regain owner-occupied housing.

Introduction

Historically, the federal government has promoted homeownership in a variety of ways.[1] Even in today's housing climate, the expansion and preservation of homeownership opportunities to low-income households continues to be among the highest priorities of the Department. The

[1] For an overview of this issue and its application to low-income households, see Retsinas and Belsky (2002a). Also see McCarthy, Van Zandt, and Rohe (2001).

rationale for the national emphasis on homeownership is the widely held belief that homeownership benefits individuals and society in a fundamental way.[2] The notion of the house as an asset, particularly for lower to middle-income households that can afford to purchase a home, is central to this emphasis.

This article considers one channel through which we hypothesize that these benefits are delivered. The impact of homeownership on the wealth position of households (during the 1984-to-1992 period) is estimated and compared with nonhousing wealth. The analysis is not only based on individual household data but it also incorporates neighborhood characteristics. Our results are encouraging for policies designed to increase low-income homeownership. Lower income households appear to be served well by homeownership.

The Joint Center for Housing Studies (JCHS) notes that, even during the stock market boom, housing equity still represented the majority of wealth for most homeowners (JCHS, 2000). More recently, JCHS (2003) presents compelling evidence that homeowners' ability to borrow against housing wealth has been a mainstay of the current economic recovery. Although HUD and other federal agencies have tried to make owner-occupied housing more affordable to lower and middle-income households, these households must nonetheless make significant financial commitments to achieve homeownership. The financial commitment (average housing costs as a percentage of household income) associated with homeownership among lower income households is striking. As noted in the analysis by Orr and Peach (1999), the percentage commitment can run as high as 40 to 60 percent.[3] The work of Scanlon (1999) suggests that this kind of financial commitment is not surprising because homeownership for minority households is a critical determinant of "life satisfaction."

For lower middle-income households, homeownership is the single largest investment they will ever make. As such, it may be their most important source of wealth accumulation and ultimate financial security. Currently, a substantial debate reexamines whether and under what economic circumstances housing is the best investment for low-income households.[4]

This article empirically models family wealth accumulation as a function of a household's level of housing expenditure, the appreciation of housing in the neighborhoods in which they live, and the movement of households through a series of housing choices during the study period. The movement of a household from renting to homeownership and, subsequently, to other owned homes (often higher in value) or back to rental status over time is referred to as a household's hierarchy of housing choices. We use the dynamic approach to homeownership choice and transitions described in Boehm and Schlottmann (2004) as the first step in predicting housing wealth accumulation for these families. In so doing, we are able to provide insights regarding the intertemporal pattern of household housing choice on wealth accumulation; that is, we are able

[2] Various literature summaries of these impacts appear in the five papers contained in "Part 5, Socioeconomic Impacts of Homeownership," in Retsinas and Belsky (2002b).

[3] As discussed in Mayer (1999), the implied financial risks of this commitment for lower income households are significant.

[4] For example, the following papers discuss this issue: Belsky and Duda (2002); Boehm and Schlottmann (2002); Case and Marynchenko (2002); Di, Yang, and Liu (2004); and Goetzmann and Spiegel (2002).

to determine how two factors might be expected to affect the amount of housing wealth that the household accumulates: (1) how soon during a given period of observation a renter becomes a homeowner, and (2) whether that household makes a transition quickly to other (potentially higher valued) owned units.

This article fills a void in the literature on housing choice and wealth accumulation. If the fundamental nature of housing wealth accumulation is indeed dynamic, little work has been done empirically that uses a dynamic approach. Our approach can help explain the divergent findings in the literature on the importance of owner-occupied housing as an asset-building strategy for low-income households.

In this context, the literature on family wealth accumulation and housing choice has three shortcomings. First, little (if any) detailed family wealth information has been available, particularly over time for a given set of households. Thus, as described in detail in Belsky and Duda (2002), little analysis of the timing of purchase and the dynamic of wealth accumulation has occurred.[5] Rather, the literature has focused on the *average* appreciation rates of homes either located in low-cost or low-income neighborhoods or at the bottom of the price distribution. As Goetzmann and Spiegel (2002) convincingly point out, this traditional measurement for housing as an asset is rather "dismal."[6] Case and Marynchenko (2002) discuss in detail the complex nature of such measurements for three large metropolitan areas (Boston, Chicago, and Los Angeles).[7]

Second, it is clear from the literature cited in Boehm (1993) on first-time homeownership that wealth per se is an important factor affecting the likelihood and timing of home purchase. Few studies have attempted to model this dynamic. This issue is more important given the later work of Gyourko, Linneman, and Wachter (1999) exploring differential rates of homeownership by race. Although the authors find no differences in ownership rates among households that have sufficient wealth to meet downpayment and closing requirements, significant differences in ownership rates occur among wealth-constrained households. In this regard, this article addresses how housing wealth accumulation relates to total wealth.

Third, if timing is an issue, almost *no* analysis of the dynamics (timing) of home purchase and the family's subsequent movement through the hierarchy of housing choices has occurred. Without this type of analysis, it is not surprising that we know relatively little about the impact of the pattern of housing choice on wealth accumulation. See Boehm and Schlottmann (2002) for a summary of relevant literature on this topic.

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[5] Demographic profiles and income profiles in general are tabulated at a given point in time. Classifications usually profile recent first-time purchasers versus current renters, differences by income or racial cohorts, and so on. Although these studies provide valuable information, particularly if derived from data sources such as the American Housing Survey, the basic characteristics of the data do not allow for a dynamic examination of the issues considered in this article.

[6] Goetzman and Spiegel deal with a theme that is closely related to the literature cited in this article: the implicit risk associated with housing investment among low-income households. Their paper contains references dealing with the risk of housing and the probability of mortgage default, including suggesting policy options such as creating insurance products to mitigate unwanted local housing risk.

[7] Note that Case and Marynchenko's analysis of these three cities (with different conditions in the regional economies) suggests that homeownership as a "good" or "bad" investment depends on the time of purchase. The results presented in the analysis in this article reinforce their conclusion.

The literature mentioned previously has three primary implications for future research. First, detailed wealth information on families is seldom available on a consistent basis. Second, such information on wealth is even less likely to be available over time so that changes in wealth can be observed. Third, the process of housing wealth accumulation is dynamic; housing wealth accumulation depends critically on how soon a family that is renting becomes a homeowner and whether the family graduates to more highly valued owned units over time or rents again and never regains homeownership.

The study addresses the three shortcomings of the literature explained previously through a dynamic model of housing choice and housing expenditure to predict potential housing wealth accumulation for households across income and racial groups. Specifically, we develop a probability model from which we calculate the cumulative likelihood of homeownership over time for all households in the study. It is important to note that this approach explicitly accounts for the likelihood that, having become owners, households may subsequently make the transition back to rental tenure and/or may move to other owned units over time. We predict the likelihood of owning a first house and, subsequently, the likelihood of moving to other owned homes and/or returning to rental tenure during the observation period. Along with estimates of housing expenditure levels at different points in time for households in the study, we calculate estimates of potential housing wealth accumulation (through appreciation). These estimates are compared with actual nonhousing wealth accumulation during the same time period for these families stratified by race (minority versus majority) and high versus low income. Thus, we can draw conclusions about the potential importance of homeownership as a component of family wealth accumulation.

This article consists of six sections, including this introduction. The second section presents an overview of the data on which the study is based and several calculations, including the housing transitions among households during the study period. The section also presents and discusses the accumulation of nonhousing wealth and shows these results along the dimensions of low-income, high-income, and minority household status. The third section includes a discussion of the study's methodology. The fourth section summarizes empirical results. The fifth section presents findings regarding the wealth accumulation associated with homeownership. These results for housing wealth accumulation are then compared to the earlier findings for nonhousing wealth accumulation. The sixth section presents conclusions.

Data and Primary Calculations: Housing Transitions, Housing Appreciation, and Nonhousing Wealth

This section describes the data set used in the analysis, the empirical estimation, and the subsequent calculations that form the basis of our research.

Data

This study uses data from the Panel Study of Income Dynamics (PSID), as collected by the Survey Research Center at the University of Michigan. Based on an initial survey of 5,000 families in 1968,

the PSID provides detailed annual family histories, including housing choice.[8] Our analysis uses the PSID primary database and the special supplements containing information on household family wealth.[9] These supplements have been subjected to a high-quality imputation procedure, which ensures consistency across all three supplements available (1984, 1989, and 1994). The supplements provide detailed information about eight parameters on the net-wealth position of each family: (1) the value of the family's total debt; (2) the value of any family farm or business; (3) the amount of money in the family's checking and saving accounts; (4) the value of family-owned real estate (other than its primary residence); (5) the value of family stocks, mutual funds, and individual retirement accounts (IRAs); (6) the value of the family's automobile(s); (7) the value of any other assets of note owned by the family; and (8) the value of the family's equity in its primary residence.[10] More importantly, the PSID provides a sample for analysis that is more representative of the true wealth distribution in the United States than are alternative data sets.[11]

In addition, the specific form of the PSID used in this study is the proprietary geocoded version.[12] This database contains specific information on the locations of household residences in the sample at the census tract level. The availability of this geographic information will allow for the examination of housing value appreciation at the neighborhood level; that is, the average appreciation of owned homes in a given census tract and the identification of the housing markets in which households reside. Previous research using the PSID generally has not been able to focus this specifically on housing location.

We estimate our model of housing choice for the 9-year observation period from 1984 to 1992.[13] Each household is followed throughout this period. In addition, for both the cumulative probabilities of homeownership and the estimation of average annual wealth accumulation, households are partitioned into four groups. These four groups reflect White and minority households classified by median income.[14] Specifically, our analysis focuses on households whose real income was above

[8] During our sample period, the PSID reinterviews were conducted annually. Starting in 1997, the PSID reinterviews have been done only every 2 years.

[9] These special supplements were funded by the National Institute on Aging.

[10] A description of the PSID is available at the University of Michigan's Institute for Social Research website (http://psidonline.isr.umich.edu); in the "PSID Guide" section, see the "Overview" section and the associated references.

[11] This issue is discussed in Di, Yang, and Liu (2004). In particular, the authors suggest that the PSID is more representative of the "true" wealth distribution than either the Survey of Consumer Finances (which oversamples the wealthy) or the Survey of Income and Program Participation (which overrepresents the poor).

[12] Access to this sensitive data was provided through a formal agreement between the University of Michigan and the University of Tennessee. Unlike the earlier work of Boehm and Schlottmann (2004), the geocoded PSID allows for actual tracking of housing choices across census tracts.

[13] At the start of this analysis, full information on our households was available only through 1992, even though the wealth information for 1994 was already available. Thus, although the 1994 wealth information could be used to infer wealth levels in 1992, the period of analysis itself was only through 1992.

[14] In the geocoded PSID used in this analysis, during the 9-year period, the number of Hispanic households was too small to apply the modeling methodology subsequently outlined in the text (small cells). Thus, Hispanic households were not able to be treated as a cohort distinct from African-American households; therefore, we employ a single minority cohort classification.

the median and below the median (in 1984).[15] We are particularly interested in any implications for *both* lower income households and minority households.

Transitions in the Housing Hierarchy

Based on the data from the PSID described previously, exhibits 1a through 1d illustrate the dynamic nature of housing choice during the 9-year period of study (1984 to 1992). For each type of household classified by minority status and household income, the four panels of exhibit 1 (exhibits 1a through 1d) show four possible housing states: renting, first home purchase, second home purchase, and third home purchase.[16] Not all households were retained in the sample. Individuals were retained in the sample if they could be tracked the entire time and if they maintained the status of household head or spouse during this period. Exhibits 1a through 1d also show the average length of time (mean duration in years) a household is in a specific housing state. Three points are important to note regarding these exhibits.

First, notice that the movement of households from renting to homeownership is *not* a simple transition to first home purchase. This observation is true across the different types of households. A significant number of homeowners are observed to make a transition to a new (second) home. Any measurement of average wealth accumulation attributable to homeownership must recognize the implicit change in value between the first home and the second. For example, if a household initially resides in a house that is valued at $75,000 and house prices were appreciating at a rate of 5 percent a year, the appreciation would be $3,750. Subsequently, if the household were to move to another house valued at $100,000 and the appreciation rate stayed the same, the dollar amount of annual housing wealth accumulation achieved through appreciation would have increased to $5,000. In addition, in our sample, even when stratified by race and income, approximately 25 percent of renters who are making the transition to homeownership are not moving to a first home; they have been homeowners previously during the period. For example, for high-income minority households (in exhibit 1), 29 moves are transitions from renting to purchasing a second home, 2 moves are transitions from renting to purchasing a third home, and 110 moves are transitions from renting to purchasing a first home during the observation period. Thus, approximately 22.0 percent ([29+2]/141) of these moves out of rental units are not to the first home owned during the observation period. For the sample as a whole, this ratio is 28.7 percent. This observation might help explain some of the diverse results in the literature concerning house values for "first-time" buyers, who often are defined as all those who move from renting to owning without regard for prior tenure experience.

[15] Households were assigned to an individual metropolitan statistical area or, for rural residents, the appropriate county. Using median income information for the two census periods that bracket the 9-year study period (the 1980 Census and the 1990 Census with income information for 1979 and 1989, respectively), the annual average increase for those periods was applied and then used to stratify 1984 median income in the sample. This method was suggested to us by research staff at HUD. It is important to note that results presented in this study do not vary for alternative definitions of low income; that is, the results are the same whether low income is defined as 75 percent, 80 percent, or 90 percent of the area median income. The fundamental issue appears to be an individual household's position relative to the area median income.

[16] Although a small number of "fourth house" households are present in the data, the cells are too small for analysis.

Exhibit 1a

Transition Matrix—High-Income White Households[a]

	Transition		
	From Renting to First Home	From First Home to Second Home	From Second Home to Third Home
Number of spells[b]	283	466	122
Mean duration[c]	3.06	3.48	2.15
	Transition		
	From First Home to Renting	**From Second Home to Renting**	**From Third Home to Renting**
Number of spells	220	61	15
Mean duration	3.32	2.41	2.34
	Transition		
	From Renting to Second Home		**From Renting to Third Home**
Number of spells	138		25
Mean duration	1.96		1.40

[a] As described in the text, data are derived from the Panel Study of Income Dynamics (PSID) (1984 to 1992) and relevant PSID supplemental surveys.

[b] "Spell" refers to the time spent in a given tenure state (renting, first purchase, and so on). These entries represent the number of individual spells in the data for each state. The cells represent count data (length time varying) rather than a "fixed" interval (Markov) matrix.

[c] Average time in original state, measured in years.

Exhibit 1b

Transition Matrix—High-Income Minority Households[a]

	Transition		
	From Renting to First Home	From First Home to Second Home	From Second Home to Third Home
Number of spells[b]	110	55	7
Mean duration[c]	3.42	3.62	1.57
	Transition		
	From First Home to Renting	**From Second Home to Renting**	**From Third Home to Renting**
Number of spells	66	13	1
Mean duration	2.99	1.85	1.5
	Transition		
	From Renting to Second Home		**From Renting to Third Home**
Number of spells	29		2
Mean duration	2.11		1.5

[a] As described in the text, data are derived from the Panel Study of Income Dynamics (PSID) (1984 to 1992) and relevant PSID supplemental surveys.

[b] "Spell" refers to the time spent in a given tenure state (renting, first purchase, and so on). These entries represent the number of individual spells in the data for each state. The cells represent count data (length time varying) rather than a "fixed" interval (Markov) matrix.

[c] Average time in original state, measured in years.

Exhibit 1c

Transition Matrix—Low-Income White Households[a]

	Transition		
	From Renting to First Home	From First Home to Second Home	From Second Home to Third Home
Number of spells[b]	315	145	35
Mean duration[c]	3.95	3.20	2.29
	Transition		
	From First Home to Renting	**From Second Home to Renting**	**From Third Home to Renting**
Number of spells	200	53	6
Mean duration	3.05	2.02	1.33
	Transition		
	From Renting to Second Home		**From Renting to Third Home**
Number of spells	86		24
Mean duration	2.17		1.5

[a] *As described in the text, data are derived from the Panel Study of Income Dynamics (PSID) (1984 to 1992) and relevant PSID supplemental surveys.*

[b] *"Spell" refers to the time spent in a given tenure state (renting, first purchase, and so on). These entries represent the number of individual spells in the data for each state. The cells represent count data (length time varying) rather than a "fixed" interval (Markov) matrix.*

[c] *Average time in original state, measured in years.*

Exhibit 1d

Transition Matrix—Low-Income Minority Households[a]

	Transition		
	From Renting to First Home	From First Home to Second Home	From Second Home to Third Home
Number of spells[b]	196	64	7
Mean duration[c]	4.18	3.68	1.86
	Transition		
	From First Home to Renting	**From Second Home to Renting**	**From Third Home to Renting**
Number of spells	132	31	2
Mean duration	2.84	1.91	1.00
	Transition		
	From Renting to Second Home		**From Renting to Third Home**
Number of spells	52		9
Mean duration	1.91		1.71

[a] *As described in the text, data are derived from the Panel Study of Income Dynamics (PSID) (1984 to 1992) and relevant PSID supplemental surveys.*

[b] *"Spell" refers to the time spent in a given tenure state (renting, first purchase, and so on). These entries represent the number of individual spells in the data for each state. The cells represent count data (length time varying) rather than a "fixed" interval (Markov) matrix.*

[c] *Average time in original state, measured in years.*

Second, note that housing transitions are not symmetrical. Specifically, movement from renting to purchasing a first home and then to purchasing a second home and possibly a third home is not necessarily a smooth process. Households become renters throughout the observation period, although they remain renters for decreasing amounts of time as they move up the purchase hierarchy. For example, for high-income White households, exhibit 1a shows 220 instances in which first-time homebuyers make the transition back to rental status. We also observe transitions from a second or third owned home to rental tenure 61 and 15 times, respectively. For those households that make the transition back to owning, however, the more experience they have as owners, the more quickly they make the transition. Specifically, the average duration in rental tenure for those who begin the observation period as renters but ultimately achieve homeownership is 3.06 years. For renters who ultimately make the transition to a second or third home, the average duration in rental tenure is 1.96 and 1.40 years, respectively. Both the timing and number of moves a household makes are critical for the purposes of the analysis of housing wealth accumulation. Timing will affect the length of time a household has to accumulate housing wealth, and the number of owned homes ultimately affects the house value on which appreciation is based.

Third, note that analysis of the likelihood of being in a specific state of homeownership (that is, first home, second home, or third home) conceptually is derived from four elements, namely (1) households that enter homeownership from renting, (2) households that remain in their current home, (3) households that progress to another home, and (4) households that leave homeownership to become renters. Thus, a simple average measurement of housing choice and family wealth accumulation may be misleading because each household may take a very different time path in making its housing choices. For instance, although two groups of households (for example, low-income Whites and low-income minorities) could each have a 30-percent likelihood of achieving homeownership by a particular point in the observation period, they might have very different likelihoods of making the transition into other alternative housing states (that is, back to a rental home or another owned home). Consequently, these two households would have very different likelihoods of being in a first home at a particular point in time in the probability model estimated in this analysis, as compared with a simpler model that considered only the average likelihood of transition to ownership. Once again, these dynamics, which are critical for getting an accurate picture of potential housing wealth accumulation, have not previously been incorporated into the literature on this topic.

Housing Appreciation

We matched our PSID households with the census tracts in which they lived in each year of the 9-year study period. Exhibit 2 presents information for all census tracts in our sample on the percentage of housing appreciation by income and minority status.[17] The percentages in exhibit 2

[17] It is important to remember that because this article is based on the geocoded PSID, these figures are based on the actual homeowners' experiences in the sample over time. In other words, the figures are not simple averages taken at two points in time (such as beginning and end) that do not necessarily reflect actual experience. Specifically, the appreciation is the weighted average of the appreciation in all the neighborhoods the family lived in during the sample period; the weights are the number of periods in which the family lived in a given location. The large number of observations (42,129) is the result of taking housing values for every household in the PSID sample for every year. As noted previously (see footnote 10), within the geocoded PSID sample, the small cells for Hispanic households did not enable us to consider a cohort for Hispanic households separate from that for African-American households.

are derived from the average annual appreciation (between 1990 and 2000) in the median nominal home sales prices of owner-occupied housing in each tract in the sample in which our households resided during the 9-year study period.[18] Rather than providing this information as simple averages, we thought it instructive to consider both the median appreciation and the information on the distribution. For this reason, the four panels of exhibit 2 display the two tails of the distribution (5 and 95 percent) as well as the lower quartile and upper quartile. For example, for high-income White households, the median annual percentage increase is 4.63 percent, but 5 percent of the time households experienced returns greater than 12 percent. On the opposite end of the spectrum, 5 percent of the time households experienced losses in house value greater than 0.53 percent.

If a general observation is possible, it might be that homeownership (as measured by rate of appreciation) is a positive experience across all groups. Higher income homeowners have, of course, properties with higher values, but the rates of appreciation during the period are reasonably similar. There does not appear to be any particular oddity for the four cohorts, each of which displays a fundamental consistency of appreciation experience. All cohorts (at the lower tail of 5 percent) experience negative returns; the upper tail (95 percent) receives rates of appreciation more than double those of homeowners at the median, and so on. Even for low-income minorities, the upper 5 percent of returns is 11.353 percent or higher, which is more than twice the median return of 4.305 percent.

Exhibit 3 shows the basic trends in (absolute) housing values from the PSID data for the 9-year observation period. Housing values increase with income and race in the expected manner. For example, considering all observation years, high-income White households have the highest median housing value—$80,000. From there, values decrease to $50,000 for high-income minorities, $48,000 for low-income Whites, and $32,000 for low-income minorities. When reflecting on the basic relationship between housing value and income and minority cohorts over time, however, most of the relationships appear reasonably stable during the period. For example, the ratio of

Exhibit 2

Percent Annual Appreciation in House Value 1990–2000—Census Tract Information for Tracts in Which PSID Households Reside, by Income and Racial Group

Subsample	5 Percent (%)	Lower Quartile (%)	Median (%)	Upper Quartile (%)	95 Percent (%)	Number of Observations
High-income White households	– 0.530	2.016	4.630	7.230	12.025	15,651
High-income minority households	– 0.456	2.353	4.786	7.245	11.930	4,068
Low-income White households	– 0.855	1.551	4.189	6.916	11.599	11,448
Low-income minority households	– 0.536	1.842	4.305	6.822	11.353	10,962
Total						42,129

PSID = Panel Study of Income Dynamics.

[18] Although the period for the PSID data is 1984 to 1992, tract-level data were not available in a format for the 1980 Census that allowed for the data to be combined with the PSID data. Consequently, census information from the 1990-to-2000 period was used as the best estimate of tract-level appreciation differences.

house value (measured at the median) between lower income minority households and lower income White households from 1984 ($27,500 and $40,000, respectively) to 1992 ($40,000 and $58,500, respectively) is basically steady at approximately 68 percent. Similarly, if we compare the two extremes shown in exhibit 3 (that is, low-income minority households and high-income White households), the basic ratio of value during the 9-year period remains in the range of 40 percent ($27,500 and $67,500, respectively, in 1984 and $40,000 and $100,000, respectively, in 1992).

Exhibit 3

Housing Value by 1984-to-1992 Period and Individual Years (1 of 2)

Year and Group	5 Percent ($)	Lower Quartile ($)	Median ($)	Upper Quartile ($)	95 Percent ($)
All years (1984 to 1992)					
High-income White	25,000	55,000	80,000	130,000	295,000
High-income minority	12,000	33,000	50,000	80,000	175,000
Low-income White	8,000	30,000	48,000	75,000	150,000
Low-income minority	3,500	15,000	32,000	50,000	90,000
Individual years					
1984					
High-income White	25,000	49,250	67,500	95,000	175,000
High-income minority	10,000	30,000	45,000	69,000	110,000
Low-income White	6,000	25,000	40,000	60,000	100,000
Low-income minority	3,000	12,000	27,500	40,000	75,000
1985					
High-income White	25,000	50,000	70,000	100,000	200,000
High-income minority	9,000	30,000	44,750	68,000	125,000
Low-income White	5,000	25,000	40,000	60,000	100,000
Low-income minority	3,000	13,500	30,000	45,000	80,000
1986					
High-income White	25,000	50,000	75,000	110,000	225,000
High-income minority	9,000	30,000	45,000	70,000	131,250
Low-income White	6,500	25,000	42,000	62,500	115,000
Low-income minority	4,000	14,000	30,000	45,000	80,000
1987					
High-income White	25,000	55,000	80,000	125,000	275,000
High-income minority	10,000	30,000	48,000	76,000	150,000
Low-income White	8,000	25,000	43,500	68,000	135,000
Low-income minority	3,000	15,000	30,000	49,000	80,000
1988					
High-income White	25,000	55,000	85,000	140,000	300,000
High-income minority	10,000	32,000	50,000	80,000	160,000
Low-income White	8,000	30,000	46,500	75,000	150,000
Low-income minority	4,000	17,000	32,000	46,400	80,000
1989					
High-income White	28,000	56,000	90,000	150,000	325,000
High-income minority	15,000	36,000	57,000	85,000	190,000
Low-income White	9,000	30,000	50,000	78,000	175,000
Low-income minority	4,000	19,000	35,000	50,000	93,000

Exhibit 3

Housing Value by 1984-to-1992 Period and Individual Years (2 of 2)

Year and Group	5 Percent ($)	Lower Quartile ($)	Median ($)	Upper Quartile ($)	95 Percent ($)
1990					
High-income White	30,000	60,000	92,000	160,000	350,000
High-income minority	15,000	39,000	60,000	89,500	220,000
Low-income White	9,000	30,000	52,000	83,000	175,000
Low-income minority	3,400	15,000	35,000	50,000	95,000
1991					
High-income White	29,000	60,000	95,000	156,500	330,000
High-income minority	14,000	40,000	60,000	90,000	200,000
Low-income White	9,000	32,000	55,000	85,000	185,000
Low-income minority	4,000	20,000	35,000	55,000	110,000
1992					
High-income White	30,000	65,000	100,000	160,000	350,000
High-income minority	15,000	40,000	60,000	92,000	225,000
Low-income White	10,000	35,000	58,000	88,500	175,000
Low-income minority	5,000	20,000	40,000	60,000	120,000

Nonhousing Wealth

Of critical importance to this article is the experience of homeownership on wealth accumulation of households. To understand this concept requires comparing housing wealth accumulation with nonhousing wealth accumulation. As was discussed in detail previously, supplements on household family wealth have been added to the primary PSID database. Consequently, the nonhousing wealth position of the family can be determined as well as changes in that wealth during 5-year intervals. Exhibit 4 presents annual accumulation of nonhousing wealth in nominal dollars by income and racial cohort for the study period.

Exhibit 4 shows nonhousing wealth at the start of the study period (1984) as well as the average annual change for the 9-year period. For each household subsample (as presented in exhibit 2), information is provided for the median value, two tails (5 and 95 percent), and lower and upper quartiles. The exhibit shows a wide disparity in nonhousing wealth and savings across racial and income groups. High-income White households have a median net-wealth position of $20,700 in 1984 and have median savings of $2,650 during the period. In contrast, low-income minority households have a median net wealth position of $150 at the start of the period and median savings of $0 during the same observation period.

This comparison provides striking evidence not only of major differences between cohorts but also of the difficulty that low-income and minority households experience in building nonhousing wealth during the observation period. These results provide an interesting context in which discussions of the role of housing in wealth accumulation of (low-income) households can take place.

As shown in exhibit 4, low-income minority households basically are able to simply maintain their original nonhousing wealth position over time. The average annual change in nonhousing wealth

Exhibit 4

Annual Accumulation of Nonhousing Wealth, by Income and Racial Group, for All Sample Households (1984–92)

Income/Racial Group	5 Percent ($)	Lower Quartile ($)	Median ($)	Upper Quartile ($)	95 Percent ($)	Number of Observations
High-income White						
Average change in wealth	– 15,003	– 560	2,650	11,505	63,728	1,739
Wealth in 1984	– 165	7,210	20,700	70,200	292,000	
High-income minority						
Average change in wealth	– 7,331	– 871	300	3,475	20,080	452
Wealth in 1984	– 1,522	2,001	6,650	17,900	84,500	
Low-income White						
Average change in wealth	– 3,727	– 658	300	2,978	18,370	1,272
Wealth in 1984	– 2,110	680	5,000	21,400	133,000	
Low-income minority						
Average change in wealth	– 2,440	– 200	0	530	4,800	1,218
Wealth in 1984	– 2,000	0	150	2,400	16,000	
Total						**4,684**

is zero, with significant negative experience for many households. Low-income White households do better (an annual average change of $300), but the lower quartile experiences an annual loss of more than twice the median value (a negative $658). For the period covered by this study, it appears that the accumulation of nonhousing wealth by low-income households is modest.

As expected, the nonhousing wealth accumulation experience of high-income households is more favorable. White households experience, in a relative sense, positive gains, with significant annual accumulations in the upper quartile ($11,505). High-income minority households in the upper quartile also have significant changes in nonhousing wealth accumulation ($3,475) but start the period at much lower levels of total nonhousing wealth. Thus, given the appreciation of owned housing in neighborhoods in which the households in the sample lived during the observation period (exhibit 3) and the relatively modest accumulation of nonhousing wealth by families in the sample during the same time (exhibit 4), it appears that owned housing might be expected to play a pivotal role in the accumulation of wealth, particularly for low-income and/or minority families.

Model Specification[19]

Based on the previous discussion, modeling the relationship between family wealth accumulations and housing choice would be more meaningful if the following three elements of the dynamics of actual housing choice could be incorporated:

1. The likelihood of transition between specific housing states at a point in time. These transitions should reflect household characteristics, including income and wealth.

[19] Readers not interested in the model development should proceed to the fourth section, Empirical Analysis, which presents the results of the empirical analysis.

2. Based on the previous discussion, the cumulative probability that a household attains a specific housing state during the study period. These cumulative probabilities need to reflect the nonsymmetric nature of housing transitions.[20]

3. The dynamics of households moving between renting and owning as a more involved process than time to (first) homeownership. Modeling this process requires an explicit recognition of timing issues (see exhibit 1 and the accompanying discussion).

The three elements mentioned here are modeled in the dynamic approach to homeownership and the housing hierarchy in Boehm and Schlottmann (2004). In the analysis presented in this article, the predicted probabilities of homeownership that can be derived from this model developed by Boehm and Schlottmann (2004) are combined with estimates of housing expenditure and house price appreciation to produce an estimate of wealth accumulation for households in the sample. This approach involves several steps. First, the likelihood of transitions within the hierarchy of housing choices must be estimated to provide probabilities of homeownership. Households enter the sample as either owners or renters; subsequently, they could make any or all of the following seven transitions during the 9-year observation period:[21]

1. Renting to owning their first home.
2. Owning their first home to renting.
3. Owning their first home to owning their second home.
4. Renting to owning their second home.
5. Owning their second home to renting.
6. Owning their second home to owning their third home.
7. Renting to owning their third home.

After this model has been employed to estimate the likelihood of owning and the way this probability changes over time, it is then necessary to predict the level of housing expenditure by each household if it were to purchase a home in a given point in time. This prediction requires estimation of a housing expenditure equation and, subsequently, the prediction of housing expenditure for all households in the sample. Finally, it is necessary to determine the change in house value that could be expected over time for the homeowners in the sample in a specific location. Unlike previous studies that have used broad averages, we are able to track individual homeowners by census tract.[22] Consequently, we can measure the actual change in value for housing in the neighborhoods (census tracts) in which these households are living at a particular time. We accomplish this measurement by calculating average annual house price appreciation for each census tract between the 1990 Census and the 2000 Census.

[20] As noted earlier in the discussion of exhibit 1, households do not always move directly from renting to a first house, then a second house, and so on; sometimes they make the transition back to renting. In addition, the probability of being in a first house at any given point in time is a function of the likelihood of moving into that home from a rental unit and the likelihood of moving out to a rental unit or to a second owned home.

[21] Although a few households in the sample owned more than three housing units during the observation period, there were too few of them to include additional transitions to ownership in the analysis.

[22] As noted previously, the geocoded PSID, not the "standard" PSID, is able to accomplish this tracking function.

Together, these predicted values enable us to calculate the expected housing wealth accumulation for different subgroups of families in the sample. It is important to point out that this empirical approach captures the dynamics of household housing choice much more realistically than did previous studies in this area. Typically, renters are observed making the transition to homeownership. Because they have made this transition, their remaining transitions have been ignored in previous analyses. Given the number and nature of subsequent housing choices that occur in our sample, analysis along traditional lines can be misleading. We might expect substantial distortion of the potential wealth accumulation of the household. For example, assume that two households become owners for the first time in the third year of the observation period and that, subsequently, one of the households returns to rental housing while the other not only remains an owner but also moves to its second and third owned unit. Clearly, these two households have different wealth accumulation potential. Our probability model specification captures this difference; traditional models have not.

Our analysis does not explicitly consider transaction costs. Transaction costs are difficult to measure accurately because they have both a monetary component (the actual out-of-pocket cost of moving) and a nonmonetary component (physical and psychological cost) that vary among households, particularly those at different life-cycle stages. People who move more often (for example, up the ownership hierarchy) pay more in terms of out-of-pocket costs of moving but may have lower physical and psychological costs. In any event, the transaction costs associated with moving are not considered in the following text.

Another limitation of this work concerns our ability to capture housing wealth accumulation through the process of amortization. Because we do not have information on when loans were originated and the terms of the loans, we are unable to consider the specifics of amortization for each household in the sample. In lieu of calculating household-specific amortization, we do some basic calculations in exhibit 8 to illustrate the relative importance of amortization to each racial and income group analyzed in this study.

Modeling of Housing Probabilities: A Continuous Time Model of Housing Choice and Housing Wealth Accumulation

The model developed in Boehm and Schlottmann (2004) is an adaptation of the pathbreaking approach to duration analysis (event histories) discussed in Heckman and Walker (1986).[23] A major computational difference lies in the ability of observations (households) to transition backwards (to lower levels in the housing hierarchy) instead of continuously advancing to higher states. Simply for illustrative purposes, we briefly summarize this approach.

Let T represent the time until ownership is achieved for an individual household measured from some reference point. In this analysis, the reference point is the time at which the household head enters the sample (1984). In addition, let t represent calendar time measured from the same reference point. Thus, the likelihood that a household is still in its initial housing situation at calendar

[23] Developed over several years of research, Heckman and Walker's (1986) continuous time model approach corrects for fundamental conceptual limitations of regression analysis, simple models of the hazard, and so on.

time t is P = Pr(T ≥ t). This probability must be determined indirectly by first estimating the hazard function h, the likelihood that T ≥ t given that the household achieves a new housing status in a very small time interval from t to t + Δt. This hazard rate can be made a function of a set of time-varying exogenous variables.[24]

This function can be specified more formally in a very simple form as:

$$h(t) = \lim_{\Delta t \to 0} \frac{t \le T \le t + \Delta t) \mid \Pr(T \ge t}{\Delta t} \tag{1}$$

$$= \exp\,[\alpha + \beta X + \theta],$$

where X is a vector of exogenous variables at time t + Δt and β represents an associated vector of coefficients. The term θ represents a potentially complex form to capture duration dependence.[25]

Given this estimable hazard function, the cumulative probabilities of transitioning between housing states can be derived. Specifically, where m = the number of time periods, α_k=k/m, and α_{k-1}= (k-1)/m, the cumulative probability can be expressed as:

$$P = \sum_{k=1}^{m} \int_{\alpha_{k-1}}^{\alpha_k} h(t) \exp\left[-\int_0^t h(u)\,du\right] dt\,, \tag{2}$$

The cumulative probabilities in equation (2) follow over time the transitions shown in exhibit 1. For example, renters who have never owned a home at any point in time can either remain renters or make the transition only to first-time homeownership; however, other households can exit into several possible alternative housing states, such as renting or purchasing another home. At any point in time, any prior impact of homeownership on the wealth position of a household is taken into account.

Given the probabilities of housing transition and homeownership, it is necessary to construct both a profile of housing expenditures and changes in house values to derive estimates of housing wealth accumulation for comparison with total family wealth and nonhousing wealth. As noted previously, house appreciation is based on census tract information specific to each household's location. For an estimate of housing expenditures, we follow a generally accepted format in the literature for this estimation (the estimated equation is presented in the fourth section, Empirical Analysis). The housing expenditure equation was based on all homeowners in the sample in 1984 and those households that purchased a home during the 1984-to-1992 period (yielding 4,780 observations on housing expenditures).

[24] For details on the computational algorithm, contact the authors (tboehm@utk.edu or 865–974–1723). The Weibull form of the hazard function employed in this analysis is a special case of the unrestricted hazard in which the hazard is a function of not only a set of time-varying independent variables but also of t, the length of time since the household entered the sample.

[25] For a detailed discussion of model specification and model selection, see Heckman and Walker (1986).

Housing expenditures and house price appreciation are linked to each other and the housing choice probabilities in the following manner. Using the continuous time model (CTM) of housing choice, parameters are estimated that represent the impact of various household and location characteristics on the likelihood of a household making a transition between housing tenure states (renting to owning first home, first home to second home, first home back to renting, and so on) over time. Taking the mean values for the four household types (White or minority; high or low income), which will change over time, the cumulative probability that a household of a given type becomes a homeowner by a given point in time is calculated.[26] Parameters from the housing expenditure equation can be used to estimate the expenditure a household would be expected to make if it purchased a home in a given year. Again, these estimates would change as the average characteristics of the individuals in the sample and their location change over time. For example, as income increases, predicted expenditure would increase. Because appreciation is calculated, not estimated, we use census tract-level data between 1990 and 2000 to determine the average annual appreciation in median house value for the neighborhoods (tracts) in which the different household types reside.[27] Ultimately, housing wealth accumulation is based on the predicted probability of a household choosing homeownership, its predicted expenditure on owned housing, and the predicted appreciation in house value. Specifically, for a given housing type, we predict the likelihood that an average member of a particular group would become a homeowner in year 1 and the expenditure level they would be predicted to achieve. If they did purchase, they would experience appreciation of that house value for 9 years. In year 2 of the study period, they would have a different likelihood of ownership and a different predicted expenditure level, and they would experience appreciation for 8 years, and so on. Because these cumulative probabilities will differ over time for the racial and income groups under consideration (that is, in year 2, high-income Whites might have a 30-percent likelihood of being owners but low-income minorities might have only a 5-percent probability), housing wealth accumulation would be expected to be quite different due to the timing of transitions reflected initially in exhibit 1 and captured in the CTM model used to estimate the probabilities. The prediction of housing wealth accumulation across the groups becomes the weighted average of these estimates during the sample period, where the weights are the cumulative probabilities of ownership at particular points in time. Ultimately, the primary focus of this study is the predicted value of housing wealth accumulation compared with nonhousing wealth.

Empirical Analysis

Exhibit 5 lists the variables used in the following analyses. These variables reflect personal characteristics, educational attainment, and "regional" factors that have been suggested in the literature

[26] Note that these probability calculations can be quite complex because, at a given point in time, they involve the estimation of cumulative transition probabilities from preceding periods to the current time period. For the computational details regarding these probabilities, see Boehm and Schlottmann (2004): 125.

[27] Although the 1990-to-2000 Census period does not correspond exactly with our observation period of 1984 to 1992, it is the period of time during which house price appreciation could be effectively observed using recent census data, because 1980 tract information was not available in a form that could be effectively included in the analysis. Thus, the 1990-to-2000 Census period should provide a reasonable estimate of differential appreciation in the different neighborhoods (census tracts) in which the different income and racial cohorts lived during the sample period.

Exhibit 5

Variable Names and Definitions

Variable Name	Definition
Personal Characteristics	
Married	1 = Married; 0 = otherwise
Single Female	1 = Single female; 0 = otherwise
Single Male	1 = Single male; 0 = otherwise
Race of Head	1 = Household head is White; 0 = otherwise
Veteran	1 = Household head is a veteran; 0 = otherwise
Disability	1= Household head is disabled; 0 = otherwise
Family Size	Total number of household members
Number of Moves	Total number of moves made during the observation period
House Value	House value in dollars
Period	Year of observation (1 through 9)
Education	
Less than High School	1 = Less than high school graduate; 0 = otherwise
High School Graduate	1 = High school graduate; 0 = otherwise
Some Post-Secondary Education	1 = Training after high school, but not college graduate; 0 = otherwise
College Education or More	1 = College graduate or more; 0 = otherwise
Income and Wealth	
Total Wealth	Total wealth in thousands of dollars
Permanent Income	Permanent income in thousands of dollars
Transitory Income	Transitory income in thousands of dollars
Family Income	Total family income in hundred of dollars
Regions	
New England	1 = New England (ME-VT-NH-MA-CT-RI); 0 = otherwise
Middle Atlantic	1 = Middle Atlantic (NY-NJ-PA); 0 = otherwise
South Atlantic	1 = South Atlantic (DE-MD-VA-NC-SC-GA-FL-DC); 0 = otherwise
East North Central	1 = East North Central (MI-WI-IL-IN-OH); 0 = otherwise
East South Central	1 = East South Central (WV-KY-TN-MS-AL); 0 = otherwise
West North Central	1 = West North Central (ND-SD-NE-KS-MN-IA-MO); 0 = otherwise
West South Central	1 = West South Central (TX-OK-AR-LA); 0 = otherwise
Mountain	1 = Mountain (MT-ID-WY-NV-UT-CO-AZ-NM); 0 = otherwise
Pacific	1 = Pacific (CA-WA-OR-AK-HA); 0 = otherwise
Residence	
Large Metropolitan	1 = Largest city in MSA—population of 500,000 or more; 0 = otherwise
Other Metropolitan	1 = Largest city in MSA—population of 50,000 to 499,999; 0 = otherwise
Small City	1 = Largest city in county—population of 10,000 to 49,999; 0 = otherwise
Rural	1 = Largest city in county—population of less than 10,000 or no city in county; 0 = otherwise
Price/Cost Variables for Expenditure Equation	
Effective Interest Rate[a]	Expressed as a percent. If not in an MSA, the annual state average was used.
Index of Housing Prices	Specific to the market in which the household resides at a given time. Appreciation rate between 1990 Census and 2000 Census was used to adjust values (housing, annualized).
Annual Appreciation[b]	Annual appreciation for the market in which the housing choice was made. If not in an MSA, the county was used.

MSA = metropolitan statistical area.

[a] Data source: Federal Housing Finance Board.

[b] Data source: 1990 Census and 2000 Census.

as relevant to explaining tenure choice and housing expenditure level. Financial variables include family wealth and (estimated) permanent income.[28]

Housing Hierarchy Transitions: Cumulative Probabilities

Based on our discussion of the housing transitions in exhibit 1, we estimate seven separate transitions within the housing hierarchy.[29] Individual estimated coefficients for each of these seven transitions are shown in the appendix. Variables included in the equations comprise several factors: personal characteristics, such as age, marital status and gender, race, and educational attainment of the household head; other life-cycle factors such as household size; wealth and estimates of permanent income;[30] and size of the community where the household lives.[31]

Although the model estimates are not the research thrust of this article, influences on attaining homeownership and having further transitions in the housing hierarchy generally behave as expected. For example, consider the transition from renting to first-time homeownership. This specific transition in our model corresponds to the literature on first-time homeownership. Higher levels of education and permanent income increase the likelihood of purchasing a home. Conversely, the likelihood of homeownership declines with age and "single" status, particularly for female heads of households. For a discussion of the model itself, see Boehm and Schlottmann (2004).

The four panels of exhibit 6 (exhibits 6a through 6d) present the cumulative probabilities of homeownership by income status and minority status.[32] The cumulative probabilities represent the likelihood of having a given tenure status and depend on the relevant transition probabilities. For example, consider second home purchase for high-income White households. In year 1, this probability is 2.072 percent. This observation means that, by the end of year 1, the likelihood that the average high-income White household will move into a new home from a home it owned at the beginning of the observation period is just slightly more than 2 percent. In year 2, the total likelihood of moving to a second house by the end of the period is 4.848 percent. This probability reflects the fact that between the first and the second years, it would have been possible for households that were in their first owned home to make a transition to a second home and for households that might have achieved homeownership in the first year could make a transition back

[28] Permanent income is estimated from a set of independent variables that capture the household head's human capital, employment situation, and the region and size of the community where the family resides. Separate equations are estimated for minority households and White households in each year of the panel. For a similar approach, see Boehm and Schlottmann (2002). Our estimation techniques closely follow the procedure discussed in Ihlanfeldt (1980) for estimating permanent income for housing analysis using the PSID.

[29] The "same cell" households are, of course, not estimated (that is, those renters who remain renters).

[30] Note that a few of the transitions shown in the appendix used "family income" instead of "permanent income" and/or "wealth." This independent variable choice resulted from convergence problems in estimating the model. Family income is highly correlated with both of the other variables.

[31] One group of variables not included in the specification described previously is a set of control variables capturing the households' housing experience prior to the observation period. That is, we might expect housing history before 1984 to affect the households' choices during our observation period. We experimented with a number of variables to control for the households' tenure, housing expenditure, and mobility history. None of these variables proved to be statistically significant predictors and, therefore, were not retained in the final specification of the model.

[32] Note that the individual probabilities do not simply sum to an exact total due to the nonlinear computations.

to rental status or move to a third owned housing choice. Similar arguments can be made for other cumulative probabilities, and the overall likelihood of ownership in some form (the last column) is the sum of the preceding three cumulative probability columns. Consistent with other literature, note that low-income minority households have the lowest likelihood of attaining homeownership at the end of the 9-year period (0.39, or 39 percent, in exhibit 6d). Also note that one reason for this observation is the significant likelihood that low-income minority households may no longer be in their first home (0.21, or 21 percent, in exhibit 6d); that is, they may have made the transition back to renting (as shown in the second column of exhibit 6d). Traditional probability models cannot capture this dynamic (that is, the transition out of a tenure state previously attained).

Exhibit 6a

High-Income White Households—Transition Probabilities and Cumulative Probability of Homeownership

	Transition						
Year	From First-Time Home-ownership to Renting	From First-Time Home-ownership to Second Home Purchase	From Renting to First-Time Home-ownership	First-Time Home-ownership	Second Home Purchase	Third Home Purchase	Overall Home-ownership
1	0.005412	0.02724	0.06568	0.75142	0.02072	0.00000	0.77214
2	0.014572	0.05983	0.13357	0.73593	0.04848	0.00278	0.78718
3	0.021289	0.09949	0.20435	0.71761	0.08273	0.00707	0.80741
4	0.027032	0.14139	0.27408	0.69807	0.12032	0.01266	0.83105
5	0.030697	0.18286	0.34172	0.67994	0.15883	0.01946	0.85823
6	0.032949	0.22028	0.40573	0.66510	0.19494	0.02674	0.88678
7	0.036728	0.24930	0.46485	0.65432	0.22498	0.03339	0.91269
8	0.039515	0.27181	0.51870	0.64798	0.24965	0.03946	0.93708
9	0.041056	0.28837	0.56797	0.64600	0.26904	0.04488	0.95992

Exhibit 6b

High-Income Minority Households—Transition Probabilities and Cumulative Probability of Homeownership

	Transition						
Year	From First-Time Home-ownership to Renting	From First-Time Home-ownership to Second Home Purchase	From Renting to First-Time Home-ownership	First-Time Home-ownership	Second Home Purchase	Third Home Purchase	Overall Home-ownership
1	0.00979	0.01642	0.02724	0.57566	0.00951	0.00000	0.58517
2	0.02476	0.03562	0.05920	0.56929	0.02204	0.00048	0.59182
3	0.04046	0.05892	0.09334	0.56106	0.03766	0.00123	0.59994
4	0.05652	0.08368	0.12827	0.55210	0.05511	0.00222	0.60944
5	0.07006	0.10918	0.16397	0.54450	0.07393	0.00349	0.62192
6	0.08311	0.13104	0.19898	0.53900	0.09125	0.00479	0.63504
7	0.09287	0.15028	0.23342	0.53669	0.10740	0.00616	0.65024
8	0.10056	0.16515	0.26664	0.53759	0.12100	0.00738	0.66596
9	0.10305	0.17886	0.29950	0.54202	0.13391	0.00882	0.68475

As shown in exhibit 6, low-income households generally have more difficulty purchasing a second home than other income groups do. At the end of the observation period, the cumulative probability of being in a second home is just 17.3 percent for low-income White households and only 7.1 percent for low-income minority households. In other words, first home purchase tends to be the dominant homeownership activity. In addition, note the significant likelihood that a high-income minority household might make the transition back to renting by the end of the period (10.3 percent; see the second column of exhibit 6b). This likelihood, which interferes with overall homeownership, may partly reflect the significant losses shown in exhibit 4 for nonhousing wealth among the lower quartile of high-income minority households.

Exhibit 6c

Low-Income White Households—Transition Probabilities and Cumulative Probability of Homeownership

	Transition						
Year	From First-Time Home-ownership to Renting	From First-Time Home-ownership to Second Home Purchase	From Renting to First-Time Home-ownership	First-Time Home-ownership	Second Home Purchase	Third Home Purchase	Overall Home-ownership
1	0.01419	0.02227	0.03129	0.49593	0.01110	0.00000	0.50703
2	0.03321	0.04893	0.06994	0.49255	0.02711	0.00136	0.52102
3	0.05218	0.08018	0.11185	0.48854	0.04683	0.00365	0.53901
4	0.07063	0.11290	0.15519	0.48478	0.06914	0.00665	0.56057
5	0.08641	0.14539	0.19904	0.48270	0.09309	0.01047	0.58627
6	0.10046	0.17379	0.24217	0.48318	0.11615	0.01460	0.61393
7	0.11058	0.19856	0.28424	0.48690	0.13802	0.01894	0.64386
8	0.11870	0.21740	0.32448	0.49364	0.15688	0.02303	0.67355
9	0.12406	0.23148	0.36279	0.50318	0.17293	0.02689	0.70300

Exhibit 6d

Low-Income Minority Households—Transition Probabilities and Cumulative Probability of Homeownership

	Transition						
Year	From First-Time Home-ownership to Renting	From First-Time Home-ownership to Second Home Purchase	From Renting to First-Time Home-ownership	First-Time Home-ownership	Second Home Purchase	Third Home Purchase	Overall Home-ownership
1	0.02330	0.01560	0.01525	0.27882	0.00435	0.00000	0.28317
2	0.05234	0.03417	0.03512	0.27989	0.01069	0.00022	0.29079
3	0.08281	0.05560	0.05702	0.28123	0.01851	0.00061	0.30034
4	0.11367	0.07765	0.07996	0.28303	0.02741	0.00113	0.31157
5	0.14203	0.09913	0.10346	0.28609	0.03703	0.00180	0.32492
6	0.16748	0.11790	0.12710	0.29082	0.04651	0.00256	0.33990
7	0.18775	0.13418	0.15062	0.29760	0.05572	0.00342	0.35673
8	0.20319	0.14713	0.17378	0.30639	0.06413	0.00434	0.37486
9	0.21458	0.15655	0.19652	0.31700	0.07145	0.00522	0.39368

Housing Expenditures

The housing expenditure equation was based on all homeowners in the study in 1984 and those households that purchased a home during the 1984-to-1992 period (yielding 4,780 observations on housing expenditures). Exhibit 7 shows the housing expenditure equation.[33] Because the estimated relationship for housing expenditures follows a generally accepted format in the literature for these estimations, and our estimates are in line with the literature, we comment only briefly on these estimates. One variable that warrants further discussion is our total wealth measure included in the Panel Study of Income Dynamics data. This variable combines both housing and nonhousing wealth. As such, it includes housing wealth accumulated from previous ownership experience by households in the sample. Thus, previous ownership and the subsequent housing wealth accumulation can affect current expenditure decisions that the households in our sample made.

Exhibit 7

Housing Expenditure Regression

Variable Name	Mean	Regression Coefficient	t-Statistic
Intercept	1	71648.00	8.74
Single Female	0.08389	– 8578.34	– 3.08
Single Male	0.16004	– 5161.94	– 2.19
Age	42.99958	428.04	6.97
High School Graduate	0.19100	5563.97	2.45
Some Post-Secondary Education	0.33661	10975.00	5.17
College Education or More	0.23117	35065.00	13.29
White	0.75900	13109.00	6.71
Family Size	3.11946	1647.93	2.81
Veteran	0.30021	– 1774.44	– 1.07
Disability	0.16151	– 39.67	– 0.02
Other Metropolitan	0.35335	– 7652.91	– 3.49
Small City	0.27929	– 13071.00	– 5.53
Rural	0.19916	– 18718.00	– 6.80
Total Wealth	119.09684	2.05	2.76
Permanent Income	29.63840	799.75	14.26
Transitory Income	111.87864	90.57	35.99
Index of Housing Prices	$135,280	0.05	6.19
Annual Appreciation	0.05095	26418.00	1.94
Effective Interest Rate	11.17808	– 4882.38	– 9.66
Middle Atlantic	0.10042	– 13711.00	– 3.25
South Atlantic	0.21967	– 18818.00	– 4.69
East North Central	0.16757	– 28178.00	– 6.92
East South Central	0.10167	– 26941.00	– 6.22
West North Central	0.09038	– 29720.00	– 6.87
West South Central	0.10753	– 28481.00	– 6.91
Mountain	0.04833	– 22423.00	– 4.63
Pacific	0.12050	8190.38	1.96
Number of Observations	4,780		
Adjusted R^2	0.486		

[33] Based upon our estimating equation for permanent income (see footnote 28), an estimate of transitory income was included as a regressor in the housing expenditure equation.

In addition to the demographic variables, the measures of wealth and income, broad regional identifiers, and geographically specific identifiers enabled us to include measures of housing prices, housing price appreciation, and interest cost not normally available when the PSID is used to estimate a housing expenditure equation. For each market (metropolitan statistical area [MSA] or county), the census tract data are divided into those tracts with median incomes above the area median income (high-income tracts) and those with median incomes below the area median income (low-income tracts). Median house prices and house price appreciation are computed for both the low-income and high-income subsamples. For the market in which a household made a housing expenditure, each household was assigned as high income or low income, based on the median income in that market in that year as compared with the household's income.[34] These two variables generally are significant and have the positive signs, as one might expect. In markets in which housing prices are generally higher, households spend more on housing. All things being equal, higher rates of appreciation should produce increased investment demand for housing. The coefficient for this variable was also positive and statistically significant, implying that higher levels of housing expenditure are associated with higher levels of appreciation. In addition, data from the Federal Housing Finance Board on the effective interest rate in different areas (states or MSAs) over time were added to the primary data set. As expected, higher interest rates led to lower levels of housing expenditure. In summary, for this type of data (that is, household level), the model explains housing expenditure levels quite well, with an adjusted R^2 of 0.486. Given these estimations, the housing component of family wealth accumulation can be calculated.

Wealth Accumulation: Appreciation and Amortization

The primary purpose of estimating the tenure choice and housing expenditure models outlined previously was to explore the role of housing in wealth accumulation. The dynamics of housing choice available from this approach enable a more accurate assessment of the timing of housing choice and its impact on family wealth. In this section we provide estimates of wealth accumulation by income and race (and the full sample) during the 9-year period based on the estimated equations discussed previously.[35]

We constructed wealth estimates for households in the sample in the following way. First, using the coefficients from the housing choice hierarchy, we estimated the cumulative probability of homeownership for every household (whether it is actually renting at a given point in time). In general, one would expect these probabilities to increase over time (and they do), but it is important to

[34] Note that this criterion is slightly different than that used to define the low-income subgroup in the estimate of the housing choice hierarchy described earlier. In that case, due to the intertemporal nature of the analysis and subsequent probability calculations, an income subgroup had to be established at a particular point in time and maintained throughout the analysis. In this case, because we examined purchases at a particular point in time in a pooled time-series, cross-section analysis, we were able to designate households as high income or low income in a given market at a particular point in time when they made a housing expenditure decision.

[35] The basic heuristic of these estimates is as follows. Based on the housing expenditures equation, an estimate of house value is calculated in each year from 1984 to 1992. Then, for *each* household in *each* year, house value is adjusted by the probability of ownership. The *weighted* average house values are then calculated for each subgroup (where weights are the ownership probabilities). Estimated house values for each year, and other mean values, are used to generate annualized changes in house value.

note that they reflect the likelihoods of transitions out of homeownership into rental status as well as movement up the ownership hierarchy to a second or third home. Next, in each period for every household (whether it bought a home or not) we computed its predicted level of expenditure using the coefficients from the housing expenditure equation that we estimated. Finally, we needed to calculate appreciation in house prices. As noted earlier, because actual appreciation cannot be observed, we used information from the census tracts (neighborhoods) in which households have made housing choices to approximate the appreciation. Specifically, we used the annual average appreciation in the median owner-occupied house value in the tracts where the households in the sample lived between the 1990 Census and the 2000 Census to approximate actual appreciation.[36] The estimated average annual dollar value of appreciation is a weighted average that depends on when it was assumed that a purchase took place. That is, if the household made a purchase in year 1, that expenditure level would experience appreciation for 8 years. If the household made a purchase in year 2, that expenditure level would experience appreciation for 7 years, and so on. These results are provided in exhibit 8.[37]

Exhibit 8

Housing Wealth Accumulation

Income/ Racial Group	Average Annual Housing Wealth Appreciation			Average House Value		
	Lower Quartile ($)	Median ($)	Upper Quartile ($)	Lower Quartile ($)	Median ($)	Upper Quartile ($)
High-income White	1,465	4,460	8,771	74,929	97,030	122,891
High-income minority	1,175	3,359	6,687	53,829	70,094	93,439
Low-income White	833	2,729	6,148	9,859	64,291	88,891
Low-income minority	426	1,712	4,299	29,096	42,454	63,012

Income/ Racial Group	Amortization Illustration*					
	Year 1			Year 9		
	Lower Quartile ($)	Median ($)	Upper Quartile ($)	Lower Quartile ($)	Median ($)	Upper Quartile ($)
High-income White**	304	393	498	4,405	5,704	7,224
High-income minority**	218	284	379	3,164	4,120	5,463
Low-income White***	213	275	380	3,094	3,989	5,516
Low-income minority***	124	182	269	1,805	2,634	3,910

** Uses average house value, a 30-year mortgage, an 11-percent annual interest rate, and monthly compounding.*

*** Assumes a 10-percent downpayment.*

**** Assumes a 5-percent downpayment.*

[36] Note that, although 1980 Census data could have been examined in addition to the 1990 and 2000 Census information, it was not available in a format that would have made it viable to extract information for the right tracts and add them to the data set.

[37] The housing values in exhibit 8 differ from those in exhibit 3 because values in exhibit 8 are based on sample households rather than census tracts.

The top panel of exhibit 8 is based purely on appreciation in house value for households in our sample. Comparing these results (for median values) with nonhousing wealth accumulation presented in exhibit 4 suggests four observations:

1. For high-income White households, housing is an important asset and a larger part of wealth accumulation than nonhousing wealth is. For high-income minority households, the role of housing wealth is much more important compared with nonhousing wealth, given the households' low annual increases in nonhousing wealth. Specifically, for high-income White households, median average annual housing wealth appreciation is $4,460 but nonhousing wealth accumulation during the same period is only $2,650 (exhibit 4). For, low-income minority households, these figures are $1,712 and $0, respectively.

2. For lower income households, nonhousing wealth is very small, with significant dissavings for many lower income minority households. For low-income White households, median annual average accumulation is only $300; for low-income minorities, it is approximately $0. In each case, the bottom quartile of households experiences a negative average annual change in nonhousing wealth (see exhibit 4). Thus, to a significant extent, housing wealth and total wealth are synonymous for lower income households. This observation is particularly true for minority households.

3. The implied average annual appreciation (in nominal dollars) in house value for lower income minority households is the lowest in our sample (see exhibit 8); however, it is the only significant source of wealth accumulation for these households (compared with nonhousing wealth information presented in exhibit 4).

4. Comparing the lower quartiles in exhibit 4 with those in exhibit 8, those households in the lower quartile of housing wealth accumulation clearly do better with homeownership as a manner of wealth accumulation compared with households in the lower quartile of nonhousing wealth.

Given the low (or nonexistent) nonhousing wealth accumulation for lower income households, the lower panel of exhibit 8 is particularly important because it demonstrates another element of wealth accumulation associated with homeownership. These calculations illustrate the type of forced savings associated with amortization per se. It is impossible to determine where households that entered our sample as owners are in the amortization schedule. Therefore, average annual amortization is considered at the beginning and middle years of a 30-year loan for the average annual housing values associated with a particular household type.[38] The importance of these calculations for lower income households is obvious; this observation is particularly true for minority households. Specifically, for low-income minority households, $2,634 is the median total estimated amortization during the observation period. On an annual basis, this figure averages out to approximately $293 for households whose median annual nonhousing wealth accumulation is $0, this amortization represents a substantial amount of "forced savings" resulting from mortgage repayment.

[38] Other assumptions are shown in exhibit 8.

Taken together, in our view, exhibit 8 and the other reported results present a strong argument that—

- Owned housing is an important means of wealth accumulation.
- Housing as wealth is particularly important for minority and lower income households.
- The implicit movement of households up the housing hierarchy only adds to the (positive) magnitude of these effects.[39]

Conclusions

This article has examined the role of housing choice within the housing hierarchy on family wealth accumulation. In the housing policy literature, this examination represents the first time a dynamic model of housing choice has been used to estimate potential wealth accumulation from owned housing. In addition, to our knowledge, it is the first time the geographically detailed version of the PSID has been used to locate households within census tracts to identify the relative differences in house price appreciation that might be expected to occur in different high- and low-income neighborhoods in different locations across the country.

Our results illustrate the complex nature of housing choice for households, particularly those with lower incomes. Rather than simply focusing on time to homeownership, we find a high likelihood that lower income households will "slip" back to renting after attaining homeownership. For minority households, this probability is quite high. In addition, the progression beyond first-time homeownership is quite limited for lower income households. Indeed, for minority households, first-time homeownership is effectively the only step observed in the housing hierarchy (that is, they do not trade up as much as nonminorities do).

For lower income households, nonhousing wealth accumulation is, at best, minor and, for minority households, often negative. Thus, during our 9-year study period, owned housing has been an important means of wealth accumulation. Indeed, our results may be broadly interpreted for lower income households as implying that housing wealth is synonymous with total wealth.

These results tend to support public policies aimed at both increasing homeownership opportunities in general and those policies that focus on homeownership for lower income households. Even though homeownership is not a guarantee of successful wealth accumulation,[40] household wealth appears to be positively impacted by homeownership. This conclusion is reinforced with comparisons to accumulation of nonhousing wealth. Wealth accumulation for low-income and minority households, although low, increases substantially through homeownership. In this regard, current initiatives to increase low-income homeownership seem both desirable and valid. Moreover, our work suggests that policies designed to ensure that households remain homeowners after achieving

[39] Specifically, as households make the transition from one owned home to the next, the value typically increases, thus increasing the base on which appreciation is calculated. One factor contributing to that increase in expenditure is total wealth, which includes housing wealth. Housing wealth is a function of past housing price appreciation and amortization during the periods when the household owned previously.

[40] In fact, we observe a small percentage of instances in which all of our household types lose money on their homes (see exhibit 2).

homeownership (rather than reverting to rental tenure) and policies that enable households to make the transition to higher valued owned units over time substantially increase the potential for housing wealth accumulation. These conclusions about the value of owned housing are reinforced when the positive social impacts of homeownership on households are also considered.

Appendix
Estimated Coefficients: Transitions in the Housing Hierarchy

Exhibits A-1a and A-1b present the estimated coefficients for each of the seven transitions from the model described in the third and fourth sections of this article.

Exhibit A–1a

Housing Hierarchy Transition Coefficients—Renting to Various Ownership Tenures

Variable Name	From Renting to First-Time Homeownership (1)		From Renting to Second-Time Homeownership (2)		From Renting to Third-Time Homeownership (3)	
	Estimate	t-Statistic	Estimate	t-Statistic	Estimate	t-Statistic
Intercept	0.1292	0.570	– 4.0710	– 8.531	– 6.1544	– 4.253
Personal Characteristics						
Single Female	– 0.6617	– 5.374	0.3682	1.923	0.1622	0.338
Single Male	– 0.4202	– 3.940	– 0.6797	– 2.950	– 0.8944	– 1.482
Age	– 0.0289	– 8.174	0.0165	2.704	0.0203	1.159
White	0.3741	4.451	0.7752	4.355	1.0759	2.203
Veteran	– 0.1156	– 1.292	0.1091	0.678	0.0550	0.142
Disability	0.0446	0.411	– 0.1997	– 1.113	– 0.7642	– 1.238
Family Size	– 0.1422	– 4.931	0.1053	1.940	0.0260	0.179
Income and Wealth						
Permanent Income	0.0239	7.348	0.0045	0.642	NA	NA
Total Wealth	0.0006	1.265	0.0011	2.687	NA	NA
Family Income[a]	NA	NA	NA	NA	0.0109	2.280
Residence						
Other Metropolitan	0.2395	2.567	0.1844	0.960	0.6832	1.173
Small City	0.2796	2.622	0.3028	1.427	0.8123	1.389
Rural	0.4710	3.989	0.7502	3.533	1.0148	1.647
Education						
High School Graduate	0.1362	1.223	– 0.1034	– 0.473	0.0222	0.040
Some Post-Secondary Education	0.2930	2.699	0.1560	0.766	– 0.1704	– 0.328
College Education or More	0.2523	1.857	0.1988	0.758	– 0.1306	– 0.224
Time in State						
Gamma 1	0.2548	5.258	– 0.3010	– 2.897	– 0.4226	– 1.231
Gamma 2[b]	NA	NA	NA	NA	NA	NA
f[c]	NA	NA	NA	NA	– 0.2432	– 0.309

NA = data are not available.

[a] As might be expected, Permanent Income and Total Wealth are highly correlated. For certain transitions, this collinearity prevented the model from converging. In these instances, Family Income (which is highly correlated with both Permanent Income and Total Wealth) was substituted for these two variables in the estimation.

[b] "NA" for Gamma 2 indicates that the duration term was specified as Weibull rather than quadratic for the particular transition in question.

[c] "NA" for f indicates that it was not possible to estimate the nonparametric heterogeneity parameter for the particular transition in question.

Exhibit A–1b

Housing Hierarchy Transition Coefficients—Ownership to Renting and Ownership to Ownership (1 of 2)

Variable Name	From First-Time Homeownership to Renting (1)		From Second-Time Homeownership to Renting (2)		From First-Time Homeownership to Second-Time Homeownership (3)		From Second-Time Homeownership to Third-Time Homeownership (4)	
	Estimate	t-Statistic	Estimate	t-Statistic	Estimate	t-Statistic	Estimate	t-Statistic
Intercept	1.6585	1.555	1.2376	2.039	– 0.1421	– 0.438	– 0.5654	– 0.710
Personal Characteristics								
Single Female	0.9790	4.782	0.8109	3.042	0.3308	2.171	0.4956	1.869
Single Male	0.5400	3.070	0.7464	2.329	– 0.1612	– 1.113	– 0.1968	– 0.527
Age	– 0.0368	– 6.229	– 0.0254	– 3.150	– 0.0405	– 10.629	– 0.0149	– 1.766
White	0.2468	1.910	– 0.1282	– 0.561	0.4545	3.984	0.7054	2.390
Veteran	0.2431	1.836	0.3636	1.641	– 0.0052	– 0.057	– 0.2252	– 1.212
Disability	0.0487	0.359	– 0.0222	– 0.089	0.0854	0.693	– 0.0545	– 0.212
Family Size	0.1081	2.590	– 0.0291	– 0.398	– 0.0515	– 1.555	– 0.1637	– 2.141
Income and Wealth								
Permanent Income	– 0.0313	– 5.553	– 0.0244	– 2.767	NA	NA	0.0018	0.242
Total Wealth	– 0.0037	– 11.766	– 0.0020	– 3.955	NA	NA	– 0.0001	– 0.374
Family Income[a]	NA	NA	NA	NA	0.0010	1.235	NA	NA
Residence								
Other Metropolitan	– 0.0912	– 0.607	– 0.0095	– 0.035	– 0.0799	– 0.710	– 0.3751	– 1.683
Small City	– 0.1516	– 0.929	– 0.2768	– 0.902	– 0.0668	– 0.567	– 0.2056	– 0.881
Rural	– 0.5092	– 2.835	0.1193	0.397	– 0.1363	– 1.039	– 0.2280	– 0.839
Education								
High School Graduate	– 0.4422	– 2.547	– 0.4714	– 1.437	– 0.3260	– 2.382	0.1520	0.455
Some Post-Secondary Education	– 0.1271	– 0.778	– 0.3357	– 1.265	– 0.0435	– 0.362	0.3673	1.200
College Education or More	0.2155	1.024	– 0.0327	– 0.100	0.1953	1.542	0.5532	1.578

Exhibit A–1b

Housing Hierarchy Transition Coefficients—Ownership to Renting and Ownership to Ownership (2 of 2)

Variable Name	From First-Time Homeownership to Renting (1)		From Second-Time Homeownership to Renting (2)		From First-Time Homeownership to Second-Time Homeownership (3)		From Second-Time Homeownership to Third-Time Homeownership (4)	
	Estimate	t-Statistic	Estimate	t-Statistic	Estimate	t-Statistic	Estimate	t-Statistic
Time in State								
Gamma 1	2.8761	3.200	0.1726	1.144	3.3793	5.564	0.0590	0.472
Gamma 2[b]	– 5.5328	– 3.890	NA	NA	– 6.6932	– 5.722	NA	NA
f [c]	– 1.9975	– 3.780	NA	NA	NA	NA	0.1306	0.283

NA = data are not available.

[a] *As might be expected, Permanent Income and Total Wealth are highly correlated. For certain transitions, this collinearity prevented the model from converging. In these instances, Family Income (which is highly correlated with both Permanent Income and Total Wealth) was substituted for these two variables in the estimation.*

[b] *"NA" for Gamma 2 indicates that the duration term was specified as Weibull rather than quadratic for the particular transition in question.*

[c] *"NA" for f indicates that it was not possible to estimate the nonparametric heterogeneity parameter for the particular transition in question.*

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