PD&R

Cityscape

A Journal of Policy Development and Research

Homeownership Experience of
Low-Income and Minority Households
Volume 10, Number 2 • 2008

U.S. Department of Housing and Urban Development
Office of Policy Development and Research

The goal of *Cityscape* is to bring high-quality original research on housing and community development issues to scholars, government officials, and practitioners. *Cityscape* is open to all relevant disciplines, including architecture, consumer research, demography, economics, engineering, ethnography, finance, geography, law, planning, political science, public policy, regional science, sociology, statistics, and urban studies.

Cityscape is published three times a year by the Office of Policy Development and Research (PD&R) of the U.S. Department of Housing and Urban Development (HUD). Subscriptions are available at no charge and single copies at a nominal fee. The journal is also available on line at http://www.huduser.org/periodicals/cityscape.html.

PD&R welcomes submissions to the Refereed Papers section of the journal. Our referee process is double blind and timely, and our referees are highly qualified. The managing editor will also respond to authors who submit outlines of proposed papers regarding the suitability of those proposals for inclusion in *Cityscape*. Send manuscripts or outlines to Cityscape@hud.gov.

Opinions expressed in the articles are those of the authors and do not necessarily reflect the views and policies of HUD or the U.S. government.

Visit PD&R's website, www.huduser.org, to find this publication and others sponsored by PD&R. Other services of HUD USER, PD&R's research information service, include listservs, special interest and bimonthly publications (best practices and significant studies from other sources), access to public use databases, and a hotline (800–245–2691) for help with accessing the information you need.

Contents

Guest Editor's Introduction

William Reeder
U.S. Department of Housing and Urban Development

This issue of *Cityscape* is the second of a two-part series that focuses on a selection of recent research on low-income and minority homeownership presented at symposiums that the U.S. Department of Housing and Urban Development, Office of Policy Development and Research, sponsored in 2005 and 2006. The first part of the series appeared in an issue of *Cityscape* (volume 9, number 2) released in the summer of 2007 that focused on identifying and understanding the major causes of the racial and income gaps in homeownership. That research confirmed that downpayment and closing cost constraints continue to be the greatest obstacles to homeownership for many households and that efforts such as the American Dream Downpayment Initiative and more reliable disclosures of loan terms and settlement fees to aid comparison-shopping could help households reduce these hurdles.

This second part of the series looks beyond the initial challenge of becoming a homeowner and examines the homeownership experience of low-income and minority households over time. Although much attention has been devoted to achieving homeownership, far less has been directed to the homeownership experiences of lower income and minority households after they achieve homeownership and whether their experiences differ from those of higher income households. For example, do the benefits of homeownership for low-income households differ from the traditional benefits generally found for homeowners? How do their experiences in terms of housing, family, and financial outcomes compare with those of similarly situated renters? Can lower income households sustain homeownership? Are lower income or minority households more likely to purchase older houses, and does the purchase of older homes lead to higher repair and maintenance costs? Do the houses that low-income or minority households buy appreciate in value at the same rate as houses purchased by higher income households? The articles in this issue address these questions and others.

In This Issue

The articles in this issue of *Cityscape* confirm that low-income and minority households are making good initial choices in the homes they buy and that they are obtaining good-quality housing in decent neighborhoods. Lower income and minority homeowners are as likely as others to gain from home value appreciation and reap the traditional benefits of homeownership; however, a higher proportion of these households face higher payment burdens and are more likely than higher income and nonminority households to return to being renters.

The issue begins with Christopher E. Herbert and Eric S. Belsky's review and synthesis of literature in "The Homeownership Experience of Low-Income and Minority Households: A Review and Synthesis of the Literature," which was redrafted to note recent experience through 2007. Their review reveals that lower income and minority homeowners are as likely as others to benefit from homeownership and just as likely as other owners to see their homes appreciate in value. Moreover, the authors find that there is some evidence that homeowners benefit from improved psychological and physical health and their children exhibit a greater degree of success along various dimensions.

Herbert and Belsky also examine the topic of "Initial Housing Choices Made by Low-Income and Minority Homebuyers," as reflected in tabulations from the American Housing Surveys (AHSs) from 1991 through 2003, with some information on housing costs and mortgage choices updated from the 2005 AHS. They find that the housing lower income homebuyers occupy and the neighborhood conditions they experience are similar to the housing and neighborhoods of the average U.S. household and better than the housing and neighborhoods of lower income renters. The authors also find indications of an increase in the number of buyers exposed to the risk of default, particularly as reflected in a growing share of low-income first-time homebuyers who are devoting more than one-half of their income to housing costs. On a positive note, Herbert and Belsky find that low-income and minority buyers do not appear to face significantly higher interest rates at the time of purchase compared with other buyers.

The third article, "Housing Tenure, Expenditure, and Satisfaction Across Hispanic, African-American, and White Households: Evidence From the American Housing Survey," by Thomas P. Boehm and Alan Schlottman, combines the 1998, 2002, and 2004 metropolitan statistical area samples of the AHS to examine the housing costs and levels of satisfaction with both the dwelling and neighborhood quality experienced by Hispanic, African-American, and White renter, owner, and recent-mover households. The authors find that homeowners clearly view their dwellings and neighborhoods more highly than is true for renters and that low-income households, particularly Hispanics, have the largest differentials between renters' and owners' average rankings of neighborhood and dwelling structural quality. Boehm and Schlottman also find that Hispanic households, particularly those with low incomes, have higher levels of mortgage debt and monthly housing expense than is true of White households, despite having lower house values. They note, however, that the mortgage debt for Hispanic recent movers is much closer to that of their White counterparts, raising the question of whether the differentials in terms and use of mortgage financing—for example, junior mortgages, home equity loans, refinancing loans, less financial expertise in obtaining loans—might explain the wider differentials generally observed.

Boehm and Schlottmann also consider the experience of homeowners living in manufactured housing in the article, "Is Manufactured Owned Housing a Good Alternative for Low-Income Households? Evidence From the American Housing Survey." Using 1993-through-2001 AHS data, they explore the merits of manufactured owned housing in comparison with rental housing and traditional owned housing as a housing option for low-income families. The authors find that, contrary to stereotypical notions, manufactured housing has higher average quality rankings across both the neighborhood and structural dimensions of housing services when compared with rental units (even when controlling for metropolitan and nonmetropolitan location). Moreover, factors that contribute to lower structural quality or lower neighborhood quality and changes in those

quality measures over time are similar between manufactured owned housing and traditional owned housing. In addition, they find that when the land is owned, manufactured housing can yield appreciation similar to that of conventional housing. The authors note significant variation in rates of appreciation across manufactured units, however, which may indicate these homes have greater investment risk than is true of traditional owned housing.

Finally, Boehm and Schlottmann examine the importance of housing and nonhousing sources of wealth accumulation for low-income households in the article, "Wealth Accumulation and Homeownership: Evidence for Low-Income Households." The authors use a geographically detailed version of the Panel Study of Income Dynamics in combination with 1990 and 2000 Census tract data to identify the relative differences in house price appreciation that might be expected to occur in different high-income and low-income neighborhoods in different locations across the country over a 9-year period. They find that, even though homeownership is not a guarantee of successful wealth accumulation, homeownership in general contributes positively to household wealth and may be the only source of wealth for low-income households for which nonhousing wealth accumulation is at best minor. They note, however, that owners often made the transition back to renting and, particularly for low-income minority households, did not regain owner-occupied housing during the period studied.

Conclusion

Home purchases by low-income households increased dramatically over the past two decades because of more flexible underwriting and expanded homeownership programs and as a result of a booming economy and historically low interest rates. The articles in this issue of *Cityscape* confirm that low-income and minority households have been making good initial choices in the homes they buy and that they are obtaining good-quality housing in decent neighborhoods. Lower income and minority homeowners are as likely as other homeowners to gain from house value appreciation and reap the traditional benefits of homeownership. Perhaps not surprisingly, the evidence also confirms that a higher proportion of these households face higher payment burdens, which make them more likely than higher income and nonminority households to return to being renters. This finding underscores how critical the preparation for and timing of home purchase and the choice of mortgage products can be for the long-term success of homeownership, particularly for those with little margin for error. It highlights the importance of homeownership counseling and other programs aimed at helping households make the right choices before they purchase a home and helping them maintain homeownership after they purchase. The finding also underscores the importance and shared responsibility of realistic homebuyers, considerate and scrupulous industry practitioners, and appropriate regulation for successful homeownership. One need only look to the recent upheaval in the housing and financial markets to observe the severe damage that can follow when one or more of these elements are missing.

The Homeownership Experience of Low-Income and Minority Households: A Review and Synthesis of the Literature

Christopher E. Herbert
Abt Associates Inc.

Eric S. Belsky
Harvard University

Abstract

The purpose of this article is to review and synthesize literature about low-income and minority households' experience with homeownership and to assess the extent to which homeownership is likely to benefit these groups. We present this work in the interest of supporting the development of effective policies for promoting and supporting homeownership and of addressing the concerns raised by those who fear that too great an emphasis is placed on promoting homeownership. Although several recent reviews of the literature have assessed the empirical evidence on the benefits of homeownership, this study is unique in that it explicitly focuses on what is known about low-income and minority households' experience with homeownership.

Introduction

During the latter half of the 1990s and the first half of the 2000s, the economy, capital market innovations, industry outreach, and government regulation and policy all converged to drive significant increases in the national homeownership rate. The gains were broad based, lifting the rates of low-, middle-, and high-income households, young and old households, and White and minority households. Between 1993 and 2004, homeownership rates among very low-income households, African Americans, and Hispanics increased by 6.4, 7.7, and 8.7 percentage points, respectively

(Herbert et al., 2005). These sharp increases in homeownership were all the more remarkable coming as they did on the heels of more than a decade of stagnant or declining homeownership rates (Green, 1996). Literally, millions of these households were added to the ranks of homeowners.

By 2006, lenders had substantially relaxed a variety of underwriting constraints that had made it particularly difficult for low-income households to achieve homeownership. Low downpayment loans, loans to borrowers with tarnished credit histories or thin credit records, lower documentation of income and asset requirements, lower reserve requirements, and products that lowered initial payments at the risk of higher payments later all helped low-income households purchase homes.

All these gains have at once elevated the importance of understanding the financial and social effects of homeownership on low-income households *and* limited the extent to which lessons from the past can be confidently extrapolated to the future. The likely prospective experience of low-income homeowners who have bought homes or refinanced their mortgages since 2000 is especially difficult to divine because the types of mortgage products, lending practices, pricing, and underwriting they encountered were fundamentally different from those encountered by homeowners who bought homes or refinanced before 2000. Nevertheless, with foreclosure rates now at record levels, it seems clear that new loan products, extended with more lax underwriting, may have imposed an excessive amount of risk on low-income homeowners who bought or refinanced their homes in the 2000s, especially after 2003. In addition, retrenchment in lending standards, which occurred in 2007 in response to unexpectedly poor subprime mortgage performance, may result in even greater deviations from the past experience of the low-income homeowners in housing downturns.

The purpose of this article is to review the literature on the financial and social effects of low-income homeownership. In 2003, Retsinas and Belsky characterized low-income homeownership as "the unexamined goal" and cautioned against slavish dedication to increasing homeownership for low-income individuals without first weighing the evidence of the risks and returns involved, considering the conditions under which low-income individuals purchased and financed homes, and being concerned about the sustainability of homeownership. Indeed, even before the current foreclosure crisis, a growing chorus expressed concern in recent years that the emphasis on homeownership may have gone too far (Apgar, 2004; Baker, 2005; Coy, 2004; Kosterlitz, 2004; Pitcoff, 2003; Shlay, 2004). A common theme in the critique is the manner in which homeownership has been pursued; in some cases, it has made families worse off. Support for this point of view is emerging from record numbers and shares of homes entering foreclosure in 2007. The increase is being driven by subprime loans, which are disproportionately loans to low-income and minority borrowers (Apgar, Bendimerad, and Essene, 2007). Although researchers from the Federal Reserve Bank of Boston recently concluded that foreclosures in the range of 20 percent of all subprime purchase loans made in Massachusetts between 1989 and 2007 may be likely (Gerardi, Shapiro, and Willen, 2007), even this prediction is an extrapolation from a period largely without significant home price declines or a significant relaxation of underwriting standards. Furthermore, even if buyers are able to maintain their housing payments, they may be stuck in poor-quality housing or may devote an excessive share of their income to housing. In short, critics have come to question whether many low-income and minority buyers have actually been able to realize the wealth accumulation, residential stability, and improved life outcomes for children that homeownership has promised.

This article takes stock of what is known and not known about the experiences of low-income and minority homeowners. It also speculates on what may change when moving forward as a consequence of the surge in subprime and low- and no-documentation lending and of exotic mortgages such as payment-option, interest-only, and deeply discounted adjustable-rate mortgages with initial fixed terms of 2 or 3 years. This review differs from several fairly comprehensive literature reviews that assess the benefits and costs of homeownership in general (Dietz and Haurin, 2003; McCarthy, Van Zandt, and Rohe, 2001; Rohe, McCarthy, and Van Zandt, 2002) in its explicit focus on low-income and minority homeowners. We argue that public policy must recognize that in some circumstances homeownership may not be recommended for certain households, given the low likelihood of realizing the benefits of homeownership. Finally, a growing recognition acknowledges that we know less about the homeownership experiences of low-income families than we know about the causes of homeownership disparities by income and race/ethnicity.[1] Thus, a final goal of this review is to highlight the areas in which further research is needed to enhance our understanding of this issue and to better inform the policymaking process.

This article is organized into six sections, including this introduction. The second section outlines the benefits believed to be associated with homeownership and describes the process by which these benefits may or may not be realized. The third section examines the choices homebuyers make after their initial purchase, including decisions about whether to move, remodel, refinance, or default. The fourth and fifth sections examine literature that sheds light on whether low-income and minority homebuyers are likely to realize the financial and social benefits of homeownership. The article concludes with a summary of findings and areas in which further research is needed.

Individual Benefits of Homeownership

Advocates of efforts to promote homeownership cite a wide variety of benefits that accrue to individual homeowners and to society more broadly. The focus of this article is on the financial and social benefits that individual homeowners may realize. For the most part, it does not discuss broader societal benefits generated by purported positive externalities.[2]

Financial Benefits

One principal financial benefit of homeownership is that it serves as a vehicle for wealth accumulation, both through appreciation in value and through the forced savings associated with paying down outstanding mortgage principal. Indeed, one unique aspect of homeownership is that it is one of the few leveraged investments available to households with little wealth, enabling

[1] Herbert et al. (2005) provide a comprehensive review of the literature to synthesize what we know about the causes of differences in homeownership rates by race/ethnicity and income and about policies to promote homeownership.

[2] One category of societal benefits relates to improved neighborhood conditions (such as higher quality public services, better maintained properties, and higher levels of property appreciation) that are argued to result from higher levels of homeownership. This article touches on this category of benefits to the extent that owners themselves benefit from improved neighborhood conditions. Another class of societal benefits relates to improved macroeconomic performance due to higher levels of investment in housing that is associated with owner occupants. This latter issue is beyond the scope of this article.

homeowners with very little equity in their homes to benefit from appreciation in the overall home value. For example, a buyer of a $100,000 home with a $5,000 downpayment will experience a 100-percent return on his or her investment if home prices rise by a mere 5 percent in the first year of ownership.[3] This appreciation makes homeownership especially appealing for households that have low initial savings, such as low-income households. Wealth accumulation through homeownership is also enhanced by tax law provisions that shield most appreciation in home values from capital gains taxes and that allow homeowners to deduct mortgage interest (if itemizing deductions exceeds their standard deduction).[4]

It is important to note, however, that the high transaction costs associated with buying and selling homes relative to renting are a key factor offsetting any financial returns to homeownership from appreciation of a leveraged asset. In fact, real estate agent fees alone are typically 5 to 6 percent of the sales price. Buying a home entails mortgage fees and closing costs that can amount to several percentage points of a home's value. In addition, sellers often face transfer taxes and legal fees and may have to help buyers cover cash closing costs. Thus, if owners are forced to move either shortly after buying or during a down market, these transaction costs can greatly erode or eliminate any financial returns to homeownership. It is not uncommon for the combined costs of buying and selling a home to total 8 to 10 percent—or more—of the value of a home.

Nonetheless, home equity is the single largest component of household net wealth, and it is particularly important for low-income and minority households. In 2000, housing equity accounted for 32.3 percent of aggregate household wealth, with stocks and mutual fund shares accounting for the next largest share of wealth, at 15.6 percent (Orzechowski and Sepielli, 2003). Among households in the lowest income quintile, however, housing equity accounted for 56.2 percent of aggregate wealth, while stocks and mutual funds accounted for only 7.7 percent. Even after removing low-income elderly households from the equation, home equity trumps other forms of wealth. Home equity is also a very important source of wealth among minorities, accounting for 61.8 percent of aggregate wealth among African Americans and 50.8 percent among Hispanics. Ex post evidence of the critically important role that homeownership plays in wealth accumulation is one keystone supporting efforts to promote homeownership among low-income and minority households.

Homeownership is thought to contribute to an individual's financial well-being in three other ways. First, owner occupants are insulated from rapidly rising housing costs, particularly if they have fixed-rate financing. With long-term financing, the real cost of housing generally declines over time, so homeowners can have greater capacity for accruing savings in other financial assets or can enjoy a higher level of consumption. Second, the deductibility of mortgage interest and property tax payments serves to lower the after-tax cost of homeownership, also contributing to owners' ability to increase savings or consumption. Many low-income owners may not benefit from these provisions, however, because the standard deduction often exceeds interest and property tax

[3] Of course, financial leverage is a two-edged sword and housing is not a risk-free investment. If home prices were to fall by 5 percent, the buyer's initial investment would be wiped out.

[4] As of 1998, capital gains of up to $250,000 for single filers and $500,000 for married couples filing joint returns may be exempt from taxation. Note, however, that owners cannot deduct housing-related losses as most other forms of investment allow.

payments. Third, homeownership allows a borrower to tap into secured lending against his or her home, which, all else equal, is often at a lower rate of interest than unsecured lending.

All these financial benefits are possible but in no way assured. As discussed in the following text, the proper way to view homeownership is as an investment that carries with it significant risks and uncertainties. For any number of reasons, homeowners can end up losing money on their homes or earn less of a return than if they had rented over some period.

Social Benefits

A wide variety of nonfinancial benefits attributed to homeownership are generally referred to as social benefits. One principal social benefit is that owners are thought to have higher satisfaction with their homes, in terms of both the housing unit itself and the neighborhood where they live. In theory, this observation could flow from the fact that owners have greater ability and incentive to invest in their homes to suit their tastes. Of course, the flip side of owners' ability to modify their homes as they see fit is the cost and responsibility for maintaining the home. Maintenance expenditures and responsibility can cause stress if a homeowner lacks the requisite resources and can erode any potential added satisfaction from having greater control over the physical conditions of his or her living environment.

The argument that owner occupants are more likely to be satisfied with their neighborhoods is based on the idea that owners are both more likely to invest in their own homes and be actively engaged in efforts to improve their neighborhoods to protect their investment. To the extent that homeowners tend to cluster together, owners' collective activities to improve their communities and their individual units would be expected to result in better neighborhood conditions.[5] Despite this expectation, the clustering together of financially strapped homeowners can create negative neighborhood externalities if it results in undermaintenance of homes, foreclosures, and abandonment.

Another significant benefit thought to be associated with homeownership is higher life satisfaction and better psychological health. Owners are thought to have higher self-esteem, due to both the higher social status associated with homeownership and the sense of accomplishment that results from having achieved a significant life goal. Owners are also thought to benefit from a feeling of greater control over their life, derived from the fact that owners do not have to worry about being forced out of their home by landlords' actions. The wealth created through homeownership may also contribute to this greater sense of control by providing a financial cushion that can be tapped to meet emergency needs. Owners are also thought to have better physical health, perhaps, in part, as a result of their better psychological health and, in part, due to the better quality of their homes. Of course, to the extent that owners are financially stretched to meet the costs of homeownership, they may feel less control over their lives and more vulnerable to financial and personal shocks. In these situations, owners may fare worse than renters do in terms of psychological and physical health.

[5] Herbert (1997) estimated measures of the degree of segregation in 1990 between owners and renters as measured by the dissimilarity index for 50 metropolitan areas. He found that the degree of segregation by tenure was moderate, suggesting that homeowners do, in fact, tend to cluster in neighborhoods. Although segregation by tenure was much lower than the levels of segregation experienced by African Americans, it was similar to the levels of segregation experienced by Hispanics and Asians and higher than segregation by income or education.

Finally, an important social benefit attributed to homeownership is better life outcomes for children who grow up in owner-occupied homes. Homeownership is thought to benefit children by several mechanisms. It may enable greater residential stability, which benefits children by providing a stable social and educational environment. The more home-centered lifestyle associated with homeownership may provide children with a more nurturing home environment. Given owners' incentive to invest in their homes and the fact that owner-occupied housing is much more likely to be in single-family detached housing, the greater quality, size, and privacy of these homes may also help support children's development. In addition, to the extent that homeownership helps to foster wealth creation, owners will have more financial resources available to invest in their children's education and health care and to generally provide a supportive environment for their development. A wide range of better outcomes in children has been attributed to homeownership, including higher educational attainment, less juvenile delinquency, lower rates of teenage pregnancy, and higher rates of subsequent homeownership. On the flip side, there may also be reason to be concerned about efforts that succeed in increasing low-income homeownership by having these households buy into distressed neighborhoods. In these situations, the benefits of homeownership may be offset by having children locked into these distressed communities.

Thus, just as the financial benefits of homeownership are not assured, neither are the social benefits. In many cases, the hoped-for social benefits of homeownership may not materialize because the financial benefits do not, leading to a sense of loss of control, stress, and a forced move. Much depends on the timing of home purchases and sales relative to house price cycles, the duration of homeownership and the time before a next move, the capacity to benefit from the mortgage interest deduction and capital gains exclusions, the choice of neighborhood, the choice of mortgage, and refinancing decisions.

Process for Realizing the Benefits of Homeownership

In sum, the potential benefits of homeownership outlined previously are by no means guaranteed. More specifically, whether these benefits are actually realized depends on a broad range of factors, including the following:

- When (age and timing) household heads first become homeowners.
- Where they choose to buy.
- How much the household spends on housing.
- The condition and age of the home they buy.
- How much they reinvest in maintaining and improving their homes.
- The mortgage products they can qualify for, have access to, and choose.
- If and when they refinance mortgages or tap into home equity.
- The return of alternative investments and the cost of renting instead.
- Whether income or budget shocks force them to default on their mortgage loans or house price declines spur them to do so.

- The timing of purchases and sales relative to house price cycles.
- The capacity to benefit from federal tax advantages.
- How often they move, their tenure choice, and the transaction costs of moving.

Exhibit 1 presents a conceptualization of the determinants of homeownership outcomes, delineating the key choices that affect outcomes and the types of events that affect these choices. Importantly, many of the benefits of homeownership—such as the accumulation of wealth and positive effects on children or health—would be expected to accrue only over a long period of time.

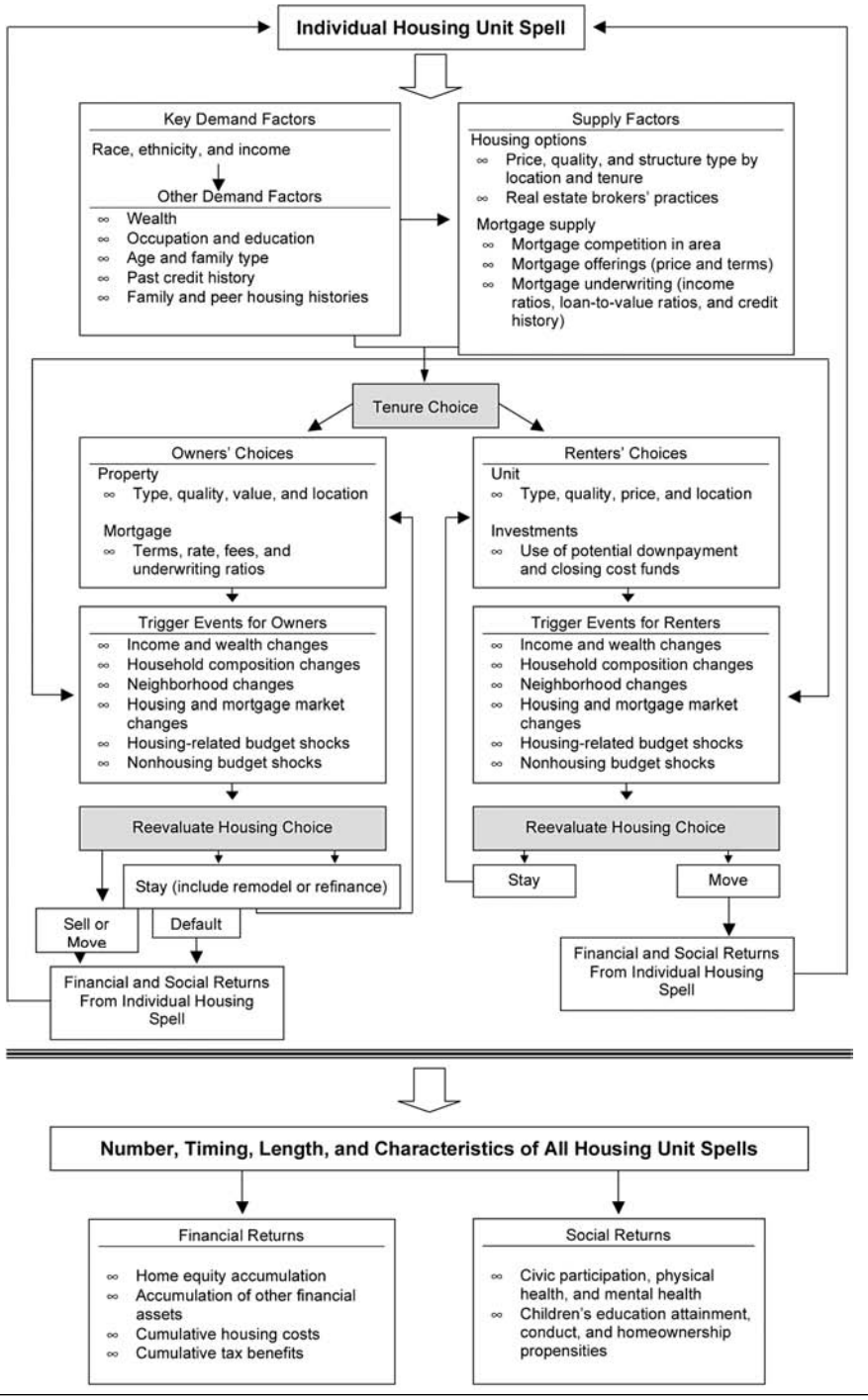
One key insight from the process outlined in exhibit 1 is that it is not the outcome of single experiences with homeownership that matters but the timing of tenure and mortgage choices throughout the life cycle. Thus, in evaluating whether an individual household benefits from homeownership, it is necessary to consider not just the outcome from the time spent in a single home but rather the household's cumulative experience in a sequence of homes. Few studies take this perspective, probably because the number of paths that individuals can trace is so great and the sample sizes of panel studies so small. As a result, most of the literature examines behavior and outcomes across single episodes of homeownership, such as equity accumulation from the purchase to the sale of a home, or examines cross-sectional behaviors and outcomes, such as who refinances during a refinance boom or default and delinquency behavior in a single year. Nonetheless, the absence of a life-cycle perspective contributes to important gaps in the existing literature.

Of particular importance for this article, *virtually all the factors that contribute to the outcomes from tenure choices are likely to be strongly influenced by a household's income, race, and ethnicity.* Lower average incomes restrict the range of housing options available to homebuyers to only lower cost units, often in lower quality neighborhoods. Although segregation of residential space by race and income may in turn influence low-income and minority owners' average house price appreciation experience, as we shall see, the evidence of a systematic effect is quite weak. In addition, research has consistently found significant geographic segmentation of mortgage markets by race and income, suggesting that where an owner lives exerts an important influence on his or her access to financial services and mortgage products. Low-income households also have measurably lower amounts of cash savings to cushion against budget and income shocks and find it more difficult to cover the costs of maintenance and replacements. Lower income typically entails lower wage work and more unstable employment, which tend to leave low-income households more prone to reductions in income through job loss. Because Hispanics and African Americans have lower levels of education on average than Whites do, receive lower earnings on average for comparable levels of education, and have average credit scores that are lower, the problems confronting low-income homebuyers and owners disproportionately affect minorities.

Finally, although the deductibility of mortgage interest on federal income taxes provides an incentive for homeownership, lower income households derive fewer benefits from this provision both because they have lower marginal tax rates and because their itemized deductions may be small relative to the standard deduction, reducing the chance that they will choose to itemize their deductions. Based on estimates of the number of tax returns claiming the mortgage interest deduction, approximately 15 percent of homeowners with incomes of less than $30,000 claim this

Exhibit 1

Conceptual Model of Lifetime Returns From Tenure Choices



deduction compared with 50 percent of those with incomes between $30,000 and $50,000 and 64 percent of those with incomes of more than $50,000.[6]

Because Hispanics and African Americans have sharply lower average wealth than do Whites of comparable incomes, and because low-income households have sharply lower average wealth than higher income households, the neighborhood and housing options of low-income individuals and minorities are further restricted, their vulnerability to income and budget shocks is greater, and the speed with which they can achieve homeownership is thereby slower.

Taken together, many of the systematic variations in income, wealth, location, and education related to race, ethnicity, and income drive many of the factors that contribute to the outcomes from homeownership, including living arrangements and family choices, number and timing of moves and tenure choices, mortgage choices, refinance behaviors, repair and remodeling behaviors, and vulnerability to house price declines or housing payment increases, income disruptions, and unforeseen but necessary nonhousing expenditures. These variations give rise to expected differences in the average experiences, risks, and returns to homeownership for low-income and minority homeowners. Thus, the "odds" of different outcomes are expected to vary by race, ethnicity, and income. The overarching goal of this article is to sort through available information to evaluate how the different factors outlined in exhibit 1 contribute to different homeownership experiences for low-income and minority homeowners.

As noted previously, for a variety of reasons, much of the literature examining the benefits of homeownership does not take a life-cycle view of housing choices; instead, it focuses on a short-run outcome—for example, the appreciation in house values over the course of a set period of time. In addition, a variety of research is not explicitly focused on examining the benefits of homeownership but rather examines either specific housing choices, such as a decision to choose a certain type of mortgage or undertake remodeling activities, or intermediate outcomes, such as the choice of moving to a new home. The process outlined in exhibit 1 helps place this research in context in considering how specific housing choices and intermediate outcomes ultimately contribute to the benefits realized by low-income homeowners.

Key Experiences and Decisions of Low-Income and Minority Homeowners

Three critical factors influence the experiences and decisions of low-income and minority homebuyers after they purchase their home. First and foremost is the question of how long these owners maintain homeownership, because many of the financial and social benefits of homeownership are derived from residential stability. Second is the experience of these owners both in refinancing their primary mortgage and in using debt to tap their accumulated home equity, because these decisions have important implications for the ongoing costs of homeownership and whether these owners are able to accumulate wealth over time. Third, differences in low-income and minority

[6] These figures are derived from estimates of the number of tax returns by claiming the mortgage interest deduction by filer income in 2004 as reported in Joint Committee on Taxation (1995) and the authors' tabulations of the number of homeowners in these income categories from the March 2004 Current Population Survey.

homeowners' tendency to invest in maintenance and improvement to their homes also influence homeownership outcomes.

Mobility, Foreclosure, and Length of Time as Homeowners

In terms of the financial benefits, given the high transaction costs of buying and selling a home, homeownership becomes very expensive if the household moves frequently. Also, although in the longer run nominal house prices are very likely to rise, short periods of falling nominal house prices are not uncommon (Belsky and Duda, 2002). If an owner is forced to sell his or her home into a down market, he or she will incur these nominal declines in values. Longer tenure in the home will enable owners to ride out short-term nominal declines and avoid these losses. Of course, if a homeowner suffers a foreclosure, the costs include not just a loss of their equity but also the psychic distress of having failed at homeownership and being forced out of his or her home and the damage done to the owner's credit history and ability to obtain credit in the future. In fact, concentration of subprime mortgages that default at rates 8 to 10 times greater than prime mortgages among low-income and minority homeowners, as well as the tendency of even prime low-income and minority borrowers to have riskier high loan-to-value ratio loans, has given rise to critiques of efforts to promote homeownership among these groups. Finally, as this article addresses later, a variety of the social benefits are associated with residential stability.

The literature touching on these issues can be divided into three strands. The first strand deals with residential mobility, which is the share of households that move out of their homes over a given time period. Although this literature in general is not concerned with movers' subsequent housing choice and so does not address the question of whether owners leave homeownership or are simply trading one owned residence for another, these studies are of interest in examining the question of whether low-income and minority owners might be more likely to incur the high transaction costs associated with moving. The second strand of the literature relates to the prevalence of foreclosure among homebuyers. Many owners who are unable to sustain homeownership may be able to take steps to avoid a foreclosure. Still, these owners may face significant costs from being forced to leave homeownership, including higher future borrowing costs from having defaulted on a loan. The third strand of the literature, which is relatively new, uses panel surveys of households to track their length of time as homeowners. This literature provides a more direct indication of the extent to which low-income and minority homebuyers are able to sustain homeownership over time as well as the factors contributing to exits from homeownership. The literature dealing with each of these three issues is discussed in turn.

Residential Mobility

Several recent reviews of the literature have concluded that convincing evidence shows that owners move less than renters do (Dietz and Haurin, 2003; Rohe, McCarthy, and Van Zandt, 2002; Rohe and Stewart, 1996).[7] The question of interest for this study, however, is whether low-income or

[7] The fact that owners move less than renters do does not mean that the evidence is clear that homeownership causes greater residential stability. In fact, individuals are more likely to buy a home when they know they are less likely to want to move in the near future. In this case, lower expected mobility leads to homeownership, not the other way around. Still, homeownership would be expected to lower mobility in several ways. First, higher transaction costs of moving make owners less inclined to move as their household circumstances change. Second, owners also have a greater ability to tailor homes to meet their needs and tastes and so may have less need to move to adjust their housing consumption.

minority homeowners are more or less likely to move than other homeowners are, not whether they are more likely to move than renters are. Actually, few studies compare the mobility choices of homeowners of different incomes or race/ethnicities. Most studies pool owners and renters and include income and race/ethnicity as independent variables, but they do not interact a household's tenure with these variables to examine whether the effect of income or race/ethnicity on mobility differs between owners and renters.

Most of the handfuls of studies that address this issue suggest that low-income households are somewhat less likely to move than are higher income groups (Gronberg and Reed, 1992; Haurin and Lee, 1989; Henderson and Ioannides, 1989). This result is attributed to the fact that higher income households have more choices in the housing market and are less deterred by transaction costs and so are more likely to move than low-income households are. These same studies also generally find that White owners have lower mobility than minorities (Gronberg and Reed, 1992; Henderson and Ioannides, 1989). This finding is at odds with the explanation advanced for the higher mobility of higher income households. If it is the degree of choice in housing markets that drives mobility, then minorities ought to have lower mobility than Whites do. Instead, it is possible that the greater mobility among minority homeowners is more likely to reflect their greater difficulty in sustaining homeownership. Most of these studies rely on data from several decades ago, however, and may be of less relevance for current market circumstances. More recent studies that focus not only on differences in the propensity to move but also examine the subsequent tenure choice of households are more relevant for the purpose of this study. This literature is reviewed in the following paragraphs.

Mortgage Delinquency and Foreclosure

A rich literature addresses the determinants of mortgage delinquency and residential foreclosure, which the literature generally refers to as default. Perhaps not surprisingly, research consistently finds that households with lower incomes are more likely to miss payments and default on their mortgages (see Quercia and Stegman, 1992, for a thorough review of the default literature through that time). Two more recent studies—Van Order and Zorn (2002) and Deng, Quigley, and Van Order (1996)—have an explicit focus on the difference in default experience by borrower income. Although carefully done, these studies and others do not model the subprime loans that became so popular after 2000 or a declining nominal house price environment such as the one that unfolded in 2007. These studies are likely to drive much greater wedges between the default experience of minorities and Whites and that of lower and higher income households.

Van Order and Zorn (2002) study the performance of mortgages purchased by Freddie Mac that were originated between 1993 and 1995 and then tracked through 1999. Even after controlling for a variety of loan characteristics, they find that lower income groups consistently have higher default probabilities than higher income groups do. The unadjusted default rates (that is, differences in default by income category without taking into account other differences between these borrower groups) reported by Van Order and Zorn are also instructive because they indicate the extent to which low-income borrowers are likely to experience foreclosure. The data that Van Order and Zorn present indicate that, even for low-income borrowers, foreclosure is a rare event. Among their cohort of low-income borrowers from the first half of the 1990s, only 0.8 percent of

buyers with incomes of less than 80 percent of area median income experienced a foreclosure in the 4 to 6 years following origination. This rate was only slightly higher than the 0.6 percent of high-income borrowers who experienced foreclosure over the same time period.

Deng, Quigley, and Van Order (1996) shed some light on how the expansion of mortgage credit for low-income borrowers in the form of low downpayment loans may affect foreclosure rates. They developed a model predicting mortgage default based on the performance of loans purchased by Freddie Mac that were originated between 1976 and 1983 and then tracked through 1992. They then used this model to simulate the performance of mortgages over a 15-year period with different assumptions about borrowers' income relative to area median incomes, loan-to-value ratio, and fluctuations in house price appreciation and unemployment rates. Under favorable economic circumstances (longrun average unemployment of 4 percent and house price appreciation of 5 percent) and assuming a downpayment of 10 percent, they find little difference in expected 15-year foreclosure rates by income: 3.56 percent of borrowers with incomes between 60 and 100 percent of area median income would default, compared with 3.09 percent of borrowers with incomes between 100 and 150 percent of area median income.[8] If the downpayment is reduced to 0 percent, the differences in default rates by income grow larger: 6.58 percent of low-income borrowers would default, compared with 4.74 percent of borrowers with incomes above the area median. If the macroeconomic conditions are also made much more challenging (8 percent unemployment and 0 percent housing appreciation on average), the differences in default rates grow to nearly 5 percentage points: 12.88 compared with 8.00 percent.

Several conclusions can be drawn from these simulations. To begin with, although the likelihood of foreclosure among all income groups is sensitive to downpayment levels and macroeconomic conditions, low-income borrowers are more sensitive to these factors than higher income borrowers are. It is also true, however, that except under extremely poor macroeconomic conditions, the foreclosure rate is unlikely to exceed the low single digits over the period studied. In the prime market, foreclosure occurred in only about 1 in 20 cases over a 15-year period, even when borrowers started with no equity in their homes. Also, the absolute differences in default rates by income were not large. With 0-percent-down loans, the probability of foreclosure among low-income borrowers was only 1.87 percentage points higher than it was among higher income borrowers. Should a period of sustained poor economic conditions occur, however, with nominal house price growth averaging 0 percent for 15 years, much higher foreclosure rates would occur, and the foreclosure rate would be more than 50 percent higher among low-income borrowers than it would be among higher income borrowers. These results indicate the importance of providing support mechanisms for low-income borrowers, particularly those with low downpayments and particularly during challenging economic environments.

The issue of differences in default rates by race/ethnicity has also received a fair amount of attention in the literature and has been a contentious issue. Van Order and Zorn (2002) report statistics for a pool of Freddie Mac loans originated in 1993 to 1995, showing that, although only 0.6 percent

[8] The article also reports default rates for those with incomes of less than 60 percent of area median income (AMI), but the sample size for this group is relatively small. The authors also report default rates for those with incomes above 150 percent of AMI, but these rates are higher than for those with incomes between 100 and 150 percent of AMI.

of White borrowers experienced a foreclosure by 1999, 1.9 percent of African Americans and 2.2 percent of Hispanics lost their homes to foreclosure during that same period. Cotterman (2002), which presents information on a sample of Federal Housing Administration (FHA) loans from 1992, 1994, and 1996 that were tracked through mid-2002, also shows higher foreclosure rates for minorities compared with Whites. Across the three sample years of 1992, 1994, and 1996, White foreclosure rates were 4.1, 4.0, and 2.9 percent, respectively. In comparison, African-American rates were roughly twice as high, at 8.1, 7.6, and 4.8 percent, respectively, while Hispanic rates were higher still, at 11.0, 8.5, and 5.4 percent, respectively.[9]

As the findings of these papers show, differences in foreclosure rates are much larger by race and ethnicity than they are by income. In addition, the figures presented in Cotterman's paper also highlight the fact that foreclosure rates among FHA borrowers are much higher than among prime borrowers. Although it is still the case that most FHA minority homeowners do not experience foreclosure, the 8.1 percent of African Americans and 11.0 percent of Hispanics who lost their homes within 8 years of purchase are not insignificant. As with low-income homebuyers, these figures underscore the need to provide support for these borrowers to be able to sustain homeownership.

As noted, the studies cited previously were all based on loan performance before the recent sharp rise in foreclosure rates. The most widely cited series on mortgage delinquency and foreclosure is the National Delinquency Survey conducted by the Mortgage Bankers Association (MBA). These data show that, beginning in 2006, mortgage delinquency rates started to rise—and they have continued to increase fairly sharply through the third quarter of 2007. The overall delinquency rate for the mortgage market as of the fourth quarter of 2007 is at peak levels, at 5.82 percent, compared with a previous high of 5.56 percent in 1986. Much of this increase was driven by subprime loans. As of the fourth quarter of 2007, the share of subprime loans that were delinquent was 17.31 percent, exceeding the previous peak rate of 14.31 percent from 2002. At the same time, the delinquency rate among prime mortgages was 3.24 percent—again exceeding the previous peak of 2.67 percent in 2001.

Changes in the share of loans starting the foreclosure process have been even more dramatic. According to the MBA data, the previous record share of outstanding mortgages starting foreclosure was 0.46 percent achieved during the 2001-to-2002 recession. This rate greatly exceeded the foreclosure start rates achieved during the real estate slump of the mid-1980s, when foreclosure start rates were less than 0.30 percent. By the fourth quarter of 2007, the rate had reached 0.83 percent, far outpacing the previous record high of 0.50 percent recorded in the second quarter of 2002. Again, most of this increase is due to rising foreclosure initiation rates among subprime mortgages. As of the fourth quarter of 2007, the share of subprime mortgages starting foreclosure was 3.44 percent, while the foreclosure rate was 0.41 percent among prime mortgages.

[9] Another strand of the literature has examined differences in default rates by race while controlling for other borrower and loan characteristics. Berkovec et al. (1994) analyzed the performance of a pool of FHA loans and found that, all else being equal, African Americans had a higher default rate than Whites. This work, however, was subjected to a series of criticisms regarding the adequacy of the controls employed for credit quality and other borrower characteristics. Cotterman (2002) replicated the analysis of Berkovec et al. using data on FHA loans from the early 1990s that had information on borrowers' credit history, which was not available to Berkovec et al. Cotterman found that after credit quality was controlled for, no difference occurred in default propensities for Hispanics and Asians and, in general, no difference occurred for African Americans either.

Although the MBA survey does not present information on differences in mortgage delinquency or foreclosure by borrowers' income or race/ethnicity, given findings from a variety of studies showing that subprime lending is concentrated among minority and low-income homeowners (Apgar and Herbert, 2006), the sharp rise in subprime delinquencies and foreclosures undoubtedly has been more pronounced among these groups.

For the most part, even when foreclosure levels have been elevated, these events in general have been fairly rare; however, the recent experience with subprime loans suggests that foreclosure rates among borrowers with these loans may be several times higher. An analysis by the Center for Responsible Lending concluded that about one in five subprime loans would end in foreclosure (Schloemer et al., 2006). These results have recently been corroborated in an analysis by researchers of the Federal Reserve Bank of Boston examining foreclosure rates among subprime loans in Massachusetts (Gerardi, Shapiro, and Willen, 2007). This rate of failure is clearly cause for concern about the share of homeowners who are likely to realize the potential benefits of homeownership.

Length of Time as Homeowners

One concern with drawing conclusions from the literature analyzing residential mobility about whether low-income and minority buyers share in the benefits of homeownership is that some share of moves represents positive outcomes—owners trading up to better quality homes. On the other hand, estimates of the share of borrowers losing homes to foreclosure may also underestimate the failure of buyers to succeed as homeowners by ignoring cases in which buyers are forced by circumstances to move out of their homes but do not experience a foreclosure. Cases in which owners reluctantly put their homes up for sale, possibly at a financial loss, are not captured in foreclosure statistics. Recently, several studies have made use of panel surveys—surveys that track the same households over time—to examine the question of how long low-income and minority first-time buyers maintain homeownership (Boehm and Schlottmann, 2004b; Haurin and Rosenthal, 2005a; Haurin and Rosenthal, 2005b; Reid, 2004). By capturing all cases in which owners leave their home and do not purchase another one, these studies provide a much better indication than either the residential mobility literature or default literature of the degree to which these buyers are able to remain owners over time and so reap the benefits of homeownership.

One surprising conclusion from these studies is that a fairly sizeable share of all first-time owners—regardless of income or race/ethnicity—returns to renting or living with others after first achieving homeownership. Both Reid (2004) and Haurin and Rosenthal (2005a) find that about 40 percent of first-time homebuyers leave homeownership at some point after buying. These studies also find that low-income owners face a higher risk of being unable to sustain homeownership over time. Reid's analysis of data from the Panel Study of Income Dynamics (PSID) from 1976 through 1993 found that 53 percent of low-income buyers left homeownership within 5 years of buying their first home, compared with 23 percent of high-income buyers.[10] Employing a less restrictive definition of low-income buyer, Haurin and Rosenthal, in their analysis of data from the National Longitudinal Survey of Youth (NLSY) from 1979 through 2000, found that about 43 percent of

[10] Although Reid (2004) cites specific survivorship rates for some subgroups in the text of her study, in some cases specific rates had to be estimated based on survivorship graphs shown in the report.

low-income buyers did not sustain homeownership for more than 5 years compared with 30 percent of high-income buyers.[11]

In some respects, given differences in the samples used and time periods studied, the results of these two analyses are somewhat similar: as an approximation, roughly one-half of low-income buyers exit homeownership within 5 years of purchase, compared with one-fourth to one-third of high-income buyers.[12] The difference in survival rates between low-income and high-income buyers is much larger in Reid's study than in Haurin and Rosenthal's, however. Although Reid finds a 30-percentage-point lower survival rate for low-income buyers, Haurin and Rosenthal find a difference of only 13 percentage points. This observation may well be due to Reid's more restrictive definition of "low income," which requires that households have incomes of less than 80 percent of the area median income in every year they are observed through the year in which they buy. Haurin and Rosenthal, on the other hand, define low income as those in the bottom quartile of the income distribution in their sample at age 25. Reid's sample is also somewhat older, consisting of renters between the ages of 18 and 45; Haurin and Rosenthal begin with a sample of those between the ages of 14 and 22. Given the differences in the age groups and definition of low income, Reid's results may well represent the experience of what might be thought of as more permanently low-income households. Further work is needed to understand the difference in findings between these studies for low-income owners.

Both of these studies also find that minorities are much more likely to return to renting or living with others than Whites are. Reid's 5-year rates of exits from homeownership for minorities are between 22 and 38 percentage points higher compared with Whites in the same income categories.[13] Haurin and Rosenthal (2005a) find that African Americans are 46 percent more likely than Whites to be unable to sustain homeownership, while Hispanics are 38 percent and Asians are 39 percent more likely to leave.[14] Reid reports that, after 5 years, about 29 percent of high-income minorities did not sustain homeownership compared with 21 percent of high-income Whites, and that 58 percent of low-income minorities were no longer owners compared with 46 percent of low-income Whites.

[11] Reid's definition of low income required that the household have an income of less than 80 percent of AMI in every year it is observed through the year in which the household bought its first home. High-income buyers were those whose income was above the AMI every year they are observed through the year they purchased their home. All other households were considered moderate income. Haurin and Rosenthal (2005a), in contrast, defined households based on their income at age 25 relative to all other 25-year-olds. Those in the bottom quartile were considered low-income households, and those in the top quartile were considered high-income households. The survivor rates for Haurin and Rosenthal are unpublished figures obtained from the authors.

[12] The analysis by Boehm and Schlottmann (2004b) of the PSID from 1984 through 1992 produces a higher rate of success in maintaining homeownership for at least 5 years both for all households and for White low-income owners. For example, they find that, among high-income Whites, 95 percent survive 5 years and, among low-income Whites, 82 percent survive 5 years. A key difference from the other studies is that Boehm and Schlottmann do not limit their sample to only first-time buyers. The difference in results may reflect the fact that repeat homebuyers are more likely to maintain homeownership over time than are first-time buyers.

[13] Reid's analysis does not distinguish between different types of racial/ethnic minorities.

[14] Haurin and Rosenthal find that the differences between Whites and both Hispanics and Asians are completely accounted for by other household characteristics, while large, statistically significant differences remain for African Americans, even after controlling for other factors.

The high exit rates for low-income and minority first-time buyers are a cause for concern because the benefits of homeownership in general will be much greater for those who continue as owners for longer periods. This trend occurs both because the odds of benefiting from appreciation increase with time and the benefits of amortizing loans increase exponentially with the aging of the loan. In addition, social benefits of homeownership are strongly linked with residential stability.

Haurin and Rosenthal (2005b) also continue to track households to identify how many households regain homeownership. Although in their analysis they do not examine differences across income groups, they do report differences by race/ethnicity. Of White first-time buyers, 69 percent of those who moved back to renting or living with others for a period of time are ultimately observed to return to owning. Thus, most of these exits from homeownership are temporary. The rates of returns to homeownership are lower for minorities, but most also return to ownership status, including 59 percent of African Americans and 64 percent of Hispanics.

The studies by Reid (2004) and Haurin and Rosenthal (2005a, 2005b) also estimate models to identify the factors associated with a household leaving homeownership. Aside from identifying income and race/ethnicity as important household characteristics, these studies find that one of the most important household characteristics is whether the owners are a married couple. This finding raises concerns that growth in homeownership among single-person and single-parent households may raise the number of owners who are vulnerable to economic shocks (Herbert and Belsky, 2006). Other household characteristics associated with the risk of leaving homeownership are age and education. Both Reid (2004) and Haurin and Rosenthal (2005a, 2005b) speculate that education likely captures the owner's longrun earnings potential, with higher educated owners more likely to experience rising earnings. To the extent that greater education is associated with greater financial literacy, this result would also be consistent with the importance of financial knowledge to maintaining homeownership.

The studies also examine the importance of changes in household circumstances for precipitating an exit from homeownership. It is generally believed that "trigger events," which are unexpected changes in a household's circumstances, are important factors in producing defaults or otherwise ending homeownership spells (Elmer and Seelig, 1999; Vandell, 1995). The most commonly cited trigger events are a reduction in earnings as a result of job loss, the splintering of the household due to divorce or separation, and an increase in expenses or reduction in earnings due to a health crisis. Cutts (2003) reports that among delinquent Freddie Mac borrowers during the period from 1999 to 2003, 40 percent reported unemployment or curtailment of income as the reason for their delinquency. The next most common issue was illness or death of the borrower or someone in the family, which was reported for 24 percent of delinquent borrowers. Marital difficulties and excessive financial obligations each were cited in about 10 percent of cases.

To capture job loss or income curtailment, Reid includes an indicator of whether the borrower experienced an unemployment episode, while Haurin and Rosenthal include a change in household earnings compared with earnings in the year when the borrower purchased the home. Both studies find these measures to be significant predictors of whether a household will cease to own. Reid found an unemployment spell more than doubled the probability of ending ownership, with larger effects on higher income households. Haurin and Rosenthal found a somewhat smaller effect, with

declines of $10,000 in earnings raising the risk of leaving homeownership by 11 percent. Reid reports that job loss was more common among low-income households, with about 9 percent of low-income households and 15 percent of low-income minorities having a spell of unemployment compared with 6 percent of high-income households.

Both Reid (2004) and Haurin and Rosenthal (2005a, 2005b) find that divorce is the single event that is most strongly associated with termination of an ownership spell. Reid's findings indicate that a divorce raises the probability of leaving homeownership roughly by a factor of 10, while Haurin and Rosenthal's estimate is a more modest, but still significant, 40 percent.

Haurin and Rosenthal include an indicator of whether a change occurred in the buyer's health that limited the amount or type of work he or she could do. This situation was rare in the sample (occurring in only 1 percent of cases) and was not statistically significant. Some of the effect of illness may have been captured by a variable measuring the borrowers' change in earnings. The other effect of a health problem is on the costs incurred by the household, particularly if it does not have health insurance. The change in health measure might have been expected to capture the effect of uninsured healthcare costs, but this factor was not found to be important—at least in this sample.

Haurin and Rosenthal also include measures of prevailing mortgage rates, both at the time of purchase and at each point in the time the household is observed after purchase, all of which are found to be highly significant. They find that a 1-percentage-point higher initial mortgage interest rate increases the risk of leaving homeownership by 16 percent. The authors note that this finding provides an indication of the increased risks faced by low-income buyers using higher cost subprime financing. They also find that a 1-percentage-point increase in rates over time increases the risk of leaving homeownership by 30 percent, while a 1-percentage-point decline reduces the risk of leaving by 15 percent. Although they interpret these latter results as indicating the risks faced by those using adjustable rate financing, their data do not indicate whether borrowers actually have an adjustable rate product. Another interpretation of this result could be that owners who are forced by circumstances to change residence have a harder time maintaining ownership during periods when interest rates are high.

It is also likely that many exits from homeownership are simply rational decisions in response to changes in circumstances that do not impose significant costs on the owners. The fact that a fairly high proportion of high-income households leave homeownership within 5 years suggests that a failure to be able to afford homeownership is not the only reason for these departures. In short, a clear need exists for more information about the dynamics of homeownership over time, including the changes that occur in household circumstances, how different households respond to these changes (including whether they can draw on savings, debt, insurance, or resources provided by family and friends), and how these responses are associated with different outcomes.

Mortgage Financing Choices After Purchase

Mortgage financing choices that homeowners make after home purchase can have important repercussions for the financial benefits realized from ownership. One important decision is to refinance into lower interest rate loans when market conditions provide the opportunity to do so. The failure to take advantage of such opportunities can result in much higher interest rate costs

over the life of the mortgage. Owners also can use loans to tap accumulated home equity. Although the availability of this wealth is one benefit of homeownership, changes in mortgage markets over the past decade have made it much easier to tap home equity both through refinancing of existing mortgages and through home equity loans or lines of credit. The ease with which owners can tap their home equity may make it easier to use their wealth to support current consumption, which both increases housing costs and erodes the development of a nest egg to help weather financial crises; fund investment in homes, business, or education; or support the owner in retirement. This section explores what is known about differences among homeowners by income and race in their propensity to take advantage of refinance opportunities to lower interest rates or to cash out accumulated equity for other uses. Each of these issues is considered in turn.

Refinance Activity

In general, analysis of refinancing activity has found that low-income and minority homebuyers are less likely to refinance their primary mortgage than higher income households or Whites are. Exhibit 2 presents data from the 2003 American Housing Survey (AHS) as an indication of the difference in magnitude of the likelihood of refinancing. As of 2003, 12 percent of low-income owners had primary mortgages that were refinanced, which is about one-half of the share of moderate-income owners and one-third of the share of high-income owners. Comparing different racial/ethnic groups, Whites (24 percent) are more likely to refinance than either African Americans (14 percent) or Hispanics (21 percent). Exhibit 2 also shows that first-time buyers who are still in their first home are least likely to have refinanced (5 percent), although this observation likely reflects the fact that, on average, they have the shortest tenure in their homes and so have had less opportunity to refinance.

Exhibit 2

Refinance Activity and Reasons for Refinancing by Income and Race/Ethnicity of Owners

	Low Income (%)	Moderate Income (%)	High Income (%)	White (%)	African-American (%)	Hispanic (%)	First-Time Buyers (%)
Share of all owners with primary mortgage refinanced	12	26	35	24	14	21	5
Reason for refinancing (Share of those with refinanced mortgage)							
To get lower interest rate	83	90	93	90	84	87	97
To increase payment period	2	3	2	2	2	2	0
To reduce payment period	9	11	13	12	9	12	5
To renew or extend a loan	1	1	1	1	3	1	0
To receive cash	14	12	11	11	12	15	5
Other reason	12	10	6	8	11	12	4

Note: Reasons for refinancing sum to more than 100 percent because more than one reason can be reported.
Source: 2003 American Housing Survey

Exhibit 2 also shows the reported reasons for refinancing among owners who have refinanced. Although, by far, the most common reason given among all groups of owners is to obtain a lower interest rate, with at least 83 percent of all owners reporting this reason, low-income and minority borrowers are somewhat more likely to report a desire to take cash out or "other reasons" for pursuing a refinance. Because consolidating nonhousing debt into lower cost and longer term mortgage debt is one common reason for refinancing, it is likely that this motivation is captured in the "other reason" category (Canner, Dynan, and Passmore, 2002). Considering both the shares motivated to refinance to take cash out and for other reasons, 26 percent of low-income owners report these reasons compared with 22 percent of moderate-income owners and 17 percent of high-income owners. African Americans (23 percent) and Hispanics (27 percent) are also more likely to report these motivations than are Whites (19 percent).

Although these overall refinance propensities from the AHS provide some indication of the prevalence of this activity by income and race/ethnicity, these simple tabulations do not take into account other differences in borrowers' circumstances that affect the likelihood of pursuing a refinance. For example, borrowers with mortgages that are largely paid off would be expected to be less likely to refinance because the small loan size reduces the benefits and financing costs are larger as a percentage of the outstanding loan balance.

Two recent studies have examined differences by income and race/ethnicity in homeowners' propensity to refinance, using multivariate techniques to control for other differences in loan and borrower characteristics (Archer, Ling, and McGill, 2002; Canner, Dynan, and Passmore, 2002; Nothaft and Chang, 2004; Van Order and Zorn, 2002). In general, these studies find that low-income and minority homeowners are indeed less likely to refinance when interest rates fall and so may not realize the benefits of interest rate reductions to the same degree as other owners. These studies also suggest, however, that low-income and minority homeowners in general seem to be responsive to market conditions, but they are more likely to be impeded from taking advantage of these opportunities by other financial constraints.

One interesting contribution of Nothaft and Chang (2004) is their attempt to estimate the value of the missed refinance opportunities for African Americans and low-income owners. Compared with prototypical higher income, married-couple homeowners, African Americans are 16.5 percent less likely to refinance than Whites are, according to the authors' findings. Furthermore, Nothaft and Chang estimate that missing the opportunity to refinance results in an average lost benefit of $2,040 per African-American homeowner, or $22.0 billion in lost benefits across all African-American homeowners. Employing the same methodology, they find that 6.9 percent of low-income homeowners miss out on refinance opportunities, with a total lost benefit of $21.9 billion.

Nothaft and Chang also indicate a substantial difference between Whites and African Americans in the decline in interest rates obtained through refinance, but this observation is not the subject of detailed analysis. Although Whites average a decline of 1.33 percentage points, African Americans average a decline of only 0.39 percentage points. Several other recent studies that have examined racial disparities in mortgage interest rates have also observed that African Americans obtain much less financial benefit from refinancing. Susin (2003) and Boehm, Thistle, and Schlottmann (2006) both analyze data from the AHS and find that African Americans pay higher interest rates than Whites do. Susin's analysis of all outstanding mortgages as of 2001 concludes that African Americans

pay about 0.44 percentage point higher rates on average; much of the difference is associated with differences in rates obtained through refinancing. Boehm, Thistle, and Schlottman's analysis of primary mortgages originated from 1990 through 2001 finds that interest rates obtained by African Americans who refinance are on average 0.75 percentage points higher than the refinance rates obtained by Whites. When the authors estimate statistical models that take into account a variety of borrower and loan characteristics, they find that the unexplained difference in refinance rates increases to 1.01 percentage points.

The significant differences in mortgage rates obtained by African Americans who refinanced is consistent with the findings from a large number of studies that have found that African Americans are much more likely than other racial/ethnic groups to use subprime lenders (Calem, Gillen, and Wachter, 2004; Calem, Hershaff, and Wachter, 2004; National Community Reinvestment Coalition, 2003; Pennington-Cross, Yezer, and Nichols, 2000; Scheessele, 2002). It is telling that Boehm, Thistle, and Schlottmann and Susin find that the disparities in mortgage interest rates between Whites and African Americans are not evident among purchase mortgages. This result is consistent with the fact that the growth of subprime lending during the 1990s was most evident among refinance loans and much less evident among purchase loans—at least until the past few years.

Boehm, Thistle, and Schlottmann also use their estimated model to disaggregate the reasons for African Americans' higher interest rates into portions attributable to differences in borrower characteristics compared with differences in treatment in the market associated with race that cannot be attributed to other borrower characteristics. They find that 87 percent of the difference between African-American and White refinance interest rates is attributable to different treatment in the market and only 13 percent is due to differences in borrower or loan characteristics. They note that some of the unexplained racial difference may be due to differences in credit history, a factor not captured by the AHS.

Nothaft and Chang's estimates of the value of missed refinancing opportunities do not take into account differences in interest rates obtained by borrowers of different income levels and race/ethnicity, but the disparities found by the studies cited previously suggest that they could be substantial. Carr and Schuetz (2001) present calculations showing that each additional percentage point of interest added to a 30-year mortgage increases the total interest paid over the life of the mortgage by at least $20,000. If on average all African-American owners who refinance pay about 1-percentage-point higher rates than Whites do, the total aggregate costs of these higher rates would amount to several times Nothaft and Chang's estimated cost of $22 billion in lost benefits from the 16.5 percent of African-American owners who did not refinance.

Tapping Home Equity Through Cash-Out Refinance or Home Equity Loans

As noted previously, another issue to consider regarding mortgage finance decisions is the extent to which owners reduce the equity in their homes either through cash-out refinancing or home equity loans. Exhibit 3 illustrates the prevalence of these activities by homeowners' income, owners' race/ethnicity, and first-time owner status based on data from the 2003 AHS. Both cash-out refinancings and home equity loans are more than twice as common among moderate- and high-income owners than among low-income owners. Home equity loans are much more common among all groups. Although 1.6 percent of low-income owners took cash out of their homes through a refinanced

primary mortgage, 8.1 percent had a home equity loan in place in 2003. In comparison, among moderate- and high-income owners, 3.1 and 3.7 percent, respectively, had taken cash out through refinancing and 15.3 and 21.2 percent, respectively, had home equity loans outstanding.

As exhibit 3 also shows, African Americans were less likely than Whites to have either taken cash out through a refinancing (1.7 compared with 2.7 percent, respectively) or have a home equity loan (8.4 compared with 15.5 percent, respectively). Hispanics were also less likely than Whites to have a home equity loan (8.7 compared with 15.5 percent, respectively), but they were slightly more likely to have taken cash out through refinancing (3.2 compared with 2.7 percent, respectively). Once again, first-time buyers are much less likely than any other group of owners to tap home equity, no doubt reflecting the fact that they have less equity in their homes.

The differences in the propensity to tap home equity through borrowing, which are evident in these simple cross-tabulations, are supported by several recent studies that have used multivariate techniques. Using the AHS, Nothaft and Chang (2004) estimate models predicting the incidence of both cash-out refinancings and the use of second mortgages to draw down equity. In addition to controlling for income and race/ethnicity, these models also control for the loan-to-value ratio, the size of the primary mortgage, and the borrowers' payment-to-income ratio. Higher income households in general are more likely to tap home equity through both cash-out refinancing and second mortgages. First-time homebuyers are less likely to use either type of financing to draw down their equity. Regarding minorities, Nothaft and Chang find that "other" minority households are less likely to use refinancing to take cash out, and African Americans are no different from Whites in this regard. African Americans are, however, much more likely than Whites to take out a second mortgage, while other minorities are no different from Whites.

Finally, Canner, Dynan, and Passmore (2002) also examine the tendency for owners to take cash out through refinancing. They do not show results for the probability of taking cash out but, instead, indicate the association between borrower and loan characteristics and the amount of cash taken out. The authors find that the single most important factor is the borrower's race/ethnicity, with minorities taking out much less cash ($5,537 less, on average) than Whites do. Canner, Dynan, and Passmore find that homeowners' income is not as important as race in determining the probability of taking cash out; those whose income is less than $40,000 take out $1,847 less, on average.

To the extent that some owners are tapping their equity, it would be interesting to know how the use of proceeds from cash-out refinancing or home equity mortgages differs by income and race/ethnicity to evaluate the extent to which these funds are used to enhance owners' asset ownership or simply to fund current consumption; unfortunately, little information is available on

Exhibit 3

Propensity To Tap Home Equity by Income and Race/Ethnicity of Owners

	Low Income (%)	Moderate Income (%)	High Income (%)	White (%)	African-American (%)	Hispanic (%)	First-Time Buyers (%)
Share of all owners with—							
Cash-out refinance	1.6	3.1	3.7	2.7	1.7	3.2	0.3
Home equity loan	8.1	15.3	21.2	15.5	8.4	8.7	7.8

Source: 2003 American Housing Survey

this topic. Canner, Dynan, and Passmore (2002) report on the differences in the use of cash taken out among all owners and find that the most common use is the repayment of other debts (51 percent), followed by home improvement (43 percent) and consumer expenditures (25 percent). More rarely, the authors find that owners use proceeds to make investments in stocks or other financial instruments (13 percent) or real estate and businesses (7 percent). The AHS reports only on the proportion of cash used for home improvements. Low-income households are slightly less likely to use cash-out proceeds for home improvement expenses compared with moderate- and high-income owners (57 percent compared with 62 percent, respectively). Regarding race/ethnicity, Hispanics (67 percent) are more likely to use cashed-out funds for home improvement than either Whites (60 percent) or African Americans (56 percent).

Haurin and Rosenthal (2005c) provide some indication of the extent to which homeowners tap home equity for other purposes. This study employs a different approach than the studies discussed previously to estimate the extent to which homeowners tap capital gains for other purposes. The authors' basic approach is to predict levels of total household debt and nonhousing assets as a function of a variety of household characteristics, including changes in the value of the home. The study uses two different data sets, including pooled observations from the Survey of Consumer Finances from 1983 through 2001 and the NLSY from 1980 through 2000. The authors conclude that low-income and minority households have a somewhat higher propensity to tap capital gains, because, for each dollar gained in housing equity, the amount of household debt among these owners increases by between 12 and 18 cents, compared with an increase of 8 to 17 cents for high-income households. This conclusion differs from the studies focusing solely on mortgage debt, which found that low-income households and minorities were less likely to borrow against their homes. The results suggest that these owners may be more likely to use nonmortgage debt as a means of tapping home equity—or that they are less likely to experience gains in house values and so have less opportunity to do so.

One key finding of this study is that important differences by income are evident in how owners use their housing wealth. High-income households appear to spend most of their gains on nondurable goods because they experience little increase in the value of nonhousing assets. For low- and moderate-income households, on the other hand, much of the increased debt is associated with an increase in the value of nonhousing assets, with estimates ranging from 11 to 15 cents. Thus, although high-income households are more likely to tap housing equity for consumer expenditures, low- and moderate-income households are more likely to use their gains to finance the purchase of other durable goods.

A significant rise in recent years in the amount of home equity being extracted through refinancing is one important caveat regarding the findings of most of these studies. Freddie Mac data on conventional conforming loans show that the amount of home equity withdrawn through refinancing grew rapidly beginning in 2001. Before that year, the peak value of home equity cashed out was $40 billion in 1998. In 2001, $83 billion in home equity was cashed out. The amount continued to rise sharply through 2006, when $318 billion was cashed out.[15] The rise in cash-out refinancing seems to be

[15] See http://www.freddiemac.com/news/finance/docs/cashout_vol_annual.xls. Because these figures exclude government-insured, jumbo, and subprime mortgages, they undoubtedly underestimate the total volume of cash taken out, but the trends are nonetheless instructive.

driven by a combination of rapid growth in housing values, continued low interest rates, and increases in consumer debt in general (Canner, Dynan, and Passmore, 2002). Most of the studies cited previously rely on data from 2001 or earlier, which is before the peak of this cash-out boom.

Investing in Home Maintenance and Improvements

Another important choice that borrowers face after purchasing a home is whether and how much to invest in maintenance and improvements. These investments are important for several reasons. A certain level of investment in the house is needed to counter the effects of depreciation and protect the owner's investment. Deferred maintenance can lead to larger problems and have significant effects on the home's value. For example, ignoring a leaking roof can lead to substantial damage to both the structure and the interior of the home. Aside from being necessary to maintain the value of the home, maintenance expenditures are of interest because they can also add to the financial burdens of homeownership. If low-income and minority households purchase older homes that require greater levels of ongoing maintenance, the cost of such maintenance will increase their total housing costs.

Very little research has examined low-income owners' experience in having to make investments to maintain and repair their homes. Rohe et al. (2003), in their investigation of this issue, surveyed low-income participants in homeownership counseling programs offered through affiliates of the Neighborhood Reinvestment Corporation in eight locations around the country. The survey, conducted about 18 months after participants received counseling, asked those who had purchased homes about their experience with unexpected major costs associated with the house and whether any repairs were needed that the owner had been unable to afford. The responses from 343 homebuyers suggest that both of these issues were fairly common among the low-income buyers participating in these programs. Nearly one-half (48 percent) of the respondents indicated that they had experienced a major unexpected cost, with the most common problem being the need to repair one of the home's major systems, such as heating or plumbing. A little more than one-fourth of buyers (28 percent) also reported a needed repair that they were unable to afford, most commonly including problems related to the roof, foundation, or major systems. The survey results suggest that home maintenance issues may be fairly common among low-income buyers who receive assistance from homeownership counseling programs.

Although little work explicitly focuses on low-income homeowners, a fair amount of literature has evaluated the factors associated with an owner's decisions about whether to invest in home improvements and, if so, how much to invest. In general, this research finds that low-income and minority households are less likely to make improvements and, when they do, their investments are smaller (Baker and Kaul, 2002; Boehm and Ilhanfeldt, 1986; Harding, Miceli, and Sirmans, 2000; Mendelsohn, 1977; Montgomery, 1992).

Another interesting finding from this literature is that, although low-income homeowners in general are more likely than higher income owners to engage in do-it-yourself (DIY) efforts to maintain and improve their homes, minority homeowners are less likely to engage in DIY projects (Bogdon, 1996; Mendelsohn, 1977). Bogdon speculates that minorities might not be as likely to engage in DIY efforts because they are less likely to have grown up in an owner-occupied home and so have had less opportunity to develop the skills needed for these efforts. She also posits that some low-income

households may have greater difficulty in undertaking DIY efforts if they have to work long hours to compensate for lower hourly wages.

Tabulations of the 2003 AHS by the Joint Center for Housing Studies (2005) shed some light on the variation by income and race/ethnicity in the prevalence of DIY efforts compared with hiring professional contractors for home improvement projects. The Joint Center figures show that, although 53 percent of Whites undertake DIY projects, only 42 percent of African Americans do. Hispanics are actually 8 percentage points more likely than Whites to undertake DIY efforts. One explanation for the differences between Hispanics and African Americans may be that Hispanic immigrants come from countries where it is very common for households to construct their own housing (so-called self-help housing). Another factor might be that Hispanic owners are even more likely to be in married-couple households than Whites are and so have more adults in the household to support DIY activities.

Bogdon suggests that, to the extent that less DIY activity is the result of less knowledge of how to undertake these projects, the obvious policy response would be to make training available for new homeowners to develop these skills. If in fact the lower level of DIY activity among African Americans is indicative of less ability to undertake repairs and improvements to the home, it also raises concerns that these owners are deferring routine maintenance and potentially increasing the magnitude of these problems. This issue further highlights the lack of research that provides a good understanding of the maintenance needs of low-income homeowners, particularly African Americans, and how they respond to these needs.

A final issue regarding maintenance and improvement expenditures that has not been studied much is the relationship between neighborhood conditions and an owner's decision to invest in his or her home. In theory, poor neighborhood conditions would deter investment in the home because the owner would be less likely to recoup his or her investment in a declining area. Although most studies of home improvement activities include controls for region and whether the home is in a central city or suburban area, few have attempted to capture variations in neighborhood conditions. Of those that have, Boehm and Ihlanfeldt (1986) find that owners in areas with high crime rates and higher shares of surrounding buildings with structural defects are less likely to invest in their homes. On the other hand, Montgomery (1992) includes the AHS measure of neighborhood quality but finds that it is only weakly correlated with home improvement activities. One study, Ioannides (2002), directly assesses this issue and analyzes the association between spending on home improvement by other homeowners in the immediate vicinity on a homeowner's own improvement spending. Although he finds a strong, positive effect of neighbors' home improvement investments, the study does not identify whether this effect varies by the characteristics of the neighborhood. The question of whether investment in home upkeep and improvement varies with neighborhood condition is not well studied.

Financial Benefits of Homeownership

The belief that homeownership is the primary means of wealth creation for most U.S. households is a fundamental reason why policymakers have made it an important goal to increase homeownership opportunities for low-income and minority families. Indeed, cross-sectional evidence suggests

a powerful role for homeownership in wealth creation. In 2000, equity in homes accounted for 56 percent of aggregate wealth among households with incomes in the lowest quintile compared with 32 percent of aggregate wealth among all households. Housing wealth was even more important among African Americans, accounting for 62 percent of their aggregate wealth (Orzechowski and Sepielli, 2003). The trouble with such ex post views is that they do not address the proportion of households for whom homeownership may have produced negative results (because they revert to renting and are counted among that cohort), do not consider self-selection of households more apt to save and invest in homeownership, or do not discuss the observable differences among owners and renters that may also drive wealth accumulation, such as higher average incomes, wealth, and residential stability.

Although faith in the financial benefits of homeownership is strong, the literature examining owner-occupied housing from a financial investment perspective reveals that ownership is certainly not always the best choice. Chief among the concerns is the risk of experiencing weak appreciation in house values or even declines in house price over an investment period. These concerns are well founded; over the past 30 years, a number of markets have experienced significant booms and busts in housing prices, exposing owners who are forced to move at the wrong time to potentially significant financial losses. In other markets, even longrun appreciation in house prices has not kept pace with inflation. In these areas, owners would have been better off financially if they had invested in a balanced portfolio of stocks and bonds. Also adding to the risk of losing money on owning relative to renting are the significant transaction costs associated with buying and selling homes. Finally, even if homeownership is, in fact, a good investment for the average household, the question regarding whether it is a good investment for low-income and minority households remains.

Before turning to the central question of whether low-income and minority homeowners are less, more, or just as likely as other owners to benefit from housing appreciation, it is worth considering the general question of how financial returns to housing compare with other investments. During such an analysis, when financial leverage is not taken into account, estimates suggest that the financial returns from homeownership are a little lower than for stocks but with lower risk (Goetzmann and Spiegel, 2002). When tax considerations, imputed rent, and financial leverage are included in the analysis, on average and over fairly lengthy holding periods, homeownership is found to generate significant financial returns relative to renting and investing a downpayment in other assets (Case and Shiller, 1990; Flavin and Yamashita, 2002; Goetzmann, 1993). When financial leverage is included, the financial returns of homeownership were found to be even greater than that of stocks in all four metropolitan areas studied by Goetzmann (1993) and also by Case and Shiller (1990) over the 1980-to-1996 period. Indeed, Goetzmann concludes that when tax benefits, the value of housing services, and financial leverage are all considered together, returns from homeownership increase by a multiple of between 1.6 and 3.7 and greatly exceed the returns from alternative investments.[16] Thus, fairly strong support exists for the view that homeownership can be a sound financial investment.

[16] Several studies also examine the issue of how much housing should be owned to optimize a household investment portfolio. In general, the household's consumption demand for housing is found to force lower wealth households to hold a larger share of their wealth than is optimal in housing. These studies still find, however, that given this constraint and the risks and returns offered by owner-occupied housing, homeownership does represent a constrained optimum investment strategy (Brueckner, 1997; Flavin and Yamashita, 2002; Goetzmann, 1993).

Housing Appreciation and the Financial Return to Homeownership

House price appreciation is the single most important driver of the financial returns of homeownership relative to renting. Especially for those homeowners who leverage their investment by taking out mortgages, even small rates of price appreciation can produce large leveraged returns.

Variations in Housing Appreciation by Income and Race/Ethnicity

A fairly extensive body of literature evaluates differences in housing appreciation rates across different value submarkets within metropolitan areas. Dietz and Haurin (2003) and McCarthy, Van Zandt, and Rohe (2001) provide fairly thorough reviews of this literature. A variety of approaches are used to define submarkets by value in these studies. One approach divides individual homes into different value categories (for example, lower quartile or upper quartile) without regard to the specific neighborhood where the home is located. Another approach examines appreciation rates for individual neighborhoods as a function of neighborhood characteristics, including the median home value. Finally, a few studies use household microdata that provide information on the characteristics of the occupant and the home that can be used to define the market segment. A common feature of many of these studies is that they focus on a single market area or a small number of markets over a specific time period. In these cases, it is not clear if the findings are unique to just the individual markets over the specific period studied or if they reflect relationships that hold more generally across markets and over all time periods.

Although it is difficult to draw definitive conclusions about differences in appreciation rates by housing value from studies that examine only a few markets, when taken as a whole, the literature leads fairly convincingly to the conclusion that no consistent difference is evident in appreciation rates between low-income and high-income market segments. Although it is true that several studies have found that lower valued homes or neighborhoods have experienced less appreciation (Kim, 2000; MacPherson and Sirmans, 2001; Poterba, 1991; Seward, Delaney, and Smith, 1992), it is also the case that others have found that lower valued homes or neighborhoods have experienced more appreciation (Archer, Gratzlaff, and Ling, 1996; Belsky and Duda, 2002; Case and Mayer, 1996; Case and Shiller, 1994). Most commonly, the results of these studies find either no significant difference in appreciation rates or mixed results. This observation leads to the conclusion that whether low- or high-valued homes or neighborhoods appreciate more depends on the specific time period or the specific market studied (Case and Marynchenko, 2002; Goetzmann and Spiegel, 1997; Kiel and Carson, 1990; Li and Rosenblatt, 1997; Pollakowski, Stegman, and Rohe, 1992; Quercia et al., 2000; Smith and Ho, 1996; Smith and Tesarek, 1991).

In comparison with studies of differences in appreciation rates across different submarkets defined in terms of housing values, much less recent research examines differences in appreciation rates by the race/ethnicity of the owner or the racial/ethnic composition of the neighborhood.[17] Given

[17] Literature from the 1970s and earlier was concerned with the issue of whether the racial segregation of African Americans resulted in African Americans and Whites paying different prices for comparable housing. These studies generally focused on evaluating differences in the price of housing in a single market and at a single point in time based on the racial composition of a neighborhood and how the racial composition had been changing. The general conclusion of this literature is that, compared with Whites, African Americans paid a premium for housing in the 1960s; however, as White suburbanization accelerated in the 1970s, house prices in predominantly African-American neighborhoods were lower than in White areas. See, for example, King and Mieszkowski (1973), Schnare (1976), Schnare and Struyk (1977), and Yinger (1978).

the thinner literature on this topic, it is more difficult to draw general conclusions. Nevertheless, it appears that the effect of neighborhood racial/ethnic composition on price appreciation is also mixed. After including controls for the housing unit, neighborhood, and household, Kiel and Zabel (1996) found that the effect of neighborhood racial/ethnic composition on house prices was inconsistent in a study of three metropolitan areas from the late 1970s through 1990. Using similar controls to study two Florida metropolitan areas from 1970 to 1997, MacPherson and Sirmans (2001) found a higher Hispanic share was associated with greater price appreciation over the period but the African-American share was not associated with price changes. The authors also found that increases in the African-American share over time were associated with less appreciation in both areas but increases in the Hispanic share were associated with higher appreciation. Similarly, Coate and Vanderhoff (1993) concluded that, nationally, over the 1974-to-1983 period, homeowners' race/ethnicity was not statistically significant in predicting house price changes after other controls. Despite this finding, Quercia et al. (2000), who examined price changes in Miami over the 1972-to-1993 period, found that homes in neighborhoods with a high concentration of minorities experienced lower appreciation over the period than other neighborhoods did. Kim (2000) found the same result in Milwaukee over the 1971-to-1993 period. It is also important to bear in mind that a number of studies suggest that minority first-time homebuyers are not concentrated in predominantly minority neighborhoods anyway, although they are moving to areas with higher minority shares than White first-time homebuyers. (For a review of this literature see Herbert and Belsky, 2006.)

Variation in Appreciation by Structure Type

Another key factor to consider regarding differences in appreciation rates is the type of home purchased. For the most part, studies examining both the financial returns to housing in general and differences in appreciation rates for different segments of the housing market have focused on price trends for single-family detached housing. From 1989 to 2003, however, nearly one-fourth of low-income first-time homebuyers purchased a manufactured home, compared with only 11 percent of moderate-income and 4 percent of high-income buyers. In addition, African-American first-time buyers are also somewhat more likely to purchase single-family attached homes (12 percent) than are all buyers (8 percent), and first-time buyers in high-cost markets are more likely to purchase condominiums in multiunit structures as a more affordable way of attaining homeownership.

Unfortunately, the literature on the effect of structure type on price appreciation is particularly thin. Tong and Glascock (2000) claim that their study of Baltimore, Baltimore County, and Montgomery County in Maryland was the first designed to model drivers of appreciation rates across single-family detached homes, townhomes, and condominiums. They do note, however, that Pollakowski, Stegman, and Rohe (1992) found evidence that single-family detached homes appreciate more rapidly than others and that Clapp, Giaccotto, and Tirtiroglu (1991) found that condos appreciated less rapidly than single-family homes did in the Hartford metropolitan area. Examining the issue directly, Tong and Glascock (2000) find substantial differences in the relevant explanatory variables and in appreciation rates by structure type. Even in just these three areas, however, detached homes appreciated more in some places and during some time periods while attached homes appreciated more in other places and during other time periods. Only condos were found to have a consistent effect on prices—in this case, a positive association with price volatility. Given only a

single direct study of effects, however, the appropriate conclusion is that the correlation of price appreciation with structure type is sensitive to temporal and spatial variations in the supply of and demand for different structure types.

Regarding the influence of manufactured housing, the consistent conclusion of the few studies of the issue is that ownership of land is the decisive factor in whether the housing appreciates at or near the rates of other structure types. In cases in which owners of the manufactured housing also own the land, manufactured homes generally appreciate at close to the same rate as other homes do (although with greater variation in returns) (Apgar et al., 2002; Boehm and Schlottmann, 2004a; Jewell, 2003; Stephenson and Shen, 1997). Absent land ownership, manufactured homes offer little opportunity for appreciation.

Influence of the Timing of Purchase and Sale on Financial Returns

Although the existing literature does not support the view that low-valued homes or low-income communities necessarily produce less appreciation, the literature examining housing appreciation patterns makes clear that the timing of purchases and sales matters a great deal because appreciation rates vary substantially both across markets and over time. For example, an analysis of price trends in 163 market areas for which Freddie Mac produces price indexes reveals that, between 1990 and 1995, slightly more than one-fourth of these areas experienced declines in nominal home values and more than one-half had gains that did not keep pace with inflation. Since 1995, however, strong house price growth has been widespread. Between 2000 and 2005, 41 percent of market areas had nominal price growth of more than 50 percent and, in virtually all markets, house price growth has outpaced inflation. The Freddie Mac price indexes also reveal that over the long run the periods of price increases more than offset the periods of declining prices as house price growth exceeded inflation for the 1975-to-2005 period in all but 13 of 163 markets. Because the typical homeowner is unlikely to own a single home over the long run, however, whether a homebuyer realizes a positive financial return depends critically on both what market he or she lives in and when he or she buys and sells the homes. In fact, since the beginning of 2006, house price growth has slowed significantly, with nearly one-fourth of the markets tracked by Freddie Mac experiencing price declines by the end of 2007. Many of those who bought homes in recent years are likely to see their home values decline.

An analysis by Belsky and Duda (2002) underscores the importance of the timing of the purchase and sale of a home in determining the financial returns realized by individual owners. Analyzing repeat sales data for single-family homes in four markets over the 1982-to-1999 period, they find that the estimated mean return realized by owners of low-cost homes was consistently large and positive in all four areas but the average return for moderate- and high-cost homes was small or negative in most cases. After taking into account both general inflation and the transaction costs of selling homes, the authors also find that a large share of owners at all price levels in all markets experienced a financial loss. Thus, low-cost homes experienced greater price appreciation and exposed buyers to less risk of loss compared with higher cost homes—at least in the markets and time period Belsky and Duda studied. With buyers of low-cost homes in all four metropolitan areas less likely to lose money, homeownership appears to have been less of a gamble for those who purchased low-cost homes in those areas. In fact, the authors find that the better financial return

experienced by buyers of low-cost homes mostly reflected less where they bought than it did better timing of purchases, because high-cost purchases made up a larger share of purchases around price peaks and low-cost purchases made up a greater share of purchases during troughs. This result leads Belsky and Duda to question whether efforts to increase homeownership among low-income families during the recent housing boom might mean that these buyers will be more likely to experience losses during the current bust.[18]

Comparing the Costs of Owning and Renting

The previous section examined whether homeowners—and particularly low-income and minority homeowners—are likely to realize a fair financial return on their investment through appreciation in home values. Although homeownership may be likely to provide a fair financial return, it is still possible that individuals could be financially better off by renting a home and devoting their savings to other investments.

The ongoing costs associated with owner-occupied homes include mortgage interest, property taxes, maintenance, and hazard insurance. In addition, transaction costs are associated with buying and selling a home and with originating a mortgage both at the time of purchase and when the mortgage is refinanced. These costs are offset by the financial benefits associated with appreciation in the value of the home and the potential deductibility of payments for mortgage interest and property taxes. Thus, a complete accounting of the costs of homeownership must take into account the ongoing costs of paying for the home, the annual tax benefits realized (if any), and transaction costs and capital gains on the sale of the home.[19]

In comparison, the costs and benefits of renting are fairly straightforward. The costs include rent payments, the transaction costs of signing a new lease (such as a REALTOR® fee), and the costs of leaving an existing one (such as loss of a security deposit for damage to the unit or fees for breaking a lease). These costs are offset by the financial gain associated with investing funds that would otherwise be used to support the purchase of a home. (Alternatively, rather than count this return as a benefit of renting, these financial returns on savings can be counted as an opportunity cost associated with owning.)

Before turning to the literature that compares the costs of owning and renting, it is helpful to first examine each component of these costs to assess how they might differ based on household income or race.

[18] Several caveats to the results are important to examine. First, most of the cases in their data set consisted of owners who sold their homes within 9 years of purchase. Owners who remain in homes more than 9 years account for more than one-half of all buyers and are more likely to benefit from the tendency of homes to appreciate above the rate of real income growth over the long run. Second, the analysis is done in real terms. Thus, sellers might lose money in real terms but still walk away from a sale with cash in hand from nominal gains. Indeed, most owners sold their homes for more than they bought them for, even after transaction costs. Third, the study examines only single spells of homeownership. It is possible that those who sold their homes near the bottom of a cycle and experienced a real loss may have been well positioned to benefit from the next upswing in prices.

[19] Because capital gains taxes are not paid on either the first $250,000 in gains for single-person owners or $500,000 in gains for married-couple owners, it is generally assumed that no capital gains are paid on housing appreciation by homeowners. Although this treatment of capital gains is relatively new, the tax treatment of capital gains on owner-occupied homes in the past also generally made it possible for most owners to avoid these taxes.

Variations in Owner and Renter Costs by Income and Race/Ethnicity

The way in which the cost of owning differs from the cost of renting is most obvious when examining income. The difference results from the opportunity to deduct mortgage interest and property tax payments from income and the correlation of income with both marginal tax rates and the average size of a mortgage. An individual tax filer will benefit from this provision of the tax code only if the value of his or her itemized deductions exceeds the standard deduction.[20] The value of this benefit is equal to the amount of itemized deductions in excess of the standard deduction multiplied by the marginal tax rate paid on the income that is sheltered by these excess deductions. Low-income homebuyers are less likely to benefit from these tax provisions because their mortgage, real estate tax payments, and other itemized deductions are less likely to exceed the standard deduction and because their lower marginal tax rates reduce the value of this benefit if they do itemize.

Follain and Ling (1991) and Capone (1995) find that low-income married-couple households are unlikely to realize any tax benefits from homeownership. A simulation in Herbert and Belsky (2006) reveals that at the lowest income level considered ($15,000), single-parent, married-couple, and single-person households all fail to benefit from the tax considerations; as household income rises to $30,000, both single-person and single-parent households begin to realize some tax benefits from homeownership because itemized deductions exceed the standard deduction. Even at this income level, married couples still do not realize any benefits because of the higher level of their standard deduction. Given that the average income in 2003 for first-time low-income buyers was $30,000, this simulation suggests that the tax benefits realized by typical first-time buyers do little to reduce their out-of-pocket housing costs.

Another aspect of owners' costs that is likely to vary by income and race is the mortgage interest rate. Before 1995—and not really until subprime lending became much more common after 2000—rate differences of any magnitude at the time of loan origination for comparable mortgage products were rare and generally small. With the surge in subprime lending, which carries much higher interest rates, all of that has changed. By 2006, about one in five originated loans was subprime; likewise, between 10 and 15 percent of all mortgage debt outstanding was subprime. Release of high-cost lending information with the 2004 Home Mortgage Disclosure Act revealed conclusively that these loans are particularly common among low-income and minority owners. In addition, as discussed previously, low-income and minority owners are less likely to refinance their mortgages to lower interest rates when such opportunities arise. Minorities, in particular, are both less likely to refinance when interest rates drop and, when they do refinance, they are found to pay interest rates that are about 1 percentage point higher than the rates that Whites pay. In short, differences in mortgage choices, both at purchase and over time, are likely to contribute to differences in the cost of owning relative to renting for low-income and minority owners.

A particularly challenging and important aspect of the comparison of the costs of owning and renting is determining the market rent for a home of a given value. One approach used is to make

[20] Other than mortgage interest and property tax payments, the next most common itemized deductions are state and local taxes and charitable contributions. Other categories of itemized deductions include medical, employment, and educational costs, but these are much less commonly claimed given the rules governing what can be claimed as a deduction in each of these categories.

an assumption about the ratio of annual rent to the home's value. Most studies do not address the question of whether variations might exist in the ratio between rent and house values. Findings from Linneman and Voith (1991) and Capone (1995) suggest that a higher ratio of rents to values among low-priced homes might exist; however, with only two studies of the issue, one done in a single city and the other relying on interviews with real estate professionals around the country, this area warrants further study.

Another way in which the costs of owning may vary by income and race results from differences in the length of time that owners occupy a home. Several studies have found that low-income and minority owners are more likely to move within 5 years, making renting more attractive than owning. Yet another source for potential differences is transaction costs, but this issue has not been studied at all; it is possible that low-income or minority sellers are charged higher brokerage fees, closing costs, or mortgage origination fees. Although available studies are less conclusive regarding differences in appreciation rates experienced by minorities, no strong evidence indicates that appreciation rates are lower for these owners.

Studies Comparing the Costs of Owning and Renting

Few studies compare the all-in costs of owning and renting. All of the studies rely on simulations to explore how different assumptions influence the desirability of homeownership. All try to anchor these simulations in estimates of actual values of critical variables over some period in some set of places, but they differ in important ways in terms of how detailed their estimates of costs are; the methods used to determine the starting relationship between market rents and home values of comparable units; whether they assess the importance to results of variations in price trends, rents, and other market factors after a tenure decision is made; and how tax issues are handled. In all cases, however, actual households are not tracked over time. Instead, average values of factors, such as price appreciation, marginal tax rates, rents, and returns on common investments, are used to simulate returns.

Due to variations in methods and assumptions used in these studies, the authors reach different conclusions about the circumstances under which owning is financially better than renting and how frequently these circumstances occur. Examining the literature, it is difficult to reach any definitive conclusions about whether low-income or minority households are better off owning or renting. The literature does make it clear, however, which factors are most critical. Several studies find that determining whether owning is financially preferable to renting is especially sensitive to assumptions about the level of rents compared with house values at the time of the initial tenure choice and with the course of house prices and rents after the initial decision is made (Belsky, Retsinas, and Duda, 2005; Capone, 1995; Goodman, 1998; Mills, 1990). Unfortunately, very little empirical information is available on how rents compare with values for comparable housing units, and the studies take different approaches to making these estimates. The variability in these estimates is enough to drive large differences in the minimum number of years it typically takes before owning becomes a better financial choice than renting. The literature also suggests that, under a range of reasonable assumptions, the value of tax benefits can be quite important in determining whether owning is a better deal than renting (Capone, 1995; Goetzmann and Spiegel, 2002; Mills, 1990). The fact that low-income households and married-couple low-income households receive fewer tax benefits from owning means that these households are more likely to be better off renting

than other households are. Capone's (1995) analysis also indicates that, as long as initial rents are high relative to values, owning is clearly a better financial choice than renting for stays as short as 3 years, whether tax benefits are realized or not.[21]

Because Mills (1990) and Capone (1995) assume a constant relationship between house prices and rents, their studies do not shed light on how fluctuations in the relative levels of house prices and rents over time affect the estimation of whether owning is financially preferred to renting. As Goodman (1998) notes, the assumption that rents and house values remain in equilibrium over time ignores the fact that housing prices may be slow to adjust to changes in market conditions.[22] To address this concern, Goodman uses actual national trends in home prices and rents between 1985 and 1995 to estimate the costs of owning and renting over this period. Using the AHS from 1985, he estimates the rent on a prototypical single-family home by a hedonic regression model, with the value of the home based on a tabulation of owner-reported home values. His estimated annual rent is 6.9 percent of the house value, remarkably close to the assumption of 7 percent used by Mills. Goodman then trends these values over time using the Freddie Mac index of home prices and the Consumer Price Index for rental housing. The data presented by Goodman show that, over this period, rents and house prices grew by a nearly identical average annual growth rate; as a result, Goodman's rent-to-value ratio hardly deviates from the starting assumption of 6.9 percent, so his results do not offer a valid test of how sensitive this analysis is to an assumption of a stable relationship between rents and house values. Thus, it is not surprising that his conclusion differs little from Mills' conclusion. Goodman finds that owning is preferable to renting only if the home is occupied for about 9 years. This time period is only somewhat longer than the Mills estimate because Goodman makes somewhat more conservative assumptions about the value of tax benefits.

Belsky, Retsinas, and Duda (2005) provide a more thorough test of the importance of the volatility of house prices and rents in determining whether owning is better financially than renting. As with the other studies reviewed, they construct an equation to estimate total housing costs for owners that can be compared with the cost of renting. As Goodman does, rather than assume a constant relationship between house prices and rents, they use price indexes to incorporate actual trends in these relative prices over time; however, they improve on Goodman's analysis by analyzing price trends in four different metropolitan areas over an 18-year period. Belsky, Retsinas, and Duda chose the four markets for study because they represent different degrees of house price growth and volatility. They focus their analysis on estimating how often owner costs are less than renter

[21] Capone cites two sources in support of a higher assumed ratio of rents to values for low-income households. First, he cites a study by Linneman and Voith (1991) that used the AHS for the Philadelphia metropolitan area in 1982 to estimate rent-to-value ratios as a function of both housing and occupant characteristics. Although this analysis finds a market average rent-to-value ratio of 10 percent, it also finds that this ratio is consistently higher for lower income households—generally exceeding 12 percent for those with incomes of $15,000 or less. Linneman and Voith argue that the higher capitalization rates found for lower income households are likely a result of the lower tax benefits from homeownership for these households. Goodman and Kawai (1982), in providing further support for this view, purport that differences in tax benefits by income are reflected in housing prices. Second, Capone justifies his assumption of higher rent-to-value ratios on the basis of interviews he conducted with real estate professionals to gather their assessment of the ratio of annual rents to property values for single-family homes.

[22] For example, Blackley and Follain (1996) find that investors' costs are much more volatile than market rents. Also, Gallin (2004) finds that, although rents and house prices do tend to move together in the longer run, in the short run they may exhibit divergent trends.

costs, assuming holding periods of 3, 5, or 7 years. Given the length of their data series on rents and house values, the authors can identify 16 different 3-year holding periods, 14 5-year holding periods, and 12 7-year holding periods. They then report the share of these different holding periods in which owners' costs were lower than renters' costs.

Reflecting their concern about whether homeownership is financially appealing for low-income households, Belsky, Retsinas, and Duda's starting home value is one-half of the market median value. They use data from the Bureau of Labor Statistics on owners' estimates of the rental value of their properties and compare these estimates with home values based on tabulations of the AHS for the markets. The ratio of rents to values is then used to estimate a rent level for homes at one-half the median home value. The authors then apply the market-specific Freddie Mac house price indexes and the consumer price indexes for rental housing to these initial values. Although not reported in their paper, the authors indicate that the starting ratio of rents to values is on the order of 5 to 7 percent across the markets studied.

In their simulations, Belsky, Retsinas, and Duda find that the two factors most likely to affect the cost of owning for low-income households relative to higher income households are whether they are able to realize any tax benefits from owning and the costs of mortgage finance. These factors are relevant because the price indices used were not divided into high- and low-price segments. Thus, the appreciation by segment is assumed to be the same. The authors then present a series of scenarios to test the effect of these factors on the relative costs of owning and renting. To test the importance of tax benefits on the costs of owning, they simulate returns, assuming households do not realize any tax benefit and assuming households benefit only to the extent by which the value of their mortgage and property tax deductions exceed the standard deduction. To test the effect of mortgage choices, they simulate returns on prime rates and higher rates and examine what happens if opportunities for refinancing to a lower cost mortgage are missed.

Pooling their results from the four markets, in their base case scenario in which full tax benefits are realized, Belsky, Retsinas and Duda find that, in 53 percent of the possible 3-year holding periods, owning would be preferred to renting. Extending the holding period to 5 or 7 years, the share of cases in which owning is preferred to renting rises to 63 percent of all possible holding periods. Thus, in just a little more than one-half of the possible holding periods in the four markets, owning was better than renting. In keeping with the fact that their analysis focuses on low-valued homes, the authors' results indicate that tax benefits have little effect on the likelihood that the costs of owning are lower than the costs of renting. Belsky, Retsinas, and Duda do find, however, that having an interest rate that is 2 percentage points higher, which simulates the effect of moderately higher interest rates from a subprime loan, reduces the likelihood that the costs of owning are less than the costs of renting by between 8 and 16 percentage points. Further increasing the interest rate obtained to be 5 percentage points above prevailing rates lowers the likelihood that owning is preferred to renting to only between 15 and 22 percent. In short, the authors' analysis indicates that very high-cost subprime loans make it unlikely that owning would be cheaper than renting.[23]

[23] The authors also examine the effect of missing refinance opportunities but find very little effect on the likelihood that owning is financially preferred to renting. This result likely reflects the fact that they assume that only 2 years (1993 and 1998) offered refinance opportunities, however, so that only a small subset of all possible holding periods was affected by these missed opportunities.

In assessing the conclusions reached by Belsky, Retsinas, and Duda, it is important to bear in mind that their analysis is based on a fairly low ratio of estimated rents to values. They do not attempt to assess whether these ratios vary by price segment of the market or what effect variations in the ratio would have on their conclusions. The ratio expanded considerably in most places in the first half of the 2000s as prices soared but rents did not. Nonetheless, their analysis does show that volatility in both house prices and rents is an important factor in determining whether owning is cheaper than renting. The analysis also shows that the higher mortgage rates associated with subprime lending, which are more likely to be incurred by low-income and minority owners, can have a significant effect on whether owning is cheaper. In particular, if mortgage interest rates are 5 percentage points above prime rates, the share of cases in which owning is better financially drops from about one-half to one-fifth. Large shares of low-income owners who bought in the 2003-to-2006 period using subprime mortgages, therefore, are at considerable risk of having made a choice that will lead them to become less well off than if they had elected to rent.

Homeownership and Longrun Wealth Accumulation

The complex web of factors that play a role in determining whether owners realize financial benefits from homeownership includes the degree to which house prices increase, whether owners are able to sustain homeownership, the timing of home purchases and sales relative to housing price cycles, the degree to which owners can take advantage of the income tax benefits of owning, and the choices owners make along the way regarding financing, maintaining, and improving their homes. The literature reviewed previously provides insights on some of these individual factors: low-valued homes appear no less likely to appreciate than higher valued homes do; in the past, low-income homeowners were more likely to benefit from buying near cyclical troughs in house prices, but not so today; low-income first-time buyers have longer average durations before a subsequent move; low-income homeowners are less likely to itemize deductions; and low-income owners refinance less often when the option to refinance would be financially advantageous. These other studies do not examine the combined effect of these choices and the propensity of owners to make certain choices about actual wealth accumulation.

A smaller vein of research uses longitudinal surveys to examine actual longrun wealth accumulation of homeowners as a more direct way to examine whether the average owner has benefited from wealth accumulation above and beyond that of similarly situated renters. By following households over a long period and observing changes in wealth, these studies implicitly account for the combined effect of housing price changes, the timing of purchase and sale, the ability to take advantage of tax benefits, and the effect of choices regarding refinance, maintenance, and improvement.

Perhaps the most carefully constructed study of this ilk uses the Panel Study of Income Dynamics to examine wealth accumulation from 1989 to 2001 (Di, Belsky, and Liu, 2007). The study models the 2001 household wealth as a function of initial wealth in 1989 and other variables, including the duration of homeownership. Although the study does not separately examine low-income homeowners, it has the advantage of controlling for the possibility that households with a higher propensity to save and invest also have a higher propensity to own homes, own them for longer periods, and accumulate more wealth over time. To control for this possible self-selection bias, the study's authors fit a model of the propensity of renters to save from 1984 to 1989 and used the

fitted value in their second-step regression. After controlling for the propensity to save and invest, for initial net wealth in 1989, and for income, education, and other family and personal characteristics, Di, Belsky, and Liu find that duration of homeownership is strongly and positively associated with wealth accumulation over long periods. Race is found to have a negative independent effect on wealth accumulation, but its effect is significant in only one of two tested models. The authors also model nonhousing wealth. Here, too, they find that duration of homeownership had a positive influence on nonhousing wealth accumulation (possibly through lower home equity borrowing costs and more fixed housing payments).[24] Overall, the results of this study are especially compelling evidence of a positive effect of ownership duration on wealth accumulation because they span a period when rents were growing more slowly, stocks were growing far faster, and house prices were near their longrun average. Timing appeared to play an important role, because those homeowners who had bought near a cyclical peak in real house prices in the early 1990s mostly held their homes long enough to benefit from later appreciation following a cyclical trough.

In an earlier study without controls for possible self-selection bias, Di et al. (2004) examine the wealth accumulation of low-income homebuyers relative to other homebuyers over the 1984-to-2001 period. As with the later study, the basic approach used in this article is to estimate a regression model that predicts the level of wealth in 2001 as a function of demographic characteristics, starting wealth in 1984, and measures of the length of time spent as an owner over the period since 1984.[25] When the authors estimate a separate model predicting 2001 wealth for those with average incomes over the study period in the lowest quintile of the sample, they reject the hypothesis that the same factors predict wealth levels for both low- and higher income households. This result indicates that the process for accumulating wealth through homeownership for low-income owners is distinct from that experienced by higher income owners. In fact, the results suggest that homeownership is arguably more important in predicting wealth accumulation for low-income households. Nevertheless, it is also true that low-income households accumulate much less wealth than higher income households with or without homeownership. Because this study did not incorporate suitable controls for self-selection biases, the magnitudes of the estimates are likely unreliable. Unless self-selection bias is greater for low-income than higher income households, however, it is likely that the finding of a larger effect of ownership on wealth accumulation for lower than higher income households is robust. When combined with the finding from the Di, Belsky, and Liu (2007) study that longer durations of ownership were associated with greater wealth accumulation on average, all else being equal, these two studies suggest that ownership has had a positive influence on wealth building.

[24] This result conflicts with the findings of Krumm and Kelly (1989), who explored the effect of homeownership on total savings levels. They used data from the 1976 Survey of Consumer Credit and a variety of approaches to control for endogeneity of the levels of nonhousing wealth and the decision to own to examine the relationship between household characteristics and both nonhousing wealth and total wealth. They found that the level of nonhousing savings for owners was either no different or slightly lower than the level for renters. This finding suggests that owning either has little effect on nonhousing savings or actually reduces it, but, importantly, the authors found that total wealth levels were always higher for owners compared with renters because the accumulated wealth in home equity made up for lower nonhousing savings. Thus, Krumm and Kelly's findings also support the view that even after controls for simultaneity in the propensity to accumulate wealth and own homes, owners accumulate more wealth.

[25] For all owners, a variable measuring the number of home sales during the period was not significant, so the results do not provide any indication that more moves lowers wealth, as might be expected given the high transaction costs of moving.

Boehm and Schlottmann (1999, 2004c) conducted the only other studies to examine influences of homeownership on wealth accumulation, but neither study controls for self-selection bias. In their 1999 study, the authors examine the wealth accumulation of the children of homeowners in the Panel Study of Income Dynamics and find, after appropriate controls, that adult children of homeowners have higher incomes, own homes sooner, and accumulate more wealth than the children of renters do. In their 2004 study, they first estimate the probability that a specific household will own a home from 1984 to 1992 in the PSID, using a hazard model, and then, if they do own, simulate how much the home will be worth using census tract data from 1990 and 2000. By mapping out the probability of different tenure paths over the 9-year period, the combined models yield an estimate of the overall appreciation each individual would be likely to experience over the time span studied. Although the authors do not net out transactions costs, the study does incorporate information on the timing and neighborhood choices of homebuyers by income and race. Their results indicate that the financial returns to homeownership are, in fact, greater for higher income groups and Whites, but that low-income and minority owners are still likely to experience significant positive financial gains from homeownership. As the authors note, although the gains realized by low-income and minority owners are smaller than the gains for other owners, the gains are still positive and nontrivial. They conclude that not only is homeownership an important means of wealth accumulation for low-income families but, for most of these households, it is the only form of wealth accumulation.

Reid (2004), also using the PSID, takes a simpler approach to testing for the influence of ownership on wealth accumulation. She uses the panel nature of the data to follow households that began as renters in 1976 and to follow their tenure choices at each survey period through 1994. She finds that, although both low-income Whites and minorities who were always renters had essentially no wealth in 1994, those who had become owners had roughly $25,000 to $30,000 in wealth on average, with most of this wealth being in the form of home equity. She also found wealth levels among low-income owners to be much less than those of higher income owners. Although it uses a different time period, Reid's study is consistent with Di et al. (2004) in finding that low-income owners do not accumulate nearly as much wealth as higher income owners do, but they nonetheless accumulate more wealth than renters do. The lack of controls in Reid's study, however, even for observed differences between low-income households that opted and did not opt to become owners at a later date, makes the study less persuasive.

Another topic considered in the literature is the optimal share of household wealth to hold in housing. Ambrose and Goetzmann (1998) find in Atlanta from 1970 to 1986 that low-income homeownership was optimal only if it did not exceed 34 percent of the low-income household's portfolio. Using the PSID, Hurst, Luoh, and Stafford (1998) also find that the level of housing wealth relative to stocks in 1989 was negatively associated with overall wealth in 1994 because, beyond a critical value, it created an undesirable portfolio balance. Di et al. (2004) test the effect of holding stocks on changes in wealth between 1984 and 2001, using a dummy variable indicating whether the household held a greater share of its 1984 wealth in stocks than in housing equity. In a manner similar to Hurst, Luoh, and Stafford (1998), Di et al. (2004) find that holding more wealth in stocks resulted in higher wealth levels. They also find, however, that it is still the case that being a homeowner is associated with greater increases in wealth than if the household just held stocks.

Overall, historical evidence indicates that on average the effect of homeownership on household wealth levels has been positive—and very possibly may be even more positive for low-income homeowners compared with higher income owners. Although high-income owners accumulate even more wealth than low-income owners do, this trend is due to other observable characteristics, such as high-income owners' higher average income, education, and wealth.

Whether these findings will hold in the future, however, remains uncertain in light of the high shares of low-income households that bought near the peak of the 1993-to-2005 housing boom and the large proportion of them with riskier loans and worse credit records than any past cohort of low-income borrowers. It is even more uncertain for minority low-income homeowners, given their higher propensity to have high-cost loans with initial 2-year teaser rates originated near the cyclical peak.

Social Effects of Homeownership

Although the association between homeownership and wealth creation is an important part of the appeal of homeownership as a policy goal, policymakers are also quick to cite a variety of nonfinancial benefits as justification for efforts to increase homeownership, including greater satisfaction among owners with their homes and neighborhoods. Other nonfinancial benefits—generally referred to as social benefits—go beyond merely being more satisfied with one's home. These benefits include positive effects on children growing up in owner-occupied homes, increased involvement in community affairs by owners with potentially positive effects on surrounding communities, and improved psychological and physical health among owners. This section reviews the literature that has examined homeownership's effects in each of these spheres.

Before turning to these specific topics, several broad issues about this literature should be noted. One significant challenge plagues research on the social effects of homeownership—people who choose to become owners are, on average, likely to be different from renters in important ways that may not be apparent from available data. This difference occurs largely because households with certain propensities self-select into homeownership. For example, given the high transaction costs associated with buying and selling a home, households expecting to stay longer in one home are more apt to elect to own. This reduced residential mobility, rather than homeownership itself and the behaviors homeownership may evoke, may be in large part responsible for the effects associated with homeownership, such as positive effects on children and greater social involvement. People also may be more drawn to homeownership because they prefer to live a more home-centered life and so are motivated to invest in a larger, higher quality home. The increased quality of the house and the focus on spending more time at home as a family—which could also be achieved as a renter—may also contribute to some of the effects associated with homeownership. Finally, to the extent that homeowners tend to cluster in neighborhoods—and they do in many cases—spillover benefits may occur from living in areas in which residential mobility is lower and in which household incomes are higher. But, again, to the extent that reduced residential mobility and greater income mixing yield positive social effects, it may be possible to produce these conditions by means other than promoting homeownership (as discussed by Apgar, 2004).

Another shortcoming of the existing literature is that many studies do not include measures of the confounding factors that may help produce the outcomes associated with homeownership, most notably residential stability and good housing quality. Studies that do include measures of these factors provide a better test of homeownership's independent effect on social outcomes and of the mechanism by which homeownership may produce the outcomes of interest. Although some of these factors might be captured by observable characteristics of the household, home, or neighborhood, many of these factors may not be easy to capture with survey data. Absent the ability to employ an experimental study design to assess the effects of homeownership, researchers employ statistical techniques to try to account for this selection bias. The most common approach is to first estimate the likelihood of homeownership for a household, using observable factors, at least some of which would not be expected to influence the social outcome of interest. This estimate of whether a household is likely to become a homeowner is then used to test the influence of homeownership on the outcome of interest. Although not a perfect solution for the problem of selection bias, such estimation techniques provide at least a partial test of whether homeownership's effects are likely due to selection bias.[26] In the review that follows, studies that include such tests are regarded as providing greater evidence of homeownership's likely effects. In addition, much of the literature on the social effects of homeownership is aimed at assessing whether an association in general exists between homeownership and the outcomes of interest, and so it sheds little light on whether differences exist by income or race.[27] Nonetheless, a few studies with a particular focus on assessing outcomes among low-income homeowners have been conducted. We give these studies particular attention in our review. Virtually no studies have assessed differences in social outcomes by the owner's race/ethnicity, and so that issue is not addressed in this review.

Effects on Children

Homeownership is purported to have a variety of positive effects on children, including higher educational attainment, greater success in labor markets, fewer behavioral problems, and higher rates of homeownership as adults. Synthesizing the various theories presented in the literature, Harkness and Newman (2002) identify four pathways by which homeownership may produce these positive effects on children.

To begin with, evidence shows that homeownership may be associated with a more stimulating and emotionally supportive home environment. In support of this view, Haurin, Parcel, and Haurin (2002) find a statistically significant positive association between homeownership and indicators of a more nurturing home environment, even after controlling for a variety of household characteristics and employing statistical controls for selection bias in who becomes an owner. What is not clear is exactly why homeownership would lead to a more supportive home environment. One hypothesis is that owners have greater life satisfaction and self-esteem, which helps foster this environment. Another argument is that owners are more likely to make investments in their home to tailor it to fit their tastes, which supports a more home-centered life.

[26] For a thorough discussion of the issue of selection bias as it relates to the social benefits of homeownership and the statistical techniques available to address this problem, see Dietz and Haurin (2003).

[27] Two recent excellent reviews of this literature in general are Rohe, McCarthy, and Van Zandt (2002) and Dietz and Haurin (2003).

Another way in which homeownership may have a positive effect is by providing a better physical environment for children. Better physical conditions may improve children's physical health by reducing the risk of illness or injury due to such factors as improperly functioning heating and cooling systems, infestations of insects or rodents, or exposure to hazards such as lead paint. Improved physical health in turn may contribute to better performance in school and to greater ability to interact socially with others. Furthermore, to the extent that owner-occupied homes tend to be larger single-family units, children may also benefit from having greater physical space and privacy to do school work or pursue other interests.

A third way in which homeownership may help produce positive outcomes for children is by helping to promote residential stability by insulating the family from the need to move at a property owner's discretion. Owners may also be more reluctant to move because of the higher transaction costs associated with moving. Residential stability has been found to be associated with better educational outcomes (Hanushek, Kain, and Rivkin, 2004) and may help foster greater social connections that enhance a child's self-esteem and provide greater opportunities for social engagement.

Finally, it is also hypothesized that the greater wealth accumulation associated with homeownership may confer a variety of benefits both by providing a financial cushion that can be used in times of need to provide a more stable home environment and by making it feasible to invest in education.

Educational Outcomes

A number of high-quality studies have investigated the effects of homeownership on the educational attainment of children. Despite differences in educational outcomes examined, data sets used, and methodological approaches employed, these studies universally conclude that the children of homeowners have better educational outcomes than the children of renters, even after controlling for a wide variety of other household characteristics and employing statistical methods to account for selection bias in who becomes an owner.

Among the first studies to address this question was Green and White (1997). Using data from the PSID, they estimate the probability that 17-year-olds were either still in school or had graduated from high school. The explanatory variable of interest is whether the child's parents were homeowners, but the authors also control for race, household income, parental education, and other household characteristics. They attempt to control for selection bias in who becomes a homeowner by estimating a bivariate probit model of the joint outcomes of housing tenure and educational outcomes for children. Green and White find that the 17-year-old children of owners are, in fact, more likely to be in school than the children of renters are. Importantly, they also find that the effects of homeownership on the probability of being in school are larger for low-income families. Children in homeowner households with incomes of less than $10,000 are found to be 19 percentage points more likely to be in school than are the children of renters, but among owner households with incomes above $40,000, the difference between owners and renters is only 12 percentage points.

Green and White also test their results by examining another data source, the 1990 Decennial Census, and produce results that are similar to those found using the PSID. To test whether the homeownership effect found using the PSID could be attributed to homeowners' living in higher quality housing or having longer duration of residence in a given location, Green and White, in their analysis, used census data that also incorporates measures of housing quality (as captured

by house value or rent) and length of time residing in the house. Even after incorporating these additional control variables, the results indicate that homeownership has a statistically significant independent effect on increasing the likelihood of being in school at age 17.

In his analysis of data from the PSID, Aaronson (2000) attempts to extend the work of Green and White by employing a much broader set of control variables and using a different methodology to control for potential selection bias in who becomes a homeowner. Aaronson begins by estimating a model that includes a set of explanatory variables similar to those that Green and White used. The results indicate that children of homeowners have a likelihood of graduating from high school that is 10 percentage points higher than that of the children of renters. Then, to examine whether this effect is the result of greater household stability, Aaronson incorporates measures of change over time in employment, marital status, and household composition. He finds that adding these controls does not affect the estimated homeownership effect; however, when Aaronson adds measures of residential mobility, he finds that the estimated effect of homeownership on high school graduation rates is halved, from 10 percentage points to 5. Aaronson concludes that a good deal of the effect of homeownership is, in fact, attributable to greater residential stability that is correlated with owning. Finally, Aaronson adds further controls to account for differences in household wealth, including the amount of housing equity. Including housing wealth in the estimated model is found to further reduce the estimated effect of homeownership on high school graduation by about one-half, with greater levels of housing equity associated with a greater likelihood of graduation.

In two related studies, Harkness and Newman (2002, 2003) make several important contributions to the existing literature. First, they focus their analysis specifically on low-income households (defined as those with incomes less than 150 percent of the federal poverty definition) to examine whether low-income households are as likely as higher income groups to realize the benefits of homeownership. Second, they introduce controls for neighborhood characteristics to examine the extent to which the realization of benefits of homeownership may vary depending on the socioeconomic status of the neighborhood. Their analysis of the PSID finds that, by age 20, the children of homeowners have completed, on average, one-half year more of schooling, are 13 percentage points more likely to have graduated from high school, and are 6 percentage points more likely to have obtained some postsecondary education.

Harkness and Newman (2003) also compare the magnitude of homeownership's effects between low-income and higher income households. They find that homeownership's positive effects are consistently larger in low-income families. Aaronson's results also support this conclusion. Although Aaronson does not sort his sample into low- and high-income households, he does estimate separate models for low- and high-income neighborhoods. He finds that the benefits of homeownership are statistically significant in low-income areas but not in high-income areas. Because low-income owners are more likely to live in low-income areas, this result is consistent with the findings of Harkness and Newman.

Harkness and Newman (2003) also test the sensitivity of their results to the use of four different instrumental variables to control for selection bias in who chooses to own a home. They find that for three of the four instruments, the homeownership effect is still statistically significant regarding educational outcomes for low-income children. This result leads them to conclude that the findings are robust even when using a variety of controls for selection bias; however, they find

that for higher income families, the use of these instruments results in a loss of significance for the homeownership variable. Thus, for higher income households, less evidence exists of an effect of homeownership after controls are implemented for the selection bias in who becomes an owner.

Although the basic model presented in Harkness and Newman (2002) does not include controls for residential mobility or housing equity, the authors do test for the effect of including these variables on the estimated homeownership effect. Consistent with Aaronson's results, the inclusion of measures of residential mobility diminishes the homeownership effect, but it still remains positive and statistically significant. Housing equity, on the other hand, is not statistically significant. Boehm and Schlottmann (1999) also use the PSID to estimate the effect of homeownership on children's educational attainment. They find that housing equity is not statistically significant in predicting graduation from high school, but it is significant in predicting graduation from college. This result is consistent with the hypothesis that the wealth generated through homeownership may make it financially feasible for the children of homeowners to attend college.

Harkness and Newman's other principal contribution is to incorporate measures of neighborhood socioeconomic status, as captured by the share of residents in their homes for 5 years or more, the poverty rate, and the homeownership rate. Their results indicate that the effect of neighborhood characteristics on educational outcomes is weak, with only neighborhood stability being marginally statistically significant. When they interact an individual's tenure status with the characteristics of their neighborhood, however, they find that neighborhood characteristics have a greater effect on owners than they do on renters. In particular, greater neighborhood stability is found to have more of an effect on owners' children. This observation is consistent with findings by Aaronson that the positive effects of homeownership on high school graduation rates are larger in neighborhoods with low mobility.

On its face, Harkness and Newman's finding that the children of low-income owners are more sensitive to neighborhood stability would suggest that homeownership in unstable communities would have more deleterious effects on owners than on renters.[28] They find, however, that when the positive effects of homeownership itself are considered, the children of owners living in unstable neighborhoods are still found to have higher educational outcomes than the children of renters in these areas. In short, the authors conclude that homeownership is beneficial to low-income families, even if they live in neighborhoods with low socioeconomic status.

Haurin, Parcel, and Haurin (2002) take a somewhat different approach to evaluating the effect of homeownership on educational outcomes. Rather than examine the level of educational attainment, they use data from the National Longitudinal Survey of Youth to examine the association between homeownership and results on math and reading achievement tests. They find that homeownership has a positive and significant effect on test results for the children of owners—on average, raising math scores by 9 percent and reading scores by 7 percent. The positive influence of homeownership remains even when controls are incorporated to account for sample selection bias. Thus, in addition to providing evidence that owners' children are more likely to stay in school longer, Haurin, Parcel, and Haurin provide evidence that the academic achievement of these children is also higher.

[28] Statistically significant, positive effects of residential stability on educational outcomes imply that a lack of stability will have negative effects on these outcomes.

Employment, Earnings, and Welfare Use

Two studies have assessed the effect of homeownership on the labor market outcomes realized by the children of homeowners, including the wage rates they achieve as young adults, the likelihood that they will be idle at age 20 (that is, neither employed or in school), and the likelihood that they will receive welfare as young adults. The results suggest that homeownership is associated with at least moderately positive outcomes for children in labor markets. Harkness and Newman (2002) find that homeowners' children have average wage rates that are $0.70 per hour higher between the ages of 24 and 28, are 7 percentage points less likely to be idle at age 20, and are 9 percentage points less likely to receive welfare between the ages of 24 and 28. When controls for neighborhood characteristics are introduced, however, the effects on wage rates and idleness are no longer statistically significant, although owners' children are still less likely to receive welfare. When they employ instrumental variables to control for selection bias in who becomes an owner (Harkness and Newman, 2003), the authors do not find a statistically significant effect on idleness, but a significant and positive association exists between homeownership and both wages and reduced welfare use.

In their analysis of the PSID, Boehm and Schlottmann (1999) examine the association between homeownership and children's average wages 10 years after leaving their parents' home. Although their results do not find a statistically significant direct effect of homeownership on children's earnings, they note that homeownership does have an indirect effect on wage rates through its statistically significant association with increased educational attainment. Using the results of their models, they find that the increase in educational attainment that is associated with growing up in an owner-occupied home produces an increase in average annual earnings of $7,500.

Teenage Pregnancy and Behavioral Problems

Several studies have investigated the association between homeownership and the incidence of teenage pregnancy or behavioral problems. Green and White (1997) use the High School and Beyond survey to evaluate whether the daughters of homeowners are less likely to have had a child by age 18. Although they do find a positive effect of homeownership, the magnitude is fairly small, reducing the likelihood of having a child by only 2 percentage points. Using the PSID, Harkness and Newman find that the children of homeowners have about a 3-percentage-point lower chance of having a child by age 20, but this difference is not statistically significant in any of the specifications tested.

Haurin, Parcel, and Haurin (2002) evaluate the association between growing up in an owner-occupied home and an index of behavioral problems as measured by mothers' responses to 28 questions in the NLSY about the prevalence of behaviors such as acting out, having a strong temper, demanding attention, and being depressed or anxious. Their results indicate that homeownership is associated with a 3-percent reduction in the incidence of problematic behaviors, but the effect is not statistically significant.

Taken together, these papers suggest that homeownership may have some positive effect on children's behaviors, but, if so, the magnitude of this effect is fairly small.

Homeownership

One last outcome examined in the literature is whether the children of homeowners are more likely themselves to become owners. Boehm and Schlottmann (1999) use the PSID to examine the homeownership rates of children 10 years after leaving their parents' home. They find that, even after controlling for the usual predictors of homeownership, such as income and marital status, the children of owners have homeownership rates that are 25 percentage points higher than the rates of children of renters. This much greater tendency to own may reflect some combination of a greater preference for homeownership among those who have experienced it, greater comfort and familiarity with what is entailed in being a homeowner, or greater parental wealth that can be tapped to help achieve homeownership. Although Boehm and Schlottmann do not attempt to control for the selection bias in who chooses to become an owner, the rather substantial increase in the propensity to own a home among those who grew up in owner-occupied housing would seem likely to remain even if such controls were employed.

Effects on Social Involvement

One frequently touted benefit of homeownership is the tendency of owners to be more engaged in efforts to improve the community. Thus, increases in homeownership are thought to create more stable and healthier neighborhoods. A number of arguments are put forward in the literature to explain why homeowners are thought to be more likely to be engaged in efforts to improve their communities (Baum and Kingston, 1984; Cox, 1982; Dietz and Haurin, 2003; DiPasquale and Glaeser, 1999; Rohe, McCarthy, and Van Zandt, 2002; Rohe and Stegman, 1994a). Because neighborhood conditions have an effect on housing values, owners have a strong financial incentive to work to improve their communities. In addition to having a financial stake, owners are also likely to have an emotional stake in their homes and a pride of ownership that will motivate them to improve the surrounding community. Owners also face higher moving costs than renters do, so they may be more motivated to work to solve neighborhood problems because it is more difficult for them to move out. Finally, owners' longer duration of residence in a neighborhood may also increase the strength and number of relationships they have in the community, which increases both their willingness and ability to engage in efforts to improve the neighborhood.

The existing literature has examined several dimensions of social involvement. One aspect is the likelihood that a household will be engaged in political affairs as evidenced by how frequently they vote or whether they know the names of elected officials. Another measure of social involvement is the degree to which individuals participate in local organizations and institutions. A final dimension is the extent to which households are familiar and interact with neighbors.

Much of the existing literature, however, suffers from either a failure to account for selection bias or lack of an attempt to evaluate whether homeownership's effects differ with either the income or race of the owner. Also, studies on this topic are much less likely to include controls for residential duration to separate the effects of homeownership from the effects of residential stability. The most important study on this topic is DiPasquale and Glaeser (1999) because the authors not only introduce controls for selection bias in who becomes an owner, but they also investigate whether differences occur in homeownership's effects between low- and high-income owners and assess the influence of residential duration on estimated homeownership effect. Also of some importance

is a series of studies by Rohe and various colleagues (Rohe and Basolo, 1997; Rohe and Stegman, 1994a) based on surveys of participants in a low-income homeownership program in Baltimore and a pseudo-control group of low-income renters from the same geographic area. These studies are important because they focus explicitly on low-income households and because they examine changes in household behavior following a move to homeownership.

On the whole, the findings from these studies indicate that, at best, low-income owners have only a slight tendency to be more socially involved. Regarding voting and other indicators of engagement in the political process, although homeowners in general are more likely than renters to be engaged in political activities, this trend does not appear to be the case for low-income owners. DiPasquale and Glaeser find that low-income owners are more likely than renters to work to solve local problems, but, in general, the association between homeownership and such efforts is fairly weak because it is not statistically significant when controls for selection bias are employed. The studies by Rohe and his colleagues provide some indication that low-income owners are more likely to be involved with neighborhood associations, but because this study concerns participants in a low-income homeownership program that provided newly constructed homes in Baltimore, it is not clear if this study can be generalized to low-income homeowners. Finally, the scarce few studies that investigate differences in interactions with neighbors by tenure provide little evidence that low-income owners, in particular, are more involved with neighbors than their renter counterparts are.

Effects on Psychological and Physical Health

Another purported benefit of homeownership is a positive effect on both the psychological and physical health of owners. Psychologically, homeownership is thought to increase self-esteem, the perception of control over one's life (or self-efficacy), and overall life satisfaction. Among a variety of mechanisms by which homeownership is believed to contribute to these outcomes is higher self-esteem, which can result from the greater social status associated with homeownership and from the achievement of what is often an important personal goal of purchasing a home. In addition, owners are thought to have greater perceived control over their lives because they have greater control over their living situation. Finally, the wealth created through homeownership can contribute to a greater sense of financial security and help provide more of life's comforts. On the other hand, the greater responsibilities of maintaining a home and meeting its financial obligations may produce higher levels of stress for some households. In particular, households facing a potential foreclosure may experience a significant degree of emotional strain, leading to a loss of self-esteem, a feeling of having no control over one's life, and reduced life satisfaction.

Greater physical health may be attributable to greater psychological health based on the premise that lower stress and a better outlook on life will have positive repercussions for physical health. In addition, improved physical health could result from better quality of living conditions associated with enhanced home maintenance by owner occupants. Finally, increases in wealth associated with homeownership may also improve physical health by supporting better access to health care.

In general, the literature assessing the effects of homeownership on the psychological and physical health of homeowners is too thin to draw any firm conclusions, particularly regarding whether these effects may differ with household income. The studies by Rohe and Stegman (1994b) and

Rohe and Basolo (1997) represent the most compelling work on the issue of psychological effects. The authors' results suggest that homeownership may have a positive effect on overall life satisfaction of low-income owners, but they find little support for the hypothesis that homeownership increases self-esteem or perceived control over life. They do find, however, that improved housing conditions are associated with increased self-esteem and perceived control over life, which is consistent with the idea that homeownership indirectly influences these outcomes by helping to improve housing quality. However, if improving the quality of the home and neighborhood is the mechanism by which homeownership improves these outcomes, it may be possible to achieve the same results by means other than promoting homeownership. Efforts to improve the quality of rental housing, for example, might have the same result. Regarding physical health, some evidence indicates that owners do enjoy better health, but because most studies do not employ adequate controls for other aspects of a households' socioeconomic status or for housing quality, it is not possible to firmly conclude that this association exists. These studies in general do not shed light on whether these effects vary with homeowners' income. In short, the question of whether homeownership has an effect on physical health is very much an open question and one that requires further research.

Summary and Conclusions

This article primarily relies on a review of the existing literature to assess whether over time low-income and minority homeowners are as likely as other owners to realize the financial and social benefits of owning a home. Our general conclusion is that, for the most part, these owners are as likely as others to benefit from homeownership. Regarding homeownership's financial benefits, these owners are just as likely to see their homes appreciate in value as other owners are. Because housing is a leveraged investment, even modest appreciation in value, combined with paying down mortgage debt over time, results in fairly significant wealth accumulation. In fact, for most low-income households, housing wealth is their only source of wealth. In terms of social benefits, modest evidence shows that owners do benefit from improved psychological and physical health, although the research is not strong and little attention has been paid to whether differences occur in these outcomes for different income or racial/ethnic groups. Moreover, fairly convincing evidence shows that the children of low-income owners have greater educational success, and more modest evidence indicates that they have greater success in labor markets, are less likely to have behavioral problems, and are more likely to become homeowners themselves.

Nonetheless, even before the current foreclosure crisis, evidence indicated that low-income and minority individuals and families face a greater risk of being unable to sustain homeownership. Because the benefits of homeownership mostly accrue slowly over time, a failure to maintain homeownership will greatly reduce the chance of realizing these benefits. Although it can be argued that the risk of foreclosure remains fairly low for most owners, recent research on the rate at which households exit homeownership finds that for every household that faces foreclosure, several more voluntarily leave their homes. Several recent studies, using longitudinal panel surveys to trace the tenure choices of households over fairly lengthy periods of time, found that between 43 and 53 percent of low-income buyers will not sustain homeownership for more than 5 years compared with between 23 and 30 percent of high-income buyers. These studies also found that minorities at

all income levels are between 22 and 39 percent more likely to leave homeownership than Whites are. In the current market, the homeownership failure rate is likely to be even higher. These statistics reveal that the notion that "once an owner, always an owner" is not at all true—especially for low-income and minority families. Although sustained homeownership may yield substantial benefits, failed attempts at owning also precipitate significant costs. Cases ending in foreclosure undoubtedly impose significant financial and personal costs on these families. Much less is known about other early exits from homeownership, but these situations may also impose nontrivial financial and personal costs to the extent that owners are compelled to leave homeownership.

The research conducted on exits from homeownership draw on data that extend back before the sharp rise in homeownership rates in the 1990s. Thus, it is not the case that these relatively quick exits from homeownership are a new development. There is reason to believe, however, that the homeownership gains of the 1990s may have increased the number of owners at risk of being unable to sustain homeownership. Perhaps most importantly, the development of more flexible mortgage products has made it possible to buy a home with higher levels of debt, lower levels of savings, and worse credit histories than was previously possible—all of which have undoubtedly contributed to the high foreclosure rates the United States is now experiencing. The homeownership boom of the 1990s also brought into homeownership many more single adults, who may have less ability to carry their mortgage obligations in the wake of a financial crisis than do households headed by two adults.

Nonetheless, given the benefits that result from sustained homeownership, there is no reason to retreat from the goal of increasing homeownership opportunities for low-income and minority households. A clear need exists, however, for policies to increase the likelihood that homeownership will be sustained and its full benefits realized. A concerted policy effort to improve homeownership experiences will have three broad thrusts: (1) efforts to improve the initial homebuying choices made by these families and individuals—including whether owning is the right choice, (2) efforts to ensure that homeowners optimize their mortgage choices after purchase and make appropriate investments to maintain and improve their homes, (3) and efforts to help owners resolve crises that threaten their ability to sustain homeownership. For the most part, a variety of existing efforts support homeowners in each of these areas. As a result, the recommendations may be thought of more as an indication of where greater emphasis is needed rather than where a lack of effort currently exists. Among the specific approaches that need to be emphasized are prepurchase counseling to ensure that prospective homebuyers make informed choices about buying a home, postpurchase counseling to provide support for families after they are in their homes, affordable refinance programs to help owners minimize the costs of homeownership, and loss mitigation programs to provide options for owners in financial crisis to help them keep their homes.

This review of the existing literature has also revealed a number of areas in which not enough work has been done to fully understand the circumstances homeowners face, the nature of their decisions, or the outcomes realized. Further research is needed to provide a better understanding of the extent to which low-income and minority families and individuals benefit from homeownership and of the challenges they face in sustaining homeownership over time. Perhaps one of the most important issues identified in this review is that roughly one-half of first-time, low-income homebuyers are not able to sustain homeownership for at least 5 years and that minorities

fare slightly worse still. Relatively little is known about the experiences of these households as homeowners—what challenges they face and what resources they have to respond to these situations. Perhaps the most important area for further research is to gather better information about the experiences of low-income homeowners. Policymakers need this information to be able to identify the type of support necessary to ensure that low-income and minority households are able to sustain homeownership over time to be able to realize the many financial and social benefits of homeownership.

Acknowledgments

The authors gratefully acknowledge financial support from the U.S. Department of Housing and Urban Development (HUD), Office of Policy Development and Research. The authors also thank Harold L. Bunce and William J. Reeder of HUD for their careful and thoughtful review of earlier drafts of the report from which the authors developed this article.

Authors

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

Eric S. Belsky is executive director of the Joint Center for Housing Studies of Harvard University.

References

Aaronson, Daniel. 2000. "A Note on the Benefits of Homeownership," *Journal of Urban Economics* 47: 356–369.

Ambrose, Brent W., and William N. Goetzmann. 1998. "Risks and Incentives in Underserved Mortgage Markets," *Journal of Housing Economics* 7 (3): 274–285.

Apgar, William, Amal Bendimerad, and Ren S. Essene. 2007. Mortgage Market Channels and Fair Lending: An Analysis of HMDA Data. Working paper MM07-2. Cambridge, MA: Harvard University, Joint Center for Housing Studies.

Apgar, William C., Jr. 2004. "Rethinking Rental Housing: Expanding the Ability of Rental Housing to Serve as a Pathway to Economic and Social Opportunity," Working paper W04-11. Cambridge, MA: Harvard University, Joint Center for Housing Studies.

Apgar, William C., Jr., Allegra Calder, Michael Collins, and Mark Duda. 2002. *An Examination of Manufactured Housing as a Community- and Asset-Building Strategy*. Washington, DC: Neighborhood Reinvestment Corporation.

Apgar, William C., Jr., and Christopher E. Herbert. 2006. *Subprime Lending and Alternative Financial Service Providers: A Literature Review and Empirical Analysis*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Archer, Wayne R., Dean H. Gratzlaff, and David C. Ling. 1996. "Measuring the Importance of Location in House Price Appreciation," *Journal of Urban Economics* 40: 334–353.

Archer, Wayne R., David C. Ling, and Gary A. McGill. 2002. "Prepayment Risk and Lower-Income Mortgage Borrowers." In *Low-Income Homeownership: Examining the Unexamined Goal*, edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: Brookings Institution Press.

Baker, Dean. 2005. "Who's Dreaming? Homeownership Among Low Income Families," *CEPR Briefing Paper,* Center for Economic and Policy Research.

Baker, Kermit, and Bulbul Kaul. 2002. "Using Multiperiod Variables in the Analysis of Home Improvement Decisions by Homeowners," *Real Estate Economics* 30 (4): 551–566.

Baum, Thomas, and Paul Kingston. 1984. "Homeownership and Social Attainment," *Sociological Perspectives* 27 (2): 159–180.

Belsky, Eric S., and Mark Duda. 2002. "Asset Appreciation, Time of Purchase and Sale, and the Return to Low-Income Homeowners." In *Low-Income Homeownership: Examining the Unexamined Goal*, edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: Brookings Institution Press.

Belsky, Eric S., Nicolas Retsinas, and Mark Duda. 2005. The Financial Returns to Low-Income Homeownership. Working paper W05-9. Cambridge, MA: Harvard University, Joint Center for Housing Studies.

Berkovec, James A., Glenn B. Canner, Stuart A. Gabriel, and Timothy H. Hannan. 1994. "Race, Redlining, and Residential Mortgage Loan Performance," *Journal of Real Estate Finance and Economics* 9: 263–294.

Blackley, Dixie M., and James R. Follain. 1996. "In Search of Empirical Evidence That Links Rent and User Cost," *Regional Science and Urban Economics* 26: 409–431.

Boehm, Thomas P., and Keith R. Ihlanfeldt. 1986. "The Improvement Expenditures of Urban Homeowners: An Empirical Analysis," *AREUEA Journal* 14 (1): 48–60.

Boehm, Thomas P., and Alan Schlottmann. 2004a. *Is Manufactured Housing a Good Alternative for Low-Income Families? Evidence From the American Housing Survey.* Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Boehm, Thomas P., and Alan M. Schlottmann. 2004b. "The Dynamics of Race, Income, and Homeownership," *Journal of Urban Economics* 55: 113–130.

Boehm, Thomas P., and Alan Schlottmann. 2004c. *Wealth Accumulation and Homeownership: Evidence for Low-Income Families.* Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Boehm, Thomas P., and Alan M. Schlottmann. 1999. "Does Homeownership by Parents Have an Economic Impact on Their Children?" *Journal of Housing Economics* 8: 217–232.

Boehm, Thomas P., Paul D. Thistle, and Alan Schlottmann. 2006. "Rates and Race: An Analysis of Racial Disparities in Mortgage Rates," *Housing Policy Debate* 17 (1): 109–149.

Bogdon, Amy S. 1996. "Homeowner Renovation and Repair: The Decision to Hire Someone Else to Do the Project," *Journal of Housing Economics* 5: 323–350.

Brueckner, Jan K. 1997. "Consumption and Investment Motives and the Portfolio Choices of Homeowners," *Journal of Real Estate Finance and Economics* 15 (3): 159–180.

Calem, Paul S., Kevin Gillen, and Susan Wachter. 2004. "The Neighborhood Distribution of Subprime Mortgage Lending," *Journal of Real Estate Finance and Economics* 29 (4): 393–410.

Calem, Paul S., Jonathan E. Hershaff, and Susan M. Wachter. 2004. "Neighborhood Patterns of Subprime Lending: Evidence from Disparate Cities," *Housing Policy Debate* 15 (3): 603–622.

Canner, Glenn, Karen Dynan, and Wayne Passmore. 2002. "Mortgage Refinancing in 2001 and Early 2002," *Federal Reserve Bulletin* (December): 469–481.

Capone, Charles A., Jr. 1995. "Taxation and Housing Tenure Choice: The Case for Moderate-Income Homeownership," *Journal of Housing Economics* 4: 328–349.

Carr, James H. and Jenny Schuetz. 2001. "Financial Services in Distressed Communities: Framing the Issues, Finding Solutions," Washington, DC: Fannie Mae Foundation: 5–30.

Case, Karl, and M. Marynchenko. 2002. "Home Price Appreciation in Low- and Moderate-Income Markets." In *Low-Income Homeownership: Examining the Unexamined Goal*, edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: Brookings Institution Press.

Case, Karl E., and Christopher Mayer. 1996. "The Housing Cycle in Eastern Massachusetts: Variations among Cities and Towns," *New England Economic Review* March/April: 50–58.

Case, Karl E., and Robert J. Shiller. 1994. "A Decade of Boom and Bust in the Prices of Single-Family Homes: Boston and Los Angeles: 1983–1993," *New England Economic Review* (March): 40–51.

Case, Karl E., and Robert J. Shiller. 1990. "Forecasting Prices and Excess Returns in the Housing Market," *AREUEA Journal* 18 (3): 253–273.

Clapp, John M., Carmelo Giaccotto, and Dogan Tirtiroglu. 1991. "Housing Price Indices Based on All Transactions Compared to Repeat Subsamples," *AREUEA Journal* 19 (3): 270–285.

Coate, Douglas, and James Vanderhoff. 1993. "Race of the Homeowner and Appreciation of Single-Family Homes in the United States," *Journal of Real Estate Finance and Economics* 7 (3): 205–212.

Cotterman, Robert F. 2002. *New Evidence on the Relationship Between Race and Mortgage Default: The Importance of Credit History Data.* Washington, DC: U.S. Department of Housing and Urban Development.

Cox, Kevin. 1982. "Housing Tenure and Neighborhood Activism," *Urban Affairs Quarterly* 18 (1): 107–129.

Coy, Peter. 2004. "When Home Buying by the Poor Backfires: For Many Families, a House Can Be a Bad Investment," *Business Week,* November 1.

Cutts, Amy Crews. 2003. "Loss Mitigation Technology and Homeownership Sustainability." Paper presented at the LISC 2003 Homeownership Summit, October 2003.

Deng, Yongheng, John M. Quigley, and Robert Van Order. 1996. "Mortgage Default and Low Downpayment Loans: The Cost of Public Subsidy," *Regional Science and Urban Economics* 26: 263–285.

Di, Zhu Xiao, Eric Belsky, and Xiadong Liu. 2007. "Do Homeowners Achieve More Household Wealth in the Long Run?" *Journal of Housing Economics* 16: 274–290.

Di, Zhu Xiao, Eric Belsky, Yi Yang, and Xiadong Liu. 2004. Do Homeowners Accumulate More Wealth? The Importance of Housing to the Accumulation of Household Net Wealth. Unpublished paper. Cambridge, MA: Harvard University, Joint Center for Housing Studies.

Dietz, Robert D., and Donald R. Haurin. 2003. "The Social and Private Micro-Level Consequences of Homeownership," *Journal of Urban Economics* 54 (3): 401–450.

DiPasquale, Denise, and Edward Glaeser. 1999. "Incentives and Social Capital: Are Homeowners Better Citizens?" *Journal of Urban Economics* 45: 354–384.

Elmer, Peter J., and Steven A. Seelig. 1999. "Insolvency, Trigger Events, and Consumer Risk Posture in the Theory of Single-Family Mortgage Default," *Journal of Housing Research* 10 (1): 1–25.

Flavin, Marjorie, and Takashi Yamashita. 2002. "Owner Occupied Housing and the Composition of the Household Portfolio over the Life Cycle," *American Economic Review* 92 (1): 345–62.

Follain, James R., and David C. Ling. 1991. "The Tax Subsidy to Housing and the Reduced Value of the Mortgage Interest Deduction," *National Tax Journal* 44 (2): 147–168.

Gallin, Joshua. 2004. The Long-Run Relationship between House Prices and Rents. Working paper 2004-50. Washington, DC: Federal Reserve Board.

Gerardi, Kristopher, Adam Hale Shapiro, and Paul Willen. 2007. Subprime Outcomes: Risky Mortgages, Homeownership Experiences, and Foreclosures. Working paper 07-15 (December 3). Boston, MA: Federal Reserve Bank of Boston.

Goetzmann, William N. 1993. "The Single-Family Home in the Investment Portfolio," *Journal of Real Estate Finance and Economics* 6 (3): 201–222.

Goetzmann, William N., and Matthew Spiegel. 2002. "The Policy Implications of Portfolio Choice in Underserved Mortgage Markets." In *Low-Income Homeownership: Examining the Unexamined Goal*, edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: Brookings Institution Press.

Goetzmann, William N., and Matthew Spiegel. 1997. "A Spatial Model of Housing Returns and Neighborhood Stability," *Journal of Real Estate Finance and Economics* 14 (1–2): 11–31.

Goodman, Alan, and M. Kawai. 1982. "Permanent Income, Hedonic Prices, and Demand for Housing: New Evidence," *Journal of Urban Economics* 12: 214–237.

Goodman, Jack. 1998. The Costs of Owning and Renting Housing: 1985–1995. Working paper. National Multi Housing Council.

Green, Richard K. 1996. "Should the Stagnant Homeownership Rate Be a Source of Concern?" *Regional Science and Urban Economics* 26: 337–368.

Green, Richard K., and Michelle J. White. 1997. "Measuring the Benefits of Homeowning: Effects on Children," *Journal of Urban Economics* 41: 441–461.

Gronberg, Timothy J., and W. Robert Reed. 1992. "Estimation of Duration Models Using the Annual Housing Survey," *Journal of Urban Economics* 31: 311–324.

Hanushek, Eric A., John F. Kain, and Steven G. Rivkin. 2004. "Disruption versus Tiebout Improvement: The Costs and Benefits of Switching Schools," *Journal of Public Economics* 88 (9): 1721–1746.

Harding, John, Thomas J. Miceli, and C.F. Sirmans. 2000. "Do Owners Take Better Care of Their Housing Than Renters?" *Real Estate Economics* 28 (4): 663–682.

Harkness, Joseph, and Sandra J. Newman. 2003. "Differential Effects of Homeownership on Children from Higher- and Lower-Income Families," *Journal of Housing Research* 14 (1): 1–19.

Harkness, Joseph, and Sandra J. Newman. 2002. "Homeownership for the Poor in Distressed Neighborhoods: Does This Make Sense?" *Housing Policy Debate* 13 (3): 597–630.

Haurin, Donald R., and Kyubang Lee. 1989. "A Structural Model of the Demand for Owner-Occupied Housing," *Journal of Urban Economics* 26: 348–360.

Haurin, Donald R., Toby L. Parcel, and R. Jean Haurin. 2002. "Does Homeownership Affect Child Outcomes?" *Real Estate Economics* 30 (4): 635–666.

Haurin, Donald R., and Stuart S. Rosenthal. 2005a. *The Growth of Earnings of Low-Income Households and the Sensitivity of Their Homeownership Choices to Economic and Socio-Demographic Shocks*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Haurin, Donald R., and Stuart S. Rosenthal. 2005b. *The Sustainability of Homeownership: Factors Affecting the Duration of Homeownership and Rental Spells.* Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Haurin, Donald R., and Stuart S. Rosenthal. 2005c. *The Impact of House Price Appreciation on Portfolio Composition and Savings.* Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Henderson, J. Vernon, and Yannis M. Ioannides. 1989. "Dynamic Aspects of Consumer Decisions in Housing Markets," *Journal of Urban Economics* 26: 212–230.

Herbert, Christopher E. 1997. "Limited Choices: The Effect of Residential Segregation on Homeownership Among Blacks." Ph.D. diss., Graduate School of Arts and Sciences, Harvard University.

Herbert, Christopher E., and Eric S. Belsky. 2006. *The Homeownership Experience of Low-Income and Minority Families: A Review and Synthesis of the Literature*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Herbert, Christopher E., Donald R. Haurin, Stuart S. Rosenthal, and Mark Duda. 2005. *Homeownership Gaps Among Low-Income and Minority Households*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Hurst, Erik, Ming Ching Luoh, and Frank P. Stafford. 1998. "The Wealth Dynamics of American Families, 1984–1994," *Brookings Papers on Economic Activity* 1998:1.

Ioannides, Yannis M. 2002. "Residential Neighborhood Effects," *Regional Science and Urban Economics* 32: 145–165.

Jewell, Kevin. 2003. *Appreciation in Manufactured Housing: Stereotypes and Data*. Austin, TX: Consumers Union Southwest Regional Office.

Joint Center for Housing Studies. 2005. *The Changing Structure of the Remodeling Industry.* Cambridge, MA: Harvard University, Joint Center for Housing Studies.

Joint Committee on Taxation. 2005. *Estimates of Federal Tax Expenditures for Fiscal Years 2005–2009*. Report prepared for the House Committee on Ways and Means and the Senate Committee on Finance. Washington, DC: U.S. Government Printing Office.

Kiel, Katherine A., and Rachel T. Carson. 1990. "An Examination of Systematic Differences in the Appreciation of Individual Housing Units," *Journal of Real Estate Research*, 5 (3): 301–317.

Kiel, Katherine A., and Jeffery E. Zabel. 1996. "House Price Differentials in U.S. Cities: Household and Neighborhood Racial Effects," *Journal of Housing Economics* 5: 143–165.

Kim, Sunwoong. 2000. "Race and Home Price Appreciation in Urban Neighborhoods: Evidence from Milwaukee, Wisconsin," *The Review of Black Political Economy* 28 (2): 9–28.

King, A.T., and Peter Mieszkowski. 1973. "Racial Discrimination, Segregation, and the Price of Housing," *Journal of Political Economy* 81: 590–606.

Kosterlitz, Julie. 2004. "Housing—Home Sweet Home?" *National Journal,* March 6.

Krumm, Ronald, and Austin Kelly. 1989. "Effects of Homeownership on Household Savings," *Journal of Urban Economics* 26: 281–294.

Li, Ying, and Eric Rosenblatt. 1997. "Can Urban Indicators Predict Home Price Appreciation?" *Real Estate Economics* 25 (1): 81–104.

Linneman, Peter, and Richard Voith. 1991. "Housing Price Functions and Ownership Capitalization Rates," *Journal of Urban Economics* 30: 100–111.

MacPherson, David A., and G. Stacy Sirmans. 2001. "Neighborhood Diversity and House Price Appreciation," *Journal of Real Estate Finance and Economics* 22 (1): 81–97.

McCarthy, George, Shannon Van Zandt, and William M. Rohe. 2001. The Economic Costs and Benefits of Homeownership: A Critical Assessment of the Research. Working paper 01-02. Washington, DC: Research Institute for Housing American.

Mendelsohn, Robert. 1977. "Empirical Evidence on Home Improvements," *Journal of Urban Economics* 4: 459–468.

Mills, Edwin S. 1990. "Housing Tenure Choice," *Journal of Real Estate Finance and Economics* 3: 323–331.

Montgomery, Claire. 1992. "Explaining Home Improvement in the Context of Housing Investment in Residential Housing," *Journal of Urban Economics* 32: 326–350.

National Community Reinvestment Coalition. 2003. *The Broken Credit System: Discrimination and Unequal Access to Affordable Loans by Race and Age*. Washington, DC: National Community Reinvestment Coalition.

Nothaft, Frank E., and Yan Chang. 2004. Refinance and the Accumulation of Home Equity Wealth. Working paper 04-02. Washington, DC: Freddie Mac.

Orzechowski, Shawna, and Peter Sepielli. 2003. "Net Worth and Asset Ownership of Households: 1998 and 2000," *Current Population Reports*, P70-88. Washington, DC: U.S. Department of Commerce, Bureau of the Census.

Pennington-Cross, Anthony, Anthony Yezer, and Joseph Nichols. 2000. Credit Risk and Mortgage Lending: Who Uses Subprime and Why? Working paper 00-03. Washington, DC: Research Institute for Housing America.

Pitcoff, Winton. 2003. "Has Homeownership Been Oversold," *Shelterforce Online*. http://www.nhi.org/online/issues/sf127.html.

Pollakowski, Henry O., Michael A. Stegman, and William Rohe. 1992. Rates of Return on Housing of Low- and Moderate-Income Owners. Working paper 92-4. Cambridge, MA: Harvard University, Joint Center for Housing Studies.

Poterba, James M. 1991. "House Price Dynamics: The Role of Taxes and Demography," *Brookings Papers on Economic Activity* 2: 110–126.

Quercia, Roberto G., George W. McCarthy, Rhonda M. Ryznar, and Ayse Can Talen. 2000. "Spatio-Temporal Measurement of House Price Appreciation in Underserved Areas," *Journal of Housing Research* 11 (1): 1–28.

Quercia, Roberto G., and Michael A. Stegman. 1992. "Residential Mortgage Default: A Review of the Literature," *Journal of Housing Research* 3 (2): 341–379.

Reid, Carolina Katz. 2004. Achieving the American Dream? A Longitudinal Analysis of the Homeownership Experiences of Low-Income Households. Dissertation discussion paper. Department of Geography, University of Washington.

Retsinas, Nicolas P., and Eric S. Belsky. 2003. *Low-Income Homeownership: Examining the Unexamined Goal*. Washington, DC: Brookings Institution Press.

Rohe, William M., and Victoria Basolo. 1997. "Long-Term Effects of Homeownership on the Self-Perceptions and Social Interactions of Low-Income Persons," *Environment and Behavior* 29 (6): 793–819.

Rohe, William M., George McCarthy, and Shannon Van Zandt. 2002. "Social Benefits and Costs of Homeownership." In *Low-Income Homeownership: Examining the Unexamined Goal*, edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: Brookings Institution Press.

Rohe, William M., and Michael A. Stegman. 1994a. "The Impact of Home Ownership on the Social and Political Involvement of Low-Income People," *Urban Affairs Quarterly* 30 (1): 152–172.

Rohe, William M., and Michael A. Stegman. 1994b. "The Effects of Homeownership on the Self-Esteem, Perceived Control and Life Satisfaction of Low-Income People," *Journal of the American Planning Association* 60 (1): 173–184.

Rohe, William M., Roberto G. Quercia, Shannon Van Zandt, and Gretchen Kosarko. 2003. *Individual and Neighborhood Impacts of Neighborhood Reinvestment's Homeownership Pilot Program*. Washington, DC: Neighborhood Reinvestment Corporation.

Rohe, William M., and Leslie S. Stewart. 1996. "Homeownership and Neighborhood Stability," *Housing Policy Debate* 7 (1): 37–81.

Scheessele, Randall M. 2002. Black and White Disparities in Subprime Mortgage Refinance Lending. Housing Finance Working Paper Series, HF-014. Washington, DC: U.S. Department of Housing and Urban Development.

Schloemer, Ellen, Wei Li, Keith Ernst, and Kathleen Keest. 2006. *Losing Ground: Foreclosures in the Subprime Market and Their Cost to Homeowners*. Washington, DC: Center for Responsible Lending.

Schnare, Ann B. 1976. "Racial and Ethnic Price Differentials in an Urban Housing Market," *Urban Studies* 13: 107–120.

Schnare, Ann B., and Raymond J. Struyk. 1977. "An Analysis of Ghetto Housing Prices Over Time." In *Residential Location and Urban Housing Markets*, edited by Gregory K. Ingram. New York: National Bureau of Economic Research.

Seward, J.A., Charles J. Delaney, and Marc T. Smith. 1992. "An Empirical Analysis of Housing Price Appreciation in a Market Stratified by Size and Value of the Housing Stock," *Journal of Real Estate Research* 7 (2): 195–205.

Shlay, Anne B. 2004. "Low-Income Homeownership: American Dream or Delusion." Paper presented at the 2004 annual meetings of the Urban Affairs Association, Washington, DC.

Smith, Barton A., and William P. Tesarek. 1991. "House Prices and Regional Real Estate Cycles: Market Adjustment in Houston," *AREUEA Journal* 79 (1): 12–37.

Smith, Lawrence B., and Michael H.C. Ho. 1996. "The Relative Price Differential Between Higher and Lower Priced Homes," *Journal of Housing Economics* 5: 1–17.

Stephenson, Richard, and Guoqiang Shen. 1997. *The Impact of Manufactured Housing on Adjacent Site-Built Residential Properties in North Carolina.* Greenville, NC: East Carolina University.

Susin, Scott. 2003. "Mortgage Interest Rates and Refinancing: Racial and Ethnic Patterns." Paper presented at the 2003 AREUEA Mid-Year Meeting.

Tong, Zhong Yi, and John L. Glascock. 2000. "Price Dynamics of Owner-Occupied Housing in the Baltimore-Washington Area: Does Structure Type Matter?" *Journal of Housing Research* 11 (1): 29–66.

Van Order, Robert, and Peter Zorn. 2002. "Performance of Low-Income and Minority Mortgages." In *Low-Income Homeownership: Examining the Unexamined Goal*, edited by Nicholas P. Retsinas and Eric S. Belsky. Washington, DC: Brookings Institution Press.

Vandell, Kerry D. 1995. "How Ruthless is Mortgage Default? A Review and Synthesis of the Evidence," *Journal of Housing Research* 6 (2): 245–264.

Yinger, John. 1978. "The Black-White Price Differential in Housing: Some Further Evidence," *Land Economics* 54: 187–206.

Initial Housing Choices Made by Low-Income and Minority Homebuyers

Christopher E. Herbert
Abt Associates Inc.

Eric S. Belsky
Harvard University

Abstract

This article presents information on the initial housing choices that low-income and minority first-time homebuyers made. These characteristics are of interest because they influence the extent to which the longrun financial and social benefits of homeownership are realized. Of particular interest are the millions of low-income and minority households that bought their first home during the homeownership boom that began in the early 1990s. Much of the information presented in this article is derived from tabulations from the American Housing Surveys (AHSs) from 1991 through 2003, with some information on housing costs and mortgage choices updated from the 2005 AHS. The AHS, a national survey conducted in every odd-numbered year, is a rich source of information on characteristics of the U.S. housing stock and is one of the few sources of information on first-time homebuyers.

Introduction

Aided by a favorable economic climate, concerted efforts by the public and private sectors have succeeded in significantly increasing homeownership rates for low-income and minority households nationwide since the early 1990s. In recent years, however, both housing advocates and the popular press have raised concerns that the emphasis on promoting homeownership may be luring households and individuals into buying homes when they would be better off renting. These critiques cite rising foreclosure rates, increases in the share of buyers shouldering substantial financial burdens, and accounts of buyers being trapped in poor-quality homes as evidence that moving to homeownership is, in many cases, not beneficial for the low-income and minority households that are the focus of these efforts. In short, the very success of efforts to increase homeownership

has highlighted the need for policymakers to evaluate the extent to which new low-income and minority homeowners are reaping the expected benefits of homeownership, and, if not, what can be done to increase the chances that they will realize these benefits.

As described in more detail in Herbert and Belsky (2006), first-time homebuyers' initial housing choices can have important implications for the likelihood that these buyers will realize the long-run benefits of homeownership. These initial choices relate to the quality of the home and neighborhood, the housing-cost burden that the owners face, and the financial risks they are exposed to as a result of their mortgage choice. The purpose of this article is to present information about the initial housing choices that first-time homebuyers have made since the early 1990s to assess the extent to which homeownership is likely to benefit these groups. Although several recent reviews of the literature have assessed the empirical evidence on the benefits of homeownership, this study is unique in that it explicitly focuses on what is known about the homeownership experience of low-income and minority first-time homebuyers.

Data and Methodology

Much of the information presented in this article is derived from tabulations from the American Housing Surveys (AHSs) from 1991 through 2003, with some information on housing costs and mortgage choices updated from the 2005 AHS.[1] The AHS, a national survey conducted in every odd-numbered year, is a rich source of information on characteristics of the U.S. housing stock and is one of the few sources of information on first-time homebuyers. Information from the AHS is supplemented with a review of the existing literature where appropriate.

To place the housing choices of low-income and minority homebuyers in context, we also present information on the housing choices of several comparison groups. First, we use the housing choices of White first-time homebuyers, both moderate- and high-income buyers, to examine the extent to which the choices of minority and low-income buyers differ from these two groups. Second, we also use the housing choices of recent-mover low-income renter households to examine how the choices of homebuyers differ from those of renters. We use recent movers instead of all renters so that the choices reflect the renters' optimal housing choice subject to the constraints imposed by current market conditions. As a final point of reference, we also present information on the housing choices of all households.

The sample sizes for first-time homebuyers in specific income or racial/ethnic categories in any one survey can be fairly small; thus survey results are generally combined for all survey years since 1991 to provide more robust estimates of how the characteristics of first-time buyers and their housing choices differ across the income and racial/ethnic groups of interest. Because trends in first-time buyers over the course of the recent homeownership boom are of interest, we also compare results for two time periods: those corresponding to the 1991-through-1995 survey years with those from the 1997-through-2003 survey years for household and housing characteristics and those corresponding to the 1991-through-1997 survey years with those from the 1999-through-2005 survey years for mortgage characteristics and housing costs.

[1] This article is derived from Herbert and Belsky (2006). At the time of this earlier study, the 2005 AHS was not available.

Of course, important differences in the characteristics of the various comparison groups will contribute to the differences in the housing choices made. The first section of this article presents basic demographic information on these groups so that readers can bear these differences in mind when evaluating differences in housing choices. This section also presents information on trends in the number and characteristics of first-time homebuyers since 1991.

We discuss four main aspects of housing choices in the remaining sections of the article:

1. Housing characteristics.
2. Neighborhood characteristics.
3. Housing costs.
4. Mortgage finance characteristics.

An assessment of housing characteristics is used to assess whether low-income homebuyers, in fact, benefit from larger and higher quality housing, as is often assumed. Housing characteristics are also of interest because they influence the cost and effort associated with maintaining the home. Finally, structural qualities may influence the likelihood of future wealth accumulation. Manufactured housing, in particular, is of special interest because of its important role in increasing low-income homeownership, especially in the South, during the 1990s (Belsky and Duda, 2002). Manufactured housing poses special issues for two reasons. First, because about one-half of manufactured housing is placed on leased land, owners of these units do not share in appreciation of land values and are subject to increased costs passed on by owners of the land. Second, financing rates for these units are often more expensive than conventional mortgage rates. Specifically, the housing characteristics examined include the housing type (for example, single-family detached, manufactured, or condominium in multifamily structure); age; size of the home relative to household size; and quality (for example, number and type of housing problems).

A number of benefits associated with homeownership derive from neighborhood attributes, including the quality of public services and surrounding properties. To provide some indication of whether homeowners are more likely to live in higher quality neighborhoods, this article examines information from the AHS on the location of the home within a metropolitan area, measures of neighborhood quality, and the homeowner's satisfaction with the neighborhood. In this section, we also review the available literature on the characteristics of neighborhoods where low-income buyers have located.

Housing costs are of interest for determining whether the move to homeownership has placed an undue financial burden on these new owners. The discussion of housing costs focuses on measures of housing costs relative to household income.

Finally, because mortgage finance choices have important implications for housing costs (both initially and over time) and for buyers' exposure to economic risks such as interest rate and house value fluctuations, we also examine mortgage finance characteristics. An important issue to consider in this context is subprime lending, which increases the costs of mortgage finance and has been associated with predatory lending practices. The extensive literature that examines this latter topic is also briefly reviewed.

Trends in the Number and Characteristics of First-Time Homebuyers

Exhibit 1 provides information on trends in the annual number of low-income and minority first-time homebuyers by income as captured by the AHSs from 1991 through 2005.[2] The relatively small sample sizes of some subgroups of first-time homebuyers result in fairly sizeable sampling variations in the estimates, which may cloud information on trends in the number of buyers over time. Nonetheless, the annual estimates provide some indication of trends over time. During the early 1990s, the number of low-income first-time buyers rose from a little more than 500,000 a year to more than 750,000 a year by the 1995-to-1997 period, an increase of nearly 50 percent. These trends are consistent with the sharp rise in low-income homeownership that occurred over this period. After 1997, the number of low-income homebuyers moderated somewhat but remained above the levels that prevailed during the first years of the 1990s.[3]

The increase in minority first-time buyers was even more pronounced. Over the same periods from 1989 to 1991 and 1995 to 1997, the number of African-American first-time buyers doubled

Exhibit 1

Average Annual Number of Low-Income and Minority First-Time Homebuyers*

AHS Survey Years	Low-Income Homebuyers	African-American Homebuyers	Hispanic Homebuyers
1989 to 1991	514	128	88
1991 to 1993	578	96	120
1993 to 1995	594	180	152
1995 to 1997	761	252	196
1997 to 1999	693	228	200
1999 to 2001	643	192	219
1999 to 2001	690	156	230
2003 to 2005	730	196	254

AHS = American Housing Survey.

**Thousands of homebuyers.*

Note: The overlap in years reflects the fact that each AHS covers the 2-year period before the survey, which is conducted in the latter half of the year. For example, a survey completed in October 2005 would cover the period from October 2003 to October 2005.

Source: Tabulations from the 1991-through-2005 American Housing Surveys

[2] The AHS is conducted every other year and provides information on current occupants of the surveyed units, including whether they are first-time homebuyers and what year they obtained their home. Responses to these questions make it possible to identify first-time homebuyers who purchased their homes in the 2-year period between surveys. Because the AHS identifies the year of purchase, annual estimates are possible; but, because the sample size of first-time buyers is somewhat small for any single year, the number of homebuyers captured by the survey is divided by 2 to yield an estimate of the annual average number of first-time buyers to smooth out this sampling variation.

[3] A change occurred in the methodology used to assign the relevant area median income for each household in the AHS. As a result, the trends in the number of low-income first-time buyers between 1999 to 2001 and 2001 to 2003 must be interpreted with caution. Trends between the last 2 survey years of 2001 and 2003 suggest a very sharp falloff in the number of high-income buyers, a more moderate decline in moderate-income buyers, and a slight increase in low-income buyers. These trends may be related to the economic recession that occurred during the 2001-to-2003 period, but it seems likely that the methodology change in how the relevant area median incomes are assigned contributed to this trend.

while the number of Hispanic first-time buyers rose by 123 percent. As with low-income buyers, the number of African-American first-time buyers moderated after 1997 but still remained above the levels recorded at the start of the decade. In contrast, the number of Hispanic homebuyers continued to grow through the 2003-to-2005 period.

Exhibit 2 presents summary information about the age, household type, and racial composition of first-time buyers over the 1989-through-2003 survey years. In terms of age, in general, a fair amount of similarity exists in the age profile of the three categories of buyers; the single largest category, ages 25 to 34, is followed by the next largest category, ages 35 to 44. Low-income buyers are more likely to be both younger (under age 25) and older (age 45 or above) than either moderate- or high-income buyers. These two age groups may represent two distinct categories of low-income buyers: the younger buyers are more likely to be categorized only temporarily as low-income buyers because their incomes will increase with age, while the older buyers are more likely to be long-term low-income households that have needed more time to accumulate the savings needed to purchase a home.[4] In general, the earlier a householder becomes a homeowner, the greater chance he or she will have to reap the benefits of homeownership. The fact that low-income first-time buyers are more likely to be older means they will have less time to realize the benefits of homeownership; but the proportion of older households among low-income buyers (16 percent) is not substantially greater than it is among moderate-income (9 percent) or high-income (8 percent) households.

Exhibit 2 also shows the age distribution of recent-mover low-income renters. In general, as with the other demographic characteristics shown, low-income first-time buyers lie in between low-income renters and higher income owners in terms of age. Low-income renters have higher shares of both younger and older households than do low-income owners, who in turn have higher shares of these age groups than do higher income owners. The greater concentration of homebuyers in the 25-to-34-year-old category is consistent with the view that householders below age 25 have both greater expected mobility and less demand for housing and, therefore, are less likely to pursue homeownership. Low-income renters also have a higher share of householders who are age 45 and older, however. These householders may simply prefer to rent or they may not be able to amass the savings needed to purchase a suitable home.

More significant differences occur across the first-time buyer income categories by household type than by age. Specifically, low-income first-time buyers include a much lower share of married-couple households and a much higher share of single-earner households than do either moderate- or high-income buyers. Although married couples account for nearly two-thirds of moderate-income homebuyers and three-fourths of high-income buyers, they account for only 42 percent of low-income buyers. In contrast, single parents with children and single-person households account for 45 percent of low-income buyers, compared with only 11 percent of moderate-income buyers

[4] Because the AHS collects data from the same housing units each time, it can be used to give a sense of the degree to which households move between income categories over time. Of the low-income first-time homebuyers identified in the 1991 survey, 60 percent of those in the same housing unit at the time of the 1999 survey were still categorized as low income, while 18 percent were moderate income and 22 percent were high income. Although most households did not change their income category, nonetheless, a fair amount of upward mobility occurs. At the same time, a similar amount of downward mobility occurs. Of those households that were categorized as low income in the 1999 survey, 66 percent were also low income in 1991, while 20 percent started the period as moderate income and 14 percent started as high income.

Exhibit 2

Selected Demographic Characteristics of First-Time Homebuyers, 1989 Through 2003

Demographic Characteristic	First-Time Homebuyers			Recent-Mover, Low-Income Renters	All Households
	Low-Income Homebuyers (%)	Moderate-Income Homebuyers (%)	High-Income Homebuyers (%)	(%)	(%)
Age of household head					
Younger than 25	18	11	6	26	5
25 to 34	43	56	62	35	19
35 to 44	23	24	24	19	23
45 or older	16	9	8	20	53
Household type					
Married, no children	14	26	36	9	28
Married with children	28	38	39	15	24
Single parent with children	16	7	4	22	9
Single person	29	4	4	37	25
Other	12	16	8	18	13
Race/ethnicity					
White	67	75	77	59	76
African-American	14	10	8	20	12
Hispanic	14	9	8	15	8
Other	5	6	6	6	4

Note: Low-, moderate-, and high-income homebuyers are defined as those buyers with incomes of less than 80 percent of the area median income (AMI), 80 to 119.9 percent of AMI, and 120 percent of AMI or higher, respectively.

Source: Tabulations from the 1991-through-2003 American Housing Surveys

and 9 percent of high-income buyers. The share of single-person households among low-income buyers is particularly large, at 29 percent, compared with only 4 percent of higher income buyers.

The high proportion of single-earner households among low-income buyers is not unexpected—it is to be expected that households with single earners will have lower incomes than those with two earners. This proportion also highlights an important challenge for this group; with only a single earner to rely on, a household will have less ability to respond to a crisis, such as the loss of a job or a health problem in the family. These households also have fewer adults in the household to share the burden of maintaining the home. For these reasons, in part, single-earner households are more likely to be found among renter households. Among recent low-income renter households, 59 percent were headed by a single adult and only 24 percent were headed by married couples.

In terms of race and ethnicity, low-income first-time homebuyers include a higher share of minorities than the upper income groups do. Non-Hispanic Whites account for about three-fourths of both moderate- and high-income buyers, compared with two-thirds of low-income buyers. African Americans and Hispanics each account for 14 percent of low-income buyers, compared with 10 percent or less of the other two income groups. Minorities account for a greater share of low-income first-time buyers than they do of all households, although they account for even higher shares of recent-mover low-income renters.

At other points in this article, we compare the housing choices of low-income first-time buyers with the choices of recent-mover low-income renters. The demographic differences between these two groups evident in exhibit 2—specifically, that renters are both younger and older, include fewer married-couple households, and include a higher share of minorities—account for some of the differences in housing choices made. Although both groups have income levels below 80 percent of area median incomes, renters also have lower incomes than owners do. Across the period studied, recent-mover low-income renters have an average income of 38 percent of area median income, and low-income first-time buyers have an average income of 49 percent of area median income. In short, low-income first-time buyers are not perfectly comparable with low-income renters. Nonetheless, some of the differences in housing choices between these groups reflect differences in the housing choices available in rental and homeowner markets.

Exhibit 3 presents further information on the characteristics of first-time homebuyers by race and ethnicity. One notable difference between minorities and Whites is that minority first-time buyers tend to be older than White first-time buyers. Although only 30 percent of White first-time buyers are age 35 or older, 52 percent of African Americans, 45 percent of Hispanics, and 48 percent of "other" minorities are in these older age categories. The fact that minorities enter homeownership at later ages than Whites do means that they have less time to accumulate wealth and realize the other benefits of homeownership.

Exhibit 3

Selected Demographic Characteristics of First-Time Homebuyers by Race/Ethnicity, 1989 Through 2003

Demographic Characteristic	First-Time Homebuyers			
	White Homebuyers	African-American Homebuyers	Hispanic Homebuyers	Other Race/ Ethnicity Homebuyers
	(%)	(%)	(%)	(%)
Age of household head				
Younger than 25	13	6	11	9
25 to 34	56	42	44	44
35 to 44	20	34	30	33
45 or older	10	18	15	15
Household type				
Married, no children	27	14	18	23
Married with children	31	31	52	46
Single parent with children	8	23	11	8
Single person	21	18	9	10
Other	13	14	9	14
Income category				
Low	37	50	52	37
Moderate	28	25	23	27
High	35	25	25	36

Note: Low-, moderate-, and high-income homebuyers are defined as those buyers with incomes of less than 80 percent of the area median income (AMI), 80 to 119.9 percent of AMI, and 120 percent of AMI or higher, respectively.

Source: Tabulations from the 1991-through-2003 American Housing Surveys

Notable differences are also apparent in the distribution of household types by race/ethnicity. African-American first-time homebuyers are less likely to be married than are White first-time homebuyers (45 compared with 58 percent) and more likely than Whites are to be a single parent (41 compared with 28 percent). Thus, African-American first-time homebuyers are less likely to have two earners to support the household. In contrast, Hispanics and other minorities are more likely to be married couples with children than Whites are (52 and 46 percent, respectively, compared with 31 percent) and are less likely to be in single-person households (9 and 10 percent, respectively, compared with 21 percent). Although these minority groups are more likely to have two earners supporting the household, they are also more likely to have children, which increases nonhousing costs and may make it more difficult to meet unexpected financial demands.

Finally, exhibit 3 also presents information on the distribution of each racial/ethnic group by income. Both African Americans and Hispanics are more likely than Whites to be low-income homebuyers; about one-half of minority first-time buyers are in this category, compared with 37 percent of White first-time buyers. Other minorities have a similar income distribution to that of Whites.

Exhibit 4 shows trends in the characteristics of low-income first-time homebuyers before and after 1995 to examine the extent to which the increase in homeownership rates over this period was associated with changes in the characteristics of first-time buyers.[5] Exhibit 4 shows two notable trends in the data. First, a decrease in the share of married-couple households is evident as is a

Exhibit 4

Trends in Selected Demographic Characteristics of Low-Income First-Time Homebuyers, 1989 Through 2003

Demographic Characteristic	1989 Through 1995 (%)	1995 Through 2003 (%)
Age of household head		
Younger than 25	17	18
25 to 34	46	42
35 to 44	22	23
45 or older	15	17
Household type		
Married, no children	16	13
Married with children	34	25
Single parent with children	14	17
Single person	25	32
Other	11	13
Race/ethnicity		
White	71	64
African American	13	14
Hispanic	11	15
Other	5	6

Note: Low-income homebuyers are those defined as having incomes of less than 80 percent of the area median income.
Source: Tabulations from the 1991-through-2003 American Housing Surveys

[5] Grouping the AHS survey years together increases the sample of low-income first-time homebuyers to provide a more accurate depiction of trends.

concomitant increase in the share of single adults, either with or without children. In the 1989-through-1995 survey years, 50 percent of low-income homebuyers were married couples and 38 percent were single adults. By the 1995-through-2003 survey years, these shares had essentially reversed, with 38 percent of low-income homebuyers being married couples and 49 percent being single adults. Although moderate- and high-income buyers also experienced an increase in the share of single-adult households, the rise among these groups was only 3 to 4 percentage points. Thus, it is true that many more low-income first-time buyers consisted of households headed by a single adult.

A second notable trend was a higher share of minorities among low-income first-time buyers. During the 1989-through-1995 survey years, non-Hispanic Whites accounted for 71 percent of those buyers, but this share had declined to 64 percent since 1995. Much of the increase in the minority share resulted from a higher share of Hispanics among low-income first-time buyers, which increased from 11 percent during the 1989-through-1995 survey years to 15 percent by the 1995-through-2003 survey years.

Housing Choices of Low-Income Buyers

Exhibit 5 presents summary information on the housing units purchased by first-time homebuyers by income and racial/ethnic categories during the survey years from 1989 through 2003. Relatively little difference is evident in the choice of structure type by race/ethnicity, although African Americans are slightly more likely to live in single-family attached units and Hispanics are slightly less likely to live in manufactured housing. More significant differences are evident by income. Compared with both moderate- and high-income buyers, low-income households are less likely to purchase single-family detached homes and more likely to purchase manufactured housing. These trends parallel the findings of Belsky and Duda (2002), who found that manufactured housing played an important role in the boom in low- and moderate-income homeownership during the 1990s. Among low-income buyers, manufactured housing accounted for 23.8 percent of homes purchased, compared with 11.0 percent among moderate-income buyers and 3.5 percent among high-income buyers. One recent study found that low-income owners' satisfaction with the quality of manufactured housing is only slightly lower than that of owners of traditional homes. Because manufactured housing has much lower costs than traditional homes have, the authors conclude that manufactured housing represents a good value for low-income buyers (Boehm and Schlottmann, 2004). The study also notes, however, that the fact that a large share of these homes are on leased land greatly limits the potential for wealth accumulation from these types of units—an issue that Herbert and Belsky (2006) explore in more detail.

As noted in the introduction, a substantial difference exists in the types of housing units occupied by first-time homebuyers and renters. Low-income renters are nine times as likely to live in multifamily structures and one-third as likely to live in single-family detached housing compared with low-income buyers. Although some portion of these differences is undoubtedly related to differences in the desired quantity of housing between these groups, the differences are great enough that a portion of the disparity likely reflects the different opportunities available in the rental and owner-occupied housing markets. Low-income owners clearly are able to obtain a much greater amount of privacy than renters are.

Exhibit 5

Selected Housing Characteristics of First-Time Homebuyers by Income Category, 1989 Through 2003

Housing Characteristic	First-Time Homebuyers						Recent-Mover Low-Income Renters	All Households
	Low-Income Homebuyers	Moderate-Income Homebuyers	High-Income Homebuyers	White Homebuyers	African-American Homebuyers	Hispanic Homebuyers		
Structure type								
Single-family, detached	61.3%	73.6%	81.3%	71.8%	68.1%	73.9%	19.5%	62.7%
Single-family, attached	7.4%	8.0%	8.0%	7.4%	12.1%	7.0%	7.9%	6.1%
Multifamily	7.5%	7.4%	7.2%	7.8%	6.7%	8.5%	68.1%	24.8%
Manufactured	23.8%	11.0%	3.5%	13.0%	13.0%	10.6%	4.5%	6.4%
Median square feet per occupant	545	570	652	642	527	389	434	662
Units built in 1970 or earlier	49.7%	47.4%	40.2%	46.4%	45.3%	49.9%	53.3%	53.4%
Housing adequacy								
Moderately inadequate	4.8%	2.7%	2.3%	2.9%	4.5%	6.3%	7.9%	4.6%
Severely inadequate	2.0%	1.2%	1.1%	1.4%	2.0%	1.5%	3.0%	2.1%
Housing satisfaction*								
Average	8.1	8.3	8.4	8.3	8.6	8.4	7.4	8.1
Share rated 5 or lower	8.7%	4.6%	3.1%	5.6%	5.0%	6.3%	17.9%	9.3%

** Housing satisfaction is rated on a 10-point scale, with 10 being the best and 1 the worst.*

Source: Tabulations from the 1991-through-2003 American Housing Surveys

In terms of the amount of living space available per resident, low-income first-time buyers have less space than their higher income counterparts have. The median square feet per occupant for low-income buyers is 549. Although this figure is only slightly lower than the 560 square feet for moderate-income buyers, it is substantially less than the 653 square feet for high-income buyers. Nonetheless, low-income buyers have 26 percent more living space per occupant than do recent low-income renters, who have only 439 square feet per occupant.

Large differences exist in the amount of living space per resident by race/ethnicity. On average, White homebuyers have 642 square feet per occupant, but African-American buyers have only 527 square feet and Hispanic buyers have only 389. Although African-American homebuyers still have much more space on average than low-income renters do, Hispanic buyers actually have less space per occupant than low-income renters of all races generally have. The small amount of space per occupant among Hispanics primarily reflects the larger household sizes among Hispanic owners. Hispanic buyers' households average 3.7 people, while White buyers' households average 2.5 and African-American buyers' households average 3.1. The homes purchased by Hispanics are also about 10 percent smaller on average than homes purchased by Whites, but it is the larger household sizes that lower the space per occupant so much. Furthermore, Hispanic renters average only 313 square feet per occupant, so homeownership is associated with an increase in living space for Hispanics.

One concern cited about the emphasis on low-income homeownership is that too many buyers are purchasing inadequate housing, which increases housing costs, raises the risk of being subject to financial shocks from unexpected housing problems, and reduces the quality of the living environment enjoyed by residents. Exhibit 5 presents information on the share of buyers purchasing older housing that might be expected to need more maintenance and that, in general, might be of lower quality due to the age of the house. In terms of housing age, low-income buyers are more likely to purchase homes that were built in 1970 or earlier; 49.7 percent of low-income buyers' homes are in this age category, compared with 47.4 percent of moderate-income buyers' homes and 40.2 percent of high-income buyers' homes. Less variation exists in housing age by race/ethnicity. Hispanic first-time homebuyers have the highest share of older housing, at 49.9 percent, compared with 46.4 percent for White first-time buyers and 45.3 percent for African-American first-time buyers. The share of all households living in these older housing units is higher still, however, at 53.4 percent, which is essentially the same as the share of recent-mover low-income renters in older units. Thus, regardless of income or race/ethnicity, homebuyers tend to occupy somewhat newer units than do either all households or renters.

A more direct measure of housing quality is provided by AHS variables indicating whether a unit is moderately or severely structurally inadequate. It is true that low-income first-time buyers are more likely to live in moderately or severely inadequate units that have an inadequacy rate that is 75 percent higher than that of units purchased by moderate-income buyers and roughly twice that of units purchased by high-income buyers. Nonetheless, the share of low-income buyers in moderately or severely inadequate housing is fairly low, with 4.8 percent living in moderately inadequate housing and 2.0 percent living in severely inadequate housing. Minority homebuyers are more likely to live in inadequate housing than are Whites; 4.5 percent of African Americans and 6.3 percent of Hispanics live in moderately inadequate housing compared with 2.9 percent of

Whites. With the exception of Hispanic households, these inadequacy rates are either better than or about the same as the share of all households living in inadequate housing, which suggests that low-income and minority buyers are no worse off than other households in terms of housing condition. In addition, the level of structural inadequacy is higher among recent-mover low-income renters, with 7.9 percent living in moderately inadequate housing and 3.0 percent living in severely inadequate housing.

A similar pattern is evident with regard to housing satisfaction. As a measure of satisfaction, the AHS asks each respondent to rate his or her home as a place to live on a 10-point scale, with 10 being best and 1 being worst. Exhibit 5 shows both the average satisfaction rating and the share of households reporting a level of satisfaction of 5 or lower. Low-income buyers are found to have slightly lower average satisfaction ratings than moderate- or high-income buyers have, but they have similar levels of satisfaction compared with all households and higher levels of satisfaction compared with recent-mover low-income renters. In terms of the share with low satisfaction ratings, compared with moderate- and high-income buyers, low-income buyers are two to three times as likely to rate their satisfaction level as 5 or lower; however, the overall share of low-income buyers with low satisfaction ratings is fairly small (8.7 percent) compared with the share of either all households (9.3 percent) or recent-mover low-income renters (17.9 percent). Less difference exists in housing satisfaction by race/ethnicity, with African Americans and Hispanics actually having higher average satisfaction levels than Whites do and with similar shares of households rating their housing 5 or lower across these three groups.

Little evidence is apparent of any worsening of the quality of housing purchased by low-income buyers over the past decade. In terms of structural adequacy, among low-income buyers, the share of units that were either moderately or severely inadequate actually declined from 8.1 to 6.2 percent between the 1989-through-1995 and 1995-through-2003 survey years. Over the same time periods, the share of inadequate units among recent-mover low-income renters increased from 10.1 to 11.6 percent. A slight decline occurred in low-income buyers' satisfaction with their homes, but the changes were fairly small. The average satisfaction rating among low-income first-time buyers dropped from 8.3 to 8.1 percent, but the share of low-income buyers reporting a satisfaction rating of 5 or less rose from 8.4 to 8.9 percent. Similar changes also occurred in satisfaction levels among recent-mover low-income renters.

An obvious deficiency in these tabulations of the AHS data is that they do not account for all the differences in household characteristics among the groups being compared. Unfortunately, a very limited literature employs multivariate analysis to examine housing outcomes of low-income or minority homebuyers. Of the studies that exist, several examine the issue of how homeownership affects housing quality. The most recent of these studies is Friedman and Rosenbaum (2004), which uses the 2001 AHS to evaluate whether immigrants and racial/ethnic minorities who achieve homeownership are more likely to experience housing crowding or live in inadequate housing than Whites are. Although the study includes household income as an independent variable and finds that increases in income reduce the probability of experiencing crowding or inadequate housing problems, it does not present any estimates of the magnitude of differences between low-income and upper income households. Regarding race/ethnicity, Friedman and Rosenbaum find that African Americans and Hispanics are more likely to experience both crowding and inadequate

housing than Whites are, regardless of tenure, and so conclude that a move to homeownership does not eliminate these problems for minorities. Although African-American and Hispanic owners are worse off in these dimensions compared with White owners, the study does not examine the question of whether a move to homeownership reduces the likelihood of minorities experiencing these problems; however, the descriptive statistics presented in the study suggest that such a reduction is the case.

An earlier study (Rosenbaum, 1996) examines a similar set of questions. Rosenbaum estimates a statistical model to predict the likelihood that a housing unit is structurally inadequate or has abandoned buildings nearby, based on the race/ethnicity and socioeconomic status of the occupant, including whether he or she owns or rents the unit. The analysis relies on data for the New York area from both the AHS and the New York City Housing and Vacancy Survey. The analysis finds that minorities and lower income households are more likely to experience both of these problems; however, one of the model's strongest results is that, all else being equal, owners are less likely than renters are to experience these problems. Because the study does not interact either race/ethnicity or income with tenure, however, it does not shed light on whether an owner's lower likelihood of experiencing these problems varies by either race/ethnicity or income.

Although the exhibits presented in this section show recent-mover low-income renter households to indicate whether a move to homeownership improves housing conditions for low-income homebuyers, because we do not control for the many differences between these two groups, it is not clear if this comparison is fair. A few studies have examined the factors associated with housing satisfaction, controlling for differences in housing and household characteristics. These studies consistently find that homeownership increases housing satisfaction even after controlling for these other factors (Danes and Morris, 1986; Kinsey and Lane, 1983; Lam, 1985). Although these studies include income as an explanatory variable, they do not attempt to evaluate whether the impact of homeownership on housing satisfaction varies with income. One study (Kinsey and Lane, 1983) has an explicit focus on differences between Whites and African Americans in the factors explaining housing satisfaction. This study finds that homeownership is associated with greater increases in housing satisfaction for African Americans.

Finally, one recent study provides some insight into the question of how housing consumption changes when low-income households become homeowners. Cummings, DiPasquale, and Kahn (2002) examine the premove and postmove housing characteristics of participants in homeownership programs run by the city of Philadelphia. The study's main focus is a program that was designed to promote neighborhood revitalization by constructing deeply subsidized housing units for owner occupants in severely distressed neighborhoods. Because the program provided homeowners with per-unit subsidies in the range of $50,000 to $100,000, it is not unexpected that this group experienced significant increases in housing quality after moving. The study also found, however, that participants in a program that provided a small subsidy ($1,000) to low-income buyers in the city of Philadelphia also experienced significant improvements in housing quality. The new units were larger and were more likely to have a garage and to be in single-family structures. Overall, 75 percent of survey respondents reported that the new home was better than their previous one. Thus, this study provides limited evidence that a move to homeownership is often associated with an improvement in housing quality.

Neighborhood Characteristics

Exhibit 6 summarizes the information available from the AHS on the neighborhood choices of first-time homebuyers. The top portion of the exhibit provides information on the prevalence of neighborhood conditions that are indicators of blight, a lack of public services, or property uses that are less well suited to residential areas.[6] In general, low-income and, to a greater extent, minority first-time buyers experience worse neighborhood conditions than higher income buyers do; however, the incidence of most of these conditions is somewhat rare. Low-income buyers are more likely than minority buyers to have abandoned or vandalized properties nearby and to have trash or junk on the street; but, with both groups, less than 3 percent of buyers experience these conditions. African Americans are more likely than all other groups to have abandoned or vandalized properties nearby; 5.7 percent are exposed to this condition. Bars on windows, an indicator of greater potential for theft, are evident in 6.4 percent of low-income buyers' neighborhoods, compared with about 4 percent of moderate- and high-income buyers' neighborhoods. This condition is much more common among minorities; 11.3 percent of African Americans and 15.7 percent of Hispanics are exposed to this condition, compared with only 2.4 percent of Whites.

The most common issue in low-income buyers' neighborhoods is the presence of commercial or industrial properties. These nonresidential property uses are evident in about one in five cases for low-income and African-American buyers and nearly one in four cases for Hispanic buyers. These mixed-use neighborhoods are also fairly common in neighborhoods where White (15.4 percent), moderate-income (16.8 percent) and high-income (14.6 percent) buyers are located. Again, low-income buyers fare better in all the dimensions compared with recent-mover low-income renters and have shares that are fairly similar to those experienced by all households.

In a question that is similar to the AHS question on housing satisfaction, the survey also asks respondents to rate their neighborhood on a scale of 1 to 10, with 10 being best and 1 the worst. Exhibit 6 shows the average neighborhood rating and the share of households reporting a neighborhood rating of 5 or lower. In terms of average ratings, very little difference is evident across the first-time buyer groups by either income or race/ethnicity, ranging from a low of only 8.0 on a 10-point scale among low-income buyers to a high of 8.2 among moderate- and high-income and African-American buyers. The average neighborhood rating, however, masks some variation evident in the share of households rating their neighborhood at 5 or lower. Among low-income buyers, 11.7 percent rated their neighborhood 5 or lower, compared with 7.7 percent of moderate-income and 6.2 percent of high-income buyers. Minorities also are more likely to give a low rating to their neighborhoods; 9.6 percent of African Americans and 10.3 percent of Hispanics provided a rating of 5 or lower compared with 8.5 percent of Whites. Once again, however, all buyer groups compare favorably with recent-mover low-income renters, who, on average, rate their neighborhoods at only 7.3, and 21.6 percent rate their neighborhoods at 5 or lower. Even compared with all households, recent buyers fare well; the average across all households is a rating of 8.0, and 12.3 percent of recent buyers rate their neighborhood at 5 or lower.

[6] These neighborhood characteristics are recorded by the field staff implementing the AHS. The questions ask whether the indicated characteristic is evident within 300 feet of the subject property.

Exhibit 6

Selected Neighborhood Characteristics of First-Time Homebuyers by Income Category, 1989 Through 2003

Housing Characteristic	First-Time Homebuyers						Recent-Mover Low-Income Renters	All Households
	Low-Income Homebuyers	Moderate-Income Homebuyers	High-Income Homebuyers	White Homebuyers	African-American Homebuyers	Hispanic Homebuyers		
Neighborhood blight within 300 feet								
Abandoned or vandalized properties	2.6%	1.5%	1.0%	1.3%	5.7%	1.7%	3.9%	1.8%
Bars on windows	6.4%	4.1%	4.2%	2.4%	11.3%	15.7%	9.7%	5.9%
Trash or junk on street	2.5%	1.2%	1.2%	1.4%	2.3%	2.9%	4.1%	2.1%
Commercial or industrial properties	20.2%	16.8%	14.6%	15.4%	21.9%	24.6%	37.7%	20.1%
Neighborhood satisfaction*								
Average	8.0	8.2	8.2	8.1	8.2	8.1	7.3	8.0
Share rated 5 or lower	11.7%	7.7%	6.2%	8.5%	9.6%	10.3%	21.6%	12.3%
Metropolitan location								
Central city	30.4%	27.1%	26.7%	24.5%	39.5%	40.6%	46.6%	30.6%
Suburb	45.9%	54.7%	55.6%	52.5%	43.8%	48.7%	36.6%	47.3%
Nonmetropolitan	23.8%	18.2%	17.7%	23.1%	16.6%	10.7%	16.7%	22.1%

** Neighborhood satisfaction is rated on a 10-point scale, with 10 being the best and 1 the worst.*

Source: Tabulations from the 1991-through-2003 American Housing Surveys

Finally, exhibit 6 also compares the distribution of these households among central cities, suburbs, and nonmetropolitan areas. Although great variation in neighborhood quality is evident within each of these geographic categories, in general, neighborhoods in central cities are considered to be more likely to have lower quality public services and more land uses that are less well suited for residential areas. Central cities also tend to have lower homeownership rates than suburban areas do, and so owners in these areas may be less likely to realize benefits from higher concentrations of owner-occupied households. As shown in exhibit 6, low-income buyers are less likely to live in suburban areas than either moderate- or high-income buyers (46 percent compared with 55 to 56 percent, respectively), but this difference is split between a greater propensity to live in both central cities and nonmetropolitan areas. Little difference is apparent between the geographic location of low-income buyers and all households. In contrast, low-income renters are much more likely than low-income buyers to live in central cities; 47 percent of low-income renters live in cities, but only 30 percent of low-income buyers live in those areas. Both African Americans and Hispanics are much more likely to buy in central cities than Whites are and are less likely to buy in nonmetropolitan areas. Nonetheless, the suburbs are still the most common destination for African-American and Hispanic first-time homebuyers; 44 percent of African Americans and 49 percent of Hispanics choose to buy in those areas.

A small number of studies have used Home Mortgage Disclosure Act (HMDA) data to identify the characteristics of neighborhoods where low-income and minority homebuyers are purchasing homes. It is not possible to identify first-time homebuyers from the HMDA data, but, because these data identify the census tract where homes were purchased, they provide more precise information on homebuyers' neighborhood choices than other data sources do. These studies shed light on the extent to which low-income and minority buyers are gaining access through homeownership to higher income neighborhoods and on whether the location choices of minorities are helping to reduce racial segregation.

Stuart (2000) examined home purchases in the Boston metropolitan area from 1993 through 1998 and observes that, although a significant share of African Americans and Hispanics purchased homes outside the city of Boston, these minorities were still much more likely to purchase in the central city. Although 91 percent of Whites bought in suburban areas, only 41 percent of African Americans and 61 percent of Hispanics did so. Importantly, one-half of the African Americans and Hispanics who moved to the suburbs were found in just seven communities. Although the reasons for such constrained choices are not clear—that is, whether the choices reflect discriminatory treatment, limits due to housing affordability, or preferences for specific communities—the result may be the re-creation of racially segregated living patterns in suburban areas. In considering low-income buyers' location choices, Stuart found that, although low-income buyers were distributed across communities of all income levels, they were more likely to purchase in low-income communities (60 percent) than middle-income (47 percent) or upper income (34 percent) buyers were. Furthermore, he found that in suburban areas low-income Whites were as segregated from upper income Whites as African Americans were from Whites.

Immergluck (1999) also uses HMDA data to examine home purchase patterns by African Americans in the Chicago area. He also finds that African-American homebuyers were concentrated in a relatively small number of census tracts. In the 1995-to-1996 period, 45 percent of African-American

homebuyers located in areas that were 75 percent or more African American and 50 percent of all African-American homebuyers were concentrated in 5 percent of all census tracts. Thus, like Stuart, Immergluck finds that African-American homebuying choices seem to reinforce patterns of racial segregation. Immergluck and Smith (2001) also use HMDA data to examine patterns of home purchase by different income groups in the Chicago area. They find that significant growth occurred in homebuying activity by low-income households in suburban areas of Chicago between the 1993-through-1994 period and the 1999-through-2000 period. Although these suburban buyers were mostly concentrated in older suburbs near the core and outlying suburbs, nonetheless, a strong movement of low-income buyers to suburban areas occurred. At the same time, the number of upper income homebuyers increased rapidly in the city of Chicago, but, again, those buyers were concentrated in a few, specific neighborhoods. Nonetheless, Immergluck and Smith find some evidence of greater income mixing by homebuyers in the Chicago area during the 1990s.

Finally, Belsky and Duda (2002) also use HMDA data for the 1993-through-1999 period to examine home purchase activity by low-income and minority households in nine metropolitan areas. They also find that large shares of low-income and minority homebuyers are purchasing in the suburbs. Significant shares of low-income buyers were found to have purchased homes in moderate-income areas, leading the authors to conclude that homebuying activity was contributing to some income mixing, although these households tended to be concentrated closer to the urban core than upper income households were. Home purchases by African Americans were also more clustered near the urban core and tended to be concentrated in predominantly minority areas, leading the authors to conclude that homebuying by African Americans was not contributing materially to lowering levels of racial segregation.

In short, studies using HMDA data to examine home purchase activity present mixed conclusions regarding home purchases by low-income and minority households. Although buyers are gaining access to suburban areas, these buyers tend to locate in areas with greater concentrations of low-income and/or minority households. In short, as Belsky and Duda conclude, "whether the move to low-income homeownership has been associated with a move to opportunity remains an open question" (Belsky and Duda, 2002: 52).

Another study (Herbert and Kaul, 2005) that sheds some light on the types of neighborhoods where minorities are buying homes uses decennial census data at the census tract level for 1990 and 2000 to examine the characteristics of neighborhoods where minority homeownership rates increased the most during the 1990s. This study reaches conclusions similar to those studies using HMDA data. In general, Herbert and Kaul find that areas with the greatest gains in minority homeownership rates were more likely to be in suburban areas and were marked by higher incomes and house values and lower concentrations of minorities than areas where little change occurred in minority homeownership rates. These findings suggest that the movement to homeownership is associated with a move to areas of higher socioeconomic status and is supportive of greater racial integration. Still, the findings also indicate that minorities live in areas with lower incomes and house values and higher minority concentrations than the areas where Whites live.

Although cross-sectional comparisons may show that, on average, low-income and minority buyers reside in better neighborhoods than low-income renters do, this observation does not mean that individual buyers actually improved their neighborhood conditions as a result of their move to

homeownership. It may be that, among low-income households, those who achieve homeownership already resided in somewhat better neighborhoods than other low-income renters did. A more informative way to evaluate whether a move to homeownership is associated with an improvement in neighborhood conditions is to compare the characteristics of neighborhoods where low-income buyers lived before buying their home with the area where they purchased. Several recent studies provide results from this type of analysis.

Reid (2004) analyzes data from the Panel Study of Income Dynamics (PSID) covering a period from 1976 to 1993, using a special version of these data that includes characteristics from the decennial censuses for 1980 and 1990 for the census tracts where respondents reside. The panel nature of the PSID enables her to identify when renters become homeowners and to then compare the characteristics of the neighborhoods where they lived before and after purchasing a home. The characteristics examined include those related to demographics, economic status, and housing market conditions. Reid groups buyers into three income groups (low, moderate, and high)[7] and two racial groups (non-Hispanic White and all minorities). Reid concludes that the move to homeownership results in essentially no change in neighborhood conditions for low-income Whites but fairly sizeable improvements for low-income minorities. Small positive changes also occur for moderate- and high-income Whites and minorities. For all groups except low-income Whites, the move to homeownership results in an increase in the neighborhood homeownership rate. Low-income minorities also experience declines in the shares of female-headed households, people in poverty, households with welfare income, and unemployed adults.

Tempering the positive finding that minorities of all income levels experience some improvement in neighborhood conditions when buying a home is the fact that, compared with Whites of the same income category, minorities live in areas with lower economic status, fewer homeowners, and lower property values. Thus, although a move to homeownership improves neighborhood conditions for minorities, it by no means results in the same level of economic status that Whites of similar income levels experience.

Another recent study that examines the neighborhoods of low-income homebuyers before and after they purchase their homes is Turnham et al. (2004). This study gathered data on 788 low-income homebuyers assisted through the HOME program in 33 jurisdictions around the country during the 1993-to-2003 period. All the homebuyers assisted through the HOME program have low incomes; 74 percent of participants have incomes between 50 and 80 percent of the AMI. With a 55-percent share, minorities account for a higher share of program participants than they do of all low-income buyers.

The study found that a large majority of buyers (70 percent) moved at least 1 mile from their previous residence and so were likely to have changed neighborhoods. Of these, 47 percent moved between 1 and 5 miles, and 24 percent moved more than 5 miles.

[7] Reid's income classification is unique. The low-income category includes renters whose income is less than 80 percent of the AMI in every year they are observed up through the time they purchase a home. Moderate-income renters are those whose income exceeds the 80-percent threshold in at least 1 year through the time when they purchase the home but whose income is not consistently above the AMI. High-income renters have incomes that exceed the AMI every year they are observed through the time they purchase their home.

This study found some indications of increases in the housing status of the postmove neighborhoods. Homeownership rates were slightly higher in the postmove neighborhoods than in the premove neighborhoods (58 compared with 54 percent), as were the share of housing in single-family units (52 compared with 48 percent). Despite these trends, a variety of other measures of housing conditions, including age, vacancy rates, and values, indicated that essentially no difference existed. Similarly, the premove and postmove neighborhoods were remarkably similar in a variety of economic and demographic characteristics, including poverty rates, share of households receiving public assistance, household incomes, and share of adults with some college education.

Turnham et al. (2004) also compare the characteristics of the neighborhoods with the broader jurisdiction (either city or county) where the neighborhoods are located. In general, neighborhoods where low-income buyers purchased are somewhat below average on a number of socioeconomic indicators. For example, the neighborhoods have lower household incomes, lower house values, and lower education levels than the broader jurisdictions do; however, the neighborhoods are by no means distressed. The authors also point out the average incomes in the neighborhood are much higher than the average income of the HOME-assisted buyers. Although the average buyer's income was about $29,000, the average neighborhood income was $42,000. The study concludes that, although the move to homeownership did not result in improved neighborhood conditions, the neighborhoods were, in general, decent places to live, marked by moderate-income levels, a high share of working families, little welfare dependence, and racial diversity.

Turnham et al. (2003) conducted a similar type of analysis on a small sample (84) of homebuyers participating in the Voucher Homeownership Program in 12 markets around the country and found very similar results. The profile of families assisted through the Voucher Homeownership Program is similar to those assisted by HOME. Typical buyers using housing vouchers had incomes of less than $35,000, one-half were minorities, and most were single-parent households. Similar to the results of the study using the HOME program participants, most housing voucher buyers (61 percent) were found to have moved at least 1 mile from their previous residence, and 21 percent moved 5 miles or more. One-half of the buyers who did not move more than 1 mile purchased the same unit they had rented, however—and so experienced no change in either housing or neighborhood as a result of the purchase. For the most part, the neighborhoods where they moved were similar to those where they started, with only slight improvement evident in various socioeconomic indicators. The new neighborhood, when compared with the old neighborhood, showed a slight increase in neighborhood homeownership rates (60 compared with 57 percent) and in the share of homes in single-family structures (54 compared with 51 percent). In addition, poverty rates were slightly lower (16 compared with 18 percent) as was the share of single female-headed households (10 compared with 11 percent).

The study also conducted a windshield assessment of 32 of the properties and their surrounding neighborhoods. For the most part, the houses purchased appeared to be in better shape than surrounding properties, exhibiting better exterior condition of the structures and surrounding grounds; however, the differences were not large. For example, all the purchased units were deemed to have good or excellent exterior maintenance evident, but 90 percent of surrounding properties were similarly rated. Overall, most of the neighborhoods where buyers had purchased were rated as excellent (38 percent) or good (47 percent). In short, as with the study of the HOME

program, participants in the Voucher Homeownership Program were not found to have experienced a significant improvement in neighborhood conditions, but the areas where they bought were, in general, stable, good-quality neighborhoods.

Finally, Cummings, DiPasquale, and Kahn (2002) examine the premove and postmove neighborhood characteristics of participants in homeownership programs run by the city of Philadelphia. The main focus of their research is a program designed to promote neighborhood revitalization by constructing deeply subsidized housing units for owner occupants in severely distressed neighborhoods. The study found that this homebuyer group experienced significant declines in neighborhood quality after moving. The study also reports on the premove and postmove neighborhoods of participants in a program that provided a small subsidy ($1,000) to low-income buyers in the city of Philadelphia. The authors find that participants in this program experienced significant improvements in neighborhood characteristics in a number of dimensions, including household income, house values, and homeownership rates.

Taken as a whole, the literature that has examined the neighborhood choices of low-income and minority homebuyers paints a somewhat mixed picture. For the most part, a move to homeownership by low-income households is not associated with significant improvements in neighborhood conditions, nor does it show that low-income homebuyers are being relegated to distressed neighborhoods. For the most part, the areas with higher concentrations of low-income buyers are suburban areas with moderate incomes. On the other hand, some indications suggest that minority homebuyers may fare better than White low-income homebuyers; both the national analysis by Reid (2004) and the study of a Philadelphia homeownership program by Cummings, DiPasquale, and Kahn (2002) find that minorities realized much more substantial neighborhood improvements with a move to homeownership. The downside of this finding is that, even with these improvements, the socioeconomic status of neighborhoods where minority owners are locating is lower than that of neighborhoods where Whites with comparable incomes are locating.

Perhaps the most important concerns about the neighborhood choices of low-income and minority buyers are what implications these choices have for the likelihood of realizing the financial and social benefits associated with homeownership. Herbert and Belsky (2006) explore these issues.

Housing Costs

Exhibit 7 presents the distribution of housing cost burdens across first-time homebuyers and other household types. Housing cost burdens measure the share of income devoted to housing, including rent or mortgage payments, utilities, property insurance, and property taxes. Traditionally, housing is considered affordable if it accounts for less than 30 percent of a household's income. Housing cost burdens of between 30 and 50 percent are considered moderate, while those of 50 percent or more are severe. Exhibit 7 further breaks down those households with moderate cost burdens into those that pay between 30 and 39 percent of income for housing and those that pay between 40 and 49 percent. Housing cost burdens are shown for the 1991-through-1997 and 1999-through-2005 survey years to identify trends in cost burdens between these periods.

Exhibit 7

Trends in Housing Cost Burden for First-Time Homebuyers and Other Households*

Time Period/Housing Burden Category	First-Time Homebuyers						Recent-Mover Low-Income Renters	All Households
	Low-Income Homebuyers	Moderate-Income Homebuyers	High-Income Homebuyers	White Homebuyers	African-American Homebuyers	Hispanic Homebuyers		
1989 through 1997								
Less than 30%	51.5	82.8	94.7	76.9	69.4	58.9	42.3	72.4
30 to 39.9%	20.0	12.9	4.7	13.1	9.8	17.3	19.5	10.9
40 to 49.9%	12.1	3.3	0.5	5.0	8.7	10.1	11.0	5.3
50% or higher	16.3	1.0	0.1	5.1	12.1	13.8	27.2	11.4
1998 through 2005								
Less than 30%	44.3	75.5	90.7	71.6	66.1	52.7	41.6	70.2
30 to 39.9%	22.0	16.1	6.5	14.6	15.4	18.3	18.9	11.2
40 to 49.9%	12.2	5.2	1.7	5.9	6.8	11.5	10.7	5.5
50% or higher	21.5	3.2	1.1	7.9	11.7	17.4	28.7	13.1
Change								
Less than 30%	– 7.3	– 7.4	– 4.0	– 5.2	– 3.3	– 6.1	– 0.6	– 2.2
30 to 39.9%	2.0	3.2	1.8	1.5	5.6	1.0	– 0.5	0.3
40 to 49.9%	0.1	1.9	1.2	0.9	– 1.9	1.4	– 0.3	0.3
50% or higher	5.1	2.2	1.0	2.8	– 0.4	3.7	1.5	1.7

**Share of households spending given percent of income on housing.*

Source: Tabulations from the 1991-through-2005 American Housing Surveys

As shown, in the first part of the 1990s, low-income buyers were much more likely to face both moderate and severe housing cost burdens than were either moderate- or high-income buyers. In the 1991-through-1995 survey years, 32.1 percent of low-income buyers experienced moderate payment burdens, compared with 16.2 percent of moderate-income buyers and 5.2 percent of high-income buyers. The differences in the shares of buyers with severe payment burdens were even starker. Although 16.3 percent of low-income buyers paid more than 50 percent of their income for housing, only 1.0 percent of moderate-income and no high-income buyers faced this degree of burden. Although not as extreme as the differences categorized by income, minorities, particularly Hispanics, were also more likely to face housing cost burdens than Whites were. During this period, 27.3 percent of Hispanic first-time buyers had moderate payment burdens compared with 18.5 percent of African Americans and 18.1 percent of Whites, while 13.8 percent of Hispanics and 12.1 percent of African Americans had severe payment burdens compared with 5.1 percent of Whites.

Importantly, the share of first-time buyers facing severe housing cost burdens increased considerably after 1997, particularly among low-income buyers. In the period after 1997, 21.5 percent of low-income buyers had a severe housing cost burden, a 5.1-percentage-point increase from the first part of the 1990s. Although the share of households facing moderate and severe payment burdens increased for both moderate- and high-income buyers over the period, the increases were much smaller. Among minorities, Hispanics experienced the largest increases in the share of households with both moderate (2.4 percent) and severe (3.7 percent) payment burdens. As a result, since the late 1990s, Hispanics had payment burdens that were nearly as high as those among low-income buyers. Whites also saw a jump in the share of households with severe payment burdens (2.8 percent), while African Americans had an increase in the share with moderate payment burdens (3.7 percent). African-American homebuyers, compared with White homebuyers, were somewhat more likely to face both moderate (22.2 compared with 20.5 percent) and severe (11.7 compared with 7.9 percent) payment burdens.

For the most part, low-income renters face higher payment burdens than owners do. In the period before 1997, recent-mover low-income renters were much more likely to face severe payment burdens; 27.2 percent of recent-mover low-income renters were in this category compared with only 16.3 percent of low-income buyers. Although the incidence of severe payment burdens was rising sharply for low-income buyers, however, only a small rise occurred for low-income renters. In addition, although the share of low-income buyers with moderate payment burdens increased by 2.1 percentage points, the share of low-income renters in this category declined by 0.8 percentage points. As a result, in the period after 1997, more low-income buyers than low-income renters faced moderate payment burdens (34.2 compared with 29.6 percent), while the difference in shares with severe payment burdens narrowed to just 7.2 percentage points (21.5 compared with 28.7 percent).

In short, the increase in low-income homeownership appears to have been associated with fairly sizeable increases in the incidence of severe payment burdens among first-time buyers. Among minorities, the share of buyers with high payment burdens is most evident among Hispanics. The relaxation of mortgage underwriting requirements, which has been credited with helping to fuel the rise in homeownership rates, may also have contributed to these increases in severe payment

burdens. Although most mortgage products in the past required that housing costs (including the mortgage payment, property insurance, and taxes), in general, could not exceed about 30 percent of income, new products designed for low-income borrowers now commonly allow ratios in the upper 30s, while subprime products may allow even higher payment burdens. When the cost of utilities is added to other housing costs, these more flexible guidelines can result in total payment burdens of 50 percent of income or more. Whatever the cause, it is notable that more than one in five low-income first-time homebuyers and one in six Hispanic buyers were paying more than 50 percent of their income for housing in the period after 1997.

Mortgage Financing Choices

The mortgage terms homebuyers select can have important implications for their experience as owners both in terms of longrun mortgage costs and the degree of risk of being unable to meet future mortgage obligations. One of the most important mortgage characteristics is the interest rate. Higher interest rates raise the monthly costs of homeownership and also decrease the share of mortgage payments that go toward principal in the early years of the mortgage, in turn slowing equity accumulation. A notable characteristic of the mortgage market during the 1990s was the development of the subprime mortgage market, which gave borrowers who otherwise might not have qualified for a loan an opportunity to obtain mortgage credit—but at the cost of higher interest rates. Subprime lending has consistently been found to be disproportionately concentrated among minority and low-income borrowers and neighborhoods (see Apgar and Herbert, 2005, for a review of this literature).

As the market developed, most subprime loans were used to refinance existing mortgages. As a result, most studies of subprime lending patterns have focused on this segment of the market. The share of subprime mortgages for home purchase, however, has been growing steadily. In 1993, subprime loans accounted for a little more than 1 percent of all home purchase loans (Joint Center for Housing Studies, 2004). In contrast, according to HMDA data, by 2006 high-cost loans (a proxy for subprime loans in HMDA) had come to account for 25.3 percent of conventional first-lien home purchase loans (Avery, Brevoort, and Canner, 2007). As with refinance loans, subprime purchase loans, in general, are more common among minority borrowers. In 2006, high-cost loans accounted for 53.7 percent of first-lien conventional purchase mortgages for African Americans and 46.6 percent for Hispanics compared with 17.7 percent for non-Hispanic Whites.

The increase in subprime purchase lending to minorities and, to a lesser extent, to low-income borrowers, would be expected to be evident in the share of buyers obtaining high-interest-rate loans. The top portion of exhibit 8 presents information on average interest rates for first-time buyers by income and race/ethnicity for the periods before and after the 1997 survey.[8] In the period up through the 1997 survey, lower income buyers tended to face higher interest rates. The average interest rate for low-income buyers was 8.68 percent, compared with 8.38 percent for moderate-income buyers and 8.29 percent for high-income buyers. To put these differences in perspective,

[8] Recent first-time buyers in each survey are those who purchased their home since the previous AHS survey 2 years earlier. As a result, the interest rates reported by buyers in any one survey reflect rates prevailing during the previous 2-year period. For example, interest rates obtained by recent buyers in the 1991 AHS reflect interest rates from the 1989-to-1991 period.

Exhibit 8

Trends in Interest Rates by Income and Race/Ethnicity for First-Time Homebuyers, 1989 Through 2005

Income or Race/Ethnicity	1989 Through 2005 (%)	1989 Through 1997 (%)	1997 Through 2005 (%)	Change (%)
Average interest rates				
Low-income buyers	7.78	8.66	6.89	– 1.77
Moderate-income buyers	7.61	8.38	6.83	– 1.55
High-income buyers	7.51	8.29	6.72	– 1.57
White buyers	7.62	8.45	6.79	– 1.65
African-American buyers	7.76	8.60	6.91	– 1.69
Hispanic buyers	7.66	8.33	6.98	– 1.35
Share of buyers with high interest rates*				
Low-income buyers	11.3	11.7	10.8	– 0.9
Moderate-income buyers	8.2	7.4	9.0	1.7
High-income buyers	6.4	4.8	7.7	2.9
White buyers	8.6	8.3	8.8	0.5
African-American buyers	9.8	8.8	10.7	1.9
Hispanic buyers	10.9	9.2	12.0	2.8

** High interest rate is defined as a rate that is more than one standard deviation above the mean for the AHS period. A standard deviation ranges from 1.32 to 1.70 over the eight survey periods.*

Source: Tabulations from the 1991-through-2005 American Housing Surveys

assuming a $100,000 mortgage, the higher interest rates faced by low-income buyers is equivalent to paying about $26 more per month than higher income buyers pay. Smaller differences are evident in average interest rates by race; the average interest rate obtained by Whites was 8.45 percent compared with 8.60 percent for African Americans and 8.33 percent for Hispanics. Hispanics had the lowest average interest rates of the three racial/ethnic groups.

The most notable aspect of the trends in average interest rates is the general decline that occurred in the second half of the decade. For all groups, average interest rates declined by more than 1.5 percentage points. Average interest rates declined more among low-income buyers, helping to substantially narrow the difference in average rates between low-income and upper income buyers. This trend suggests that the expansion of affordable mortgage lending products contributed to a reduction in interest rates available to lower income buyers. African Americans also experienced a slightly larger decline in average interest rates than Whites did, narrowing the difference in average interest rates obtained by these groups to only 0.12 percentage point. Hispanics, however, experienced much smaller declines in average interest rates, but because they had started the period with lower average interest rates, in the second half of the decade there was little difference in the average rates obtained by Whites and Hispanics (6.79 compared with 6.98 percent).

Given the fact that subprime lending has expanded rapidly since 1997 and that this lending has been disproportionately concentrated among minority and low-income borrowers, it is somewhat unexpected that the trends in average interest rates did not indicate a widening of differences by

income or race/ethnicity.[9] To examine whether trends in average interest rates may mask the extent to which the share of borrowers facing very high interest rates was rising, loans were identified as having "high" interest rates if the rate was more than one standard deviation above the mean interest rate for any survey period.[10] By this measure, only a slight increase occurred in the overall share of home purchase mortgages for first-time homebuyers that had high interest rates. During the 1989-through-1997 survey years, 8.3 percent of mortgages had high interest rates compared with 9.3 percent during the 1995-through-2003 survey years.

The bottom panel of exhibit 8 presents the share of first-time buyers with high-interest-rate loans. Although high-cost loans are more common among low-income buyers, both moderate- and high-income buyers experienced larger increases in the share of high-cost loans since 1997. Although a decline of 0.9 percentage point occurred in the share of low-income buyers using high-cost loans, moderate- and high-income buyers experienced increases of 1.7 and 2.9 percentage points, respectively. During the 1997-through-2005 survey years, roughly 1 in 10 of both low- and moderate-income first-time buyers used high-cost loans, and about 1 in 13 high-income buyers used these loans. One possible explanation for this pattern is that the expansion of conventional lending to low-income buyers offset the growth in subprime lending to lower the share of buyers obtaining high-cost loans. Because moderate- and high-income buyers would not have benefited as much from the expansion of affordable lending products, the growth of subprime lending may be more evident among these groups.

Among racial/ethnic groups, little difference was evident before 1997 in the share of buyers obtaining high-cost loans. Although the share of Whites obtaining high-cost loans increased only slightly after 1997 (rising by 0.5 percentage point), the share of African Americans and Hispanics with these loans increased by 1.9 and 2.8 percentage points, respectively. This result is in keeping with findings from the literature on subprime loan usage that minorities are much more likely than Whites are to borrow through subprime lenders, but the result is at odds with the literature in that subprime lending is more common among African Americans than among Hispanics.

The general conclusion from this analysis of AHS data—that there was not a significant tendency for low-income and minority homebuyers to face higher interest rates—seems at odds with the fact that subprime lenders' share of home purchase mortgages increased dramatically from the early 1990s through 2005.[11] This conclusion, however, is also consistent with two recent studies that

[9] The increase in subprime lending may not be evident from these data because higher borrowing costs result from both higher origination costs and higher interest rates. Because the AHS does not gather information on origination costs, we cannot assess whether differences exist among borrower groups in these costs.

[10] The variation in interest rates observed across borrowers in any survey period will reflect both variation in interest rates over the 2-year period covered by the survey and variation in rates across borrowers at any particular point in time. Unfortunately, the AHS does not capture the month when mortgages are originated and so it is not possible to standardize rates by comparing them with some prevailing benchmark for the month of origination. Across the eight survey periods covered in these data, the standard deviation of interest rates ranges from 1.32 to 1.70, with greater variation in the 1991 and 1993 survey years, when interest rates were falling more rapidly.

[11] Although this trend might be an indication that the AHS does not accurately capture interest rate information, a recent study by Lam and Kaul (2003) concluded that data from the AHS on interest rates is consistent with other data sources. In fact, a comparison of interest rates on nongovernmental loans found the AHS averages to be slightly higher, which the authors conclude may be due to the fact that the AHS includes subprime loans while the comparison data set did not.

have examined differences by race and ethnicity in the interest rates obtained by homeowners. Susin (2003) and Boehm, Thistle, and Schlottmann (2006) analyze data from the AHS and find that no significant difference exists in interest rates on home purchase mortgages by race and ethnicity after differences in other available risk factors are accounted for. These same studies, however, find that African Americans pay significantly higher interest rates when they refinance. These results suggest that the simple tabulations of the AHS showing little difference in home purchase interest rates by race and ethnicity may be a fair depiction of market experience. The fact that low-income and minority buyers have fared better in the purchase mortgage market than the refinance market may also be a reflection of the fact that the emphasis of affordable lending programs has been almost exclusively for home purchase. This trend may indicate that greater attention should focus on developing efforts aimed at assisting homeowners in the refinance market.

Another important characteristic of the initial mortgage terms is the loan-to-value (LTV) ratio. Although higher LTV ratios reduce the amount of savings buyers need to qualify for a mortgage, making it easier for low-income households to purchase a home, they also increase the risk that small fluctuations in home prices will erase the buyers' equity in the home. The greater prevalence of mortgage products that enable buyers to put down less than 5 percent of the purchase price has been cited as one of the factors contributing to the increase in low-income homeownership since the early 1990s. Exhibit 9 shows the distribution of LTV ratios among first-time homebuyers by income and racial/ethnic categories both for the 1989-through-2005 survey years and the change in the distribution between the period before 1997 and the years after 1997. As we expected, low-income buyers in general have higher LTV ratios than higher income buyers do. Over the entire survey period, 24.3 percent of low-income buyers had LTV ratios of more than 95 percent, compared with 21.3 percent of moderate-income and 15.3 percent of high-income buyers. Nonetheless, a fairly high share of low-income buyers had LTV ratios of 80 percent or less; 44.4 percent of low-income buyers were in this category, compared with 41.9 percent of moderate-income and 45.5 percent of high-income buyers.[12] When racial/ethnic groups are considered, minorities are found to have a higher proportion of high LTV loans than Whites have. Among African-American and Hispanic first-time buyers, 26.8 and 24.2 percent, respectively, had LTV ratios of more than 95 percent compared with 19.0 percent of Whites. In terms of changes over time in the distribution of mortgages by LTV, an increase was evident in the share of higher LTV loans among many categories of first-time buyers; the largest increases occurred among moderate-income buyers (5.9 percentage points) and Whites (4.2 percentage points). Low-income and African-American first-time buyers experienced slight declines in the share with LTV ratios of more than 95 percent (-0.1 and -0.2 percentage point, respectively). Nonetheless, more than one-fourth of low- and moderate-income and minority first-time buyers since 1997 have purchased homes with less than 5 percent down. These buyers would be most vulnerable to a loss of their equity.

Exhibit 10 presents information on other key mortgage characteristics. Because adjustable-rate mortgages (ARMs) often provide initially lower interest rates, this option can be attractive to homebuyers who are trying to stretch their initial buying power and expect their incomes to rise over the next few years to meet any increase in interest rates. Fixed-rate mortgages, on the other hand,

[12] One explanation for the fairly high share of first-time buyers with low LTV ratios could be that they are more likely to use second mortgages to supplement a smaller first mortgage. The LTV calculation was based on only the primary mortgage.

Exhibit 9

Trends in Loan-to-Value Ratio by Income and Race/Ethnicity for First-Time Homebuyers, 1989 Through 2005

Income or Race/Ethnicity LTV Category	1989 Through 2005 (%)	1989 Through 1997 (%)	1997 Through 2005 (%)	Change (%)
Low-income buyers*				
80% or less	44.4	45.9	43.1	– 2.8
80.1 to 90%	19.3	19.5	19.1	– 0.4
90.1 to 95%	12.1	10.2	13.5	3.3
Above 95%	24.3	24.3	24.2	– 0.1
Moderate-income buyers				
80% or less	41.9	43.4	40.4	– 3.0
80.1 to 90%	22.4	24.2	20.8	– 3.5
90.1 to 95%	14.4	14.1	14.7	0.6
Above 95%	21.3	18.3	24.1	5.9
High-income buyers				
80% or less	45.5	44.5	46.4	1.9
80.1 to 90%	26.0	28.6	23.9	– 4.7
90.1 to 95%	13.2	14.0	12.4	– 1.6
Above 95%	15.3	12.9	17.3	4.4
White buyers				
80% or less	44.4	45.1	43.0	– 2.1
80.1 to 90%	23.7	25.0	22.2	– 2.8
90.1 to 95%	13.0	12.7	13.4	0.7
Above 95%	19.0	17.2	21.4	4.2
African-American buyers				
80% or less	37.8	36.7	37.9	1.1
80.1 to 90%	19.9	20.1	20.4	0.3
90.1 to 95%	15.4	16.2	15.0	– 1.2
Above 95%	26.8	27.0	26.7	– 0.2
Hispanic buyers				
80% or less	40.5	42.1	41.0	– 1.0
80.1 to 90%	20.4	23.8	18.6	– 5.2
90.1 to 95%	14.9	11.6	15.3	3.7
Above 95%	24.2	22.5	25.0	2.5

LTV = loan-to-value.

** Low-income homebuyers are defined as those buyers whose incomes are less than 80 percent of the area median income.*

Source: Tabulations from the 1991-through-2005 American Housing Surveys

provide homeowners with protection against future increases in housing costs due to rising interest rates. The data shown in exhibit 10 indicate that little variation exists across income or racial/ethnic groups in the prevalence of fixed-rate financing. Over the entire survey period, 87.1 percent of low-income buyers used fixed-rate financing compared with 87.5 percent of moderate-income and 85.5 percent of high-income buyers. African Americans and Hispanics were actually more likely to

use fixed-rate financing than Whites were. All groups increased their use of fixed-rate mortgages after 1997, reflecting the fact that interest rates in general were lower during this period so buyers were both more motivated to lock in these lower rates for the long term and had less need for an ARM product to lower initial interest rates. In the 1997-through-2005 survey years, about 89 percent of all first-time buyers used fixed-rate financing, with the shares slightly higher among African Americans and Hispanics.

Of note, the popular press in recent years has focused considerable attention on the growing use of ARMS, including a sizeable portion of these loans that are interest-only loans. As shown in exhibit 10, these trends were not yet evident in the AHS data through 2005.

Exhibit 10 also shows the share of mortgages with terms of 30 years or more. Longer term mortgages have the advantage of lowering the monthly payment, but they also build up equity more slowly. Low-income buyers have had a tendency to use shorter term financing than higher income buyers do. This trend likely reflects the fact that a relatively high share of low-income buyers chose manufactured housing, which is commonly financed with shorter term loans than site-built housing is. Over the entire period, 62.2 percent of low-income buyers chose 30-year terms or longer, compared with 77.8 percent of moderate-income buyers and 81.4 percent of high-income buyers. Less difference exists across racial/ethnic groups, although minorities tend to be more likely to use long-term financing than Whites do. Although 73.0 percent of Whites had loans with 30-year terms or longer, 73.2 percent of African Americans and 76.5 percent of Hispanics opted for loans with such long terms. All groups experienced an increase in the share of mortgages with these longer terms after 1997, with larger increases occurring among low-income and Hispanic buyers.

Exhibit 10

Trends in Selected Mortgage Characteristics of Low-Income First-Time Homebuyers, 1989 Through 2005

Mortgage Characteristic/ Income or Race/Ethnicity	1989 Through 2005 (%)	1989 Through 1997 (%)	1997 Through 2005 (%)	Change (%)
Share with fixed-rate mortgage				
Low-income buyers*	87.1	84.4	89.6	5.1
Moderate-income buyers	87.5	84.6	90.5	6.0
High-income buyers	85.5	82.1	88.5	6.3
White buyers	85.9	82.8	89.2	6.4
African-American buyers	91.0	90.0	91.9	2.0
Hispanic buyers	88.6	85.0	90.8	5.8
Share with 30-year term or longer				
Low-income buyers	62.2	57.2	67.1	9.9
Moderate-income buyers	77.8	74.3	81.4	7.1
High-income buyers	81.4	79.7	83.1	3.4
White buyers	73.0	70.0	75.9	5.9
African-American buyers	73.2	70.3	75.6	5.3
Hispanic buyers	76.5	73.9	78.0	4.1

** Low-income homebuyers are defined as those buyers with incomes of less than 80 percent of the area median income.*
Source: Tabulations from the 1991-through-2005 American Housing Surveys

Still, low-income buyers are more likely than higher income buyers to use shorter term mortgages and thus will tend to build up equity more quickly. Relatively little difference exists by race/ethnicity, although Hispanics are slightly more likely to use longer term mortgages and so will build up equity more slowly.

Summary

This article has made extensive use of information from the American Housing Survey from 1991 through 2005 to identify the characteristics of first-time homebuyers and their housing choices and to examine whether these characteristics have changed over time. In keeping with the well-documented rise in homeownership rates, the number of low-income and minority homebuyers rose rapidly beginning in the early 1990s. Between the 1989-to-1991 and 1995-to-1997 periods, the number of African-American and Hispanic first-time buyers roughly doubled, and the number of low-income buyers rose by nearly 50 percent. After 1997, the number of low-income and African-American homebuyers remained high, but increases moderated somewhat; however, the number of Hispanic buyers continued to increase. One notable change associated with the increase in low-income and African-American homebuyers over the decade was the greater proportion of single-parent and single-person households among first-time buyers. Although this trend is positive in that it indicates greater opportunities among these households that have historically had lower homeownership rates, it is also true that they may be exposed to greater risks from unexpected crises because the household includes just one wage earner.

Although the size and quality of housing purchased by low-income and minority homebuyers tend to be smaller and not quite as good as the housing that moderate- and high-income households buy, conditions are better for those buyers than for low-income renters and are at least as good as they are for the average U.S. household. Although concerns have been raised that low-income homebuyers may be much more likely to purchase housing in poor condition, the share of homes that are moderately or severely inadequate is only about 7 percent—no worse than the average for the United States, although slightly worse than the average for all homeowners. Overall, low-income homebuyers are satisfied with their homes; only 8.7 percent of those buyers rate their homes as 5 or lower on a 10-point scale. In comparison, 9.3 percent of all households and 17.9 percent of recent-mover low-income renters rate their homes as 5 or lower.

One notable difference between renters and owners is the share occupying single-family detached housing. Low-income and minority owners are much more likely to live in single-family detached homes than renters are, and so gain access to more living space and greater privacy; however, a fairly large share of low-income buyers (23.8 percent) purchased manufactured housing. Although evidence indicates that these homes provide good quality at an affordable price, concerns arise that, because a large share of these buyers do not own the land on which their units sit, they may not benefit from appreciation in land values.

Similar to the conclusions regarding housing quality, data from the AHS suggest that low-income buyers experience better neighborhood conditions and have higher satisfaction with their neighborhoods than low-income renters do and are similar to all U.S. households in both dimensions. Minority homebuyers are more likely than low-income buyers to buy in central cities, however,

which is reflected in a slightly higher propensity to live near commercial or industrial properties or to have bars on the windows of nearby buildings. Nonetheless, minorities are slightly more satisfied with their neighborhoods than low-income buyers are.

One strand of existing research has used HMDA data to examine the location choices of low-income and minority homebuyers in a small number of metropolitan areas. Although these studies cannot identify first-time buyers, the findings are consistent with those from the AHS. Low-income households are found to be gaining access to suburban areas. Although these buyers tend to locate in closer in, lower income areas, they are also fairly likely to locate in moderate-income areas, which suggests that a move to homeownership supports some degree of income mixing. These studies also find that, although minorities are gaining access to the suburbs, these buyers, particularly African Americans, are often concentrated in a small number of areas with an above-average share of minorities. As a result, the move to homeownership does not seem to be fostering greater racial integration; however, this observation does not mean that these neighborhoods are not otherwise fine places to live.

A comparison of neighborhood characteristics of low-income buyers and renters is intended to shed light on the extent to which a move to homeownership is associated with an improvement in neighborhood conditions. Several studies provide more direct evidence on the change in neighborhood conditions associated with a move to homeownership through data gathered on premove and postmove neighborhoods for samples of homebuyers participating in subsidized homeownership programs. In general, these studies find that, for the most part, little change occurs in neighborhood conditions for these buyers, although there tends to be a small increase in homeownership rates and the share of households living in single-family units. One study of this type used a national panel study to examine premove and postmove neighborhood conditions and so may have broader applicability than the studies that examine participants in government programs. This study found that, although low-income Whites did not experience any real change in neighborhood conditions by purchasing a home, low-income minorities experienced fairly sizeable improvements and moderate- and high-income minorities experienced small positive changes. Nonetheless, the study also found that the areas where minorities purchased generally ranked lower on various socioeconomic dimensions than the areas where Whites purchased. In short, although these studies collectively suggest that moves to homeownership are generally not associated with substantial improvement in neighborhood conditions, they do not find that low-income or minority homebuyers are systematically being shunted into poor-quality neighborhoods. Instead, these buyers appear to be moving to low- or moderate-income areas with few signs of distress.

This article has also presented information on the mortgage terms obtained by low-income and minority homebuyers. It is generally believed that the sizeable increases in homeownership rates over the past decade have been supported by expansion in the availability of mortgage credit through more relaxed underwriting guidelines. This observation would suggest that borrowers may have had greater access to affordable mortgage products over the decade. At the same time, however, significant growth has occurred in subprime mortgage lending, which expands the supply of credit but at the cost of higher interest rates and fees. Evidence from the AHS on differences in interest rates across first-time buyers by income and race/ethnicity suggests that, on average, low-income and minority buyers pay only slightly higher interest rates compared with upper income

and White buyers, and these differences tended to narrow over the course of the past decade. The growth of subprime lending was not yet evident in higher interest rates on purchase mortgages, at least as of 2005; however, the same cannot be said of refinance mortgages (see Herbert and Belsky, 2006).

Another important loan term is the ratio between the loan amount and the house value (LTV ratio). Although low-downpayment loans are important for addressing the lack of wealth that is the principal barrier to homeownership for most low-income and minority households, it also exposes buyers to greater risk of losing their investment due to fluctuations in home prices. Low-income and minority homebuyers are more likely to buy homes with little money down. Since 1997, about one-fourth of low-income and Hispanic homebuyers and 27 percent of African-American homebuyers have purchased homes with less than 5 percent down, compared with 21 percent of all White buyers. The shares of buyers using such high LTV loans has increased somewhat from the early 1990s, with increases of 4 percentage points for Whites and 2 percentage points for Hispanics. Although the availability of these loans has undoubtedly helped fuel the increases in homebuying, a fairly large share of buyers have little equity in their homes.

In terms of other mortgage characteristics, nothing indicates that low-income and minority first-time buyers are more likely to choose adjustable-rate mortgages and thus be exposed to interest-rate risk—at least as of 2005. Also, little difference is evident in the length of the mortgage term by income or race/ethnicity. Over the past year, however, numerous news accounts have documented the rapid growth in market share for various types of ARMS, including those with interest-only payments. Not evident from these reports, however, is the characteristics of homebuyers using these loans, particularly the extent to which the borrowers are low-income and minority first-time homebuyers.

Perhaps the most troubling aspect of the housing choices made by low-income and first-time buyers is the fairly large share facing significant housing cost burdens. In the period since 1997, a fairly significant increase in the share of low-income buyers having a severe payment burden has resulted in the need for these buyers to devote more than 50 percent of their income for housing costs. During the 1997-through-2005 survey years, 21.5 percent of low-income buyers faced such severe payment burdens, an increase of more than 30 percent from the 16.3 percent of buyers in this situation before 1997. Although African-American homebuyers are only slightly more likely to face moderate or significant payment burdens compared with Whites, Hispanics are much more likely to have significant payment burdens; 29.8 percent of Hispanics have moderate payment burdens (that is, they pay between 30 and 50 percent of income for housing) and 17.4 percent have severe payment burdens (they pay more than 50 percent of income for housing).

Overall, the evidence from the AHS and the literature paints a somewhat mixed picture of the initial housing conditions of low-income and minority homebuyers. On the one hand, for the most part, these buyers have obtained decent housing in decent neighborhoods. The houses and neighborhoods are of higher quality than those occupied by low-income renters and of similar quality to housing occupied by the average U.S. household. On the other hand, no strong evidence indicates that a move to homeownership has resulted in large increases in neighborhood quality for these buyers. Despite this observation, nothing indicates that a significant share of buyers is ending up in distressed neighborhoods.

Indications suggest that the number of buyers exposed to the risk of being unable to meet their mortgage obligations has increased. One example of this trend is the increased prevalence of high LTV loans; one-fourth or more of low-income and minority buyers have purchased their first homes with relatively little money down. Although this trend has undoubtedly helped fuel the increase in homeownership, these buyers are also more vulnerable to fluctuations in home prices. The significant increase in single-person and single-parent homebuyers also raises concerns about the ability of these households to respond to a financial crisis with only one earner to support the mortgage. Most importantly, a growing share of low-income first-time buyers are devoting more than one-half of their income to housing costs; one in five buyers has faced such a severe burden in recent years. These households clearly have little ability to adapt to any increases in housing expenses or decreases in income. On a positive note, low-income and minority buyers do not appear to face significantly higher interest rates at the time of purchase compared with other buyers.

This article has relied much less on a review of the existing literature and more on descriptive analyses of available data. In part, this focus reflects a desire to present a strong factual base about the recent low-income and minority homeownership boom to help inform the interpretation of studies about the experience of low-income and minority households as owners, which is the subject of Herbert and Belsky (2006). The focus of this article also reflects the fact that the literature examining initial housing choices is fairly thin. Several areas for further research stand out in particular. First, a need exists for multivariate analysis of the housing choices made by low-income and minority homebuyers to examine whether in fact homeownership is associated with greater housing quantity, quality, and satisfaction, taking into consideration important differences in the characteristics of renters and owners. Second, it would be very informative to make use of panel surveys of households to examine how a move to homeownership changes the quantity and quality of housing as well as its cost. Finally, further analysis of the mortgage choices made by low-income and minority homebuyers is needed given the importance of these choices in determining the financial benefits of homeownership.

Acknowledgments

The authors gratefully acknowledge financial support from the U.S. Department of Housing and Urban Development (HUD), Office of Policy Development and Research. The authors also thank HUD staff Harold L. Bunce and William J. Reeder for their careful and thoughtful review of earlier drafts of the report from which this article was developed and David A. Vandenbroucke for his assistance in providing tabulations from the 2005 American Housing Survey.

Authors

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

Eric S. Belsky is executive director of the Joint Center for Housing Studies of Harvard University.

References

Apgar, William C., Jr., and Christopher E. Herbert. 2005. *Subprime Lending and Alternative Financial Service Providers: A Literature Review and Empirical Analysis*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Avery, Robert B., Kenneth P. Brevoort, and Glenn B. Canner. 2007. "The 2006 HMDA Data," *Federal Reserve Bulletin* Vol. 93, (December): 73–109.

Belsky, Eric S., and Mark Duda. 2002. "Anatomy of the Low-Income Homeownership Boom in the 1990s." In *Low-Income Homeownership: Examining the Unexamined Goal*, edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: Brookings Institution Press.

Boehm, Thomas P., and Alan Schlottmann. 2004. *Is Manufactured Housing a Good Alternative for Low-Income Families? Evidence from the American Housing Survey*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Boehm, Thomas P., Paul D. Thistle, and Alan Schlottmann. 2006. "Rates and Race: An Analysis of Racial Disparities in Mortgage Rates," *Housing Policy Debate* 17 (1): 109–149.

Cummings, Jean L., Denise DiPasquale, and Matthew E. Kahn. 2002. "Measuring the Consequences of Promoting Inner City Homeownership," *Journal of Housing Economics* 11: 330–359.

Danes, Sharon M., and Earl W. Morris. 1986. "Housing Status, Housing Expenditures, and Satisfaction with Housing Quality," *Housing and Society* 13 (1): 32–43.

Friedman, Samantha, and Emily Rosenbaum. 2004. "Nativity Status and Racial/Ethnic Differences in Access to Quality Housing: Does Homeownership Bring Greater Parity?" *Housing Policy Debate* 15 (4): 865–901.

Herbert, Christopher E., and Eric S. Belsky. 2006. *The Homeownership Experience of Low-Income and Minority Families: A Review and Synthesis of the Literature*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Herbert, Christopher E., and Bulbul Kaul. 2005. *The Distribution of Homeownership Gains During the 1990s Across Neighborhoods*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Immergluck, Daniel. 1999. *Unfinished Business: Increases in African-American Home Buying and Continuing Residential Segregation in the Chicago Region*. Chicago, IL: Woodstock Institute.

Immergluck, Daniel, and Geoff Smith. 2001. *Home Buying by Income: 1993–2000*. Chicago: Woodstock Institute.

Joint Center for Housing Studies. 2004. *The State of the Nation's Housing*. Cambridge, MA: Harvard University, Joint Center for Housing Studies.

Kinsey, Jean, and Sylvia Lane. 1983. "Race, Housing Attributes, and Satisfaction with Housing," *Housing and Society* 10 (3): 98–116.

Lam, Julie A. 1985. "Type of Structure, Satisfaction, and Propensity to Move," *Housing and Society* 12 (1): 32–44.

Lam, Ken, and Bulbul Kaul. 2003. *Analysis of Housing Finance Issues Using the American Housing Survey.* Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Reid, Carolina Katz. 2004. Achieving the American Dream? A Longitudinal Analysis of the Homeownership Experiences of Low-Income Households. Dissertation discussion paper. Department of Geography, University of Washington.

Rosenbaum, Emily. 1996. "Racial/Ethnic Differences in Home Ownership and Housing Quality, 1991," *Social Problems* 43 (4): 403–426.

Stuart, Guy. 2000. *Segregation in the Boston Metropolitan Area at the End of the 20th Century.* Cambridge, MA: Harvard University, Harvard Civil Rights Project.

Susin, Scott. 2003. "Mortgage Interest Rates and Refinancing: Racial and Ethnic Patterns." Paper presented at the 2003 AREUEA Mid-Year Meeting.

Turnham, Jennifer, Christopher Herbert, Sandra Nolden, Judith Feins, and Jessica Bonjorni. 2004. *Study of Homebuyer Activity through the HOME Investment Partnerships Program.* Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Turnham, Jennifer, Naomi Michlin, Gretchen Locke, Michelle Wood, and Michael Baker. 2003. *Voucher Homeownership Assessment.* Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Housing Tenure, Expenditure, and Satisfaction Across Hispanic, African-American, and White Households: Evidence From the American Housing Survey

Thomas P. Boehm
The University of Tennessee

Alan Schlottmann
University of Nevada, Las Vegas

Abstract

Because of the significant growth in the number of Hispanic households in the United States, this article pools the 1998, 2002, and 2004 standard metropolitan statistical area samples of the American Housing Survey to compare the housing situations of Hispanic, African-American, and White households. We first consider the likelihood of ownership and housing costs (for both owners and renters) across race/ethnicity for all households and also households that were recent movers. We then analyze differences in ordinal rankings of structural and neighborhood quality. We find that factors that determine good structural and neighborhood quality appear to be consistent across all household types; that is, American households agree on what makes good housing. Several unique issues are identified for the Hispanic households in the sample; for example, crowding, high debt levels, and high annual housing costs per square foot for owners. On a positive note, rent subsidies appear to have a significant effect on lowering rental payments for all households. Furthermore, owners consistently rank both their structural housing characteristics and neighborhood quality higher than renters do.

Introduction[1]

In its proposed budget for fiscal year 2005, the U.S. Department of Housing and Urban Development (HUD) laid out its primary area of policy emphasis, which continues to be promoting affordable homeownership and stronger communities. In developing the details of such programs, HUD acknowledged the increasing importance of the Hispanic-American population, particularly as a component of low-income households whose housing options need improvement.

According to data from the Current Population Survey (HUD, 2006), in 1983 approximately 69.1 percent of White households, 45.6 percent of African-American households, and 41.2 percent of Hispanic households were homeowners. As of the third quarter of 2005, these figures had improved for all racial/ethnic groups; specifically, the shares of households that were homeowners amounted to 75.7 percent for Whites, 48.7 percent for African Americans, and 49.1 percent for Hispanics.[2] Despite the improvement, the gap between Whites and minorities has not narrowed significantly. Given the importance of owned housing as an asset, particularly for lower income households, and the service and externality benefits associated with homeownership, this gap in homeownership rates is a cause for concern.[3]

Even though the percentage of Hispanic households in the country now exceeds the comparable figure for African-American households as the largest minority group in the United States, it is surprising how little academic work appears in the housing economics literature focusing on the housing choices of Hispanic households (particularly, lower income households) as compared with those of White and African-American households. This dearth of research is particularly acute for a primary research question considered in this study—namely, the current state of housing quality and householders' satisfaction with their housing situation.

A significant amount of recent academic and policy research has examined how to expand homeownership opportunities for Hispanic households. What becomes quite clear from the literature is that, in addressing this question from a policy perspective, analysts and policymakers need to develop a better understanding of the differences in the housing situations that households with different racial/ethnic backgrounds (that is, Hispanic, African-American, and White) face. Issues to explore include determining how much better the quality of housing services is when provided by owned housing as compared with rental housing and what it is specifically about households' housing situations that gives rise to observed differences in the perceived quality of the housing services each racial/ethnic group receives. In particular, how do perceptions of service quality differ for Hispanic households as compared with other households? Using recent standard metropolitan statistical area (SMSA) samples of the American Housing Survey (AHS), we address these issues and investigate how they differ for Hispanics as compared with other racial groups across a number of different housing markets.

[1] This article was originally part of a series of papers that the U.S. Department of Housing and Urban Development commissioned to examine Hispanic homeownership. See Cortes et al. (2006) for references to the complete series of reports.

[2] See HUD (2005: p. 85). Also, see Herbert et al. (2005) for a thorough discussion of trends in homeownership differences by race/ethnicity and a review of the literature examining the causes of these gaps and policies designed to address them.

[3] See Boehm and Schlottmann (2002, 1999) for further development of these issues.

The analysis presented in this article has two broad thrusts. A primary point of focus is the consideration of differences by households in the sample in the perceived quality of the structural and neighborhood components of housing services. The AHS data contains detailed information on the structural characteristics of the house, the characteristics of the neighborhood in which the house is located, the demographic characteristics of the resident of the dwelling at the time of the interview, and two indices that measure the resident's satisfaction with his or her neighborhood and the quality of the structure in which they reside on an ordinal scale from 1 to 10. In general, we examine various racial groups to compare Hispanic households' satisfaction with their housing situation as compared with that of African-American and/or White households by tenure type and income category. Taking this idea one step further, we also investigate the relative importance of various individual structural and neighborhood attributes in determining households' perceptions of overall dwelling and neighborhood quality.

To place the results for housing quality within both the context of the literature and our data, however, we initially analyze the likelihood of homeownership for Hispanic households and their pattern of housing expenditures; that is, house value for owners and rental payments for renters. Differentials in household assessment of "quality" do not, of course, occur within a vacuum; instead they occur within the basic household homeownership decision. For example, an important observation one can make about structural (that is, dwelling unit) and neighborhood quality is that, across racial/ethnic groups and income levels, both structural and neighborhood quality are substantially higher for owners (as compared with renters). Thus, understanding the forces that influence the likelihood of homeownership and expenditure level are important to understanding differentials in housing satisfaction. As noted in the literature, different racial/ethnic groups may have different understandings of, access to, and proclivity to use financial markets and institutions for both saving and borrowing. For Hispanic households attempting to accumulate wealth to purchase a home, such differences, along with differentials in household income and other socioeconomic factors, could have a significant effect on the timing and likelihood of homeownership and the value of the housing they purchase.[4]

This article is organized into seven sections. Following this introductory section, the second section presents an overview of the data on which the study is based and the two data sets (the full sample and a subsample of recent movers) used in the analysis. The second section presents and discusses various aspects of housing quality and characteristics and shows the results along the dimensions of low-income, high-income, and minority household status. The third section presents results for the likelihood of ownership and expenditure for the full sample of households and recent movers. The fourth section presents 2002 and 2004 data on the effect on homeownership and expenditures over time in the United States (for nonnative born residents). The fifth section discusses the study's methodology for assessing housing and neighborhood quality differentials, and the sixth section summarizes empirical results for those quality differentials. Conclusions follow in the last section.

[4] As noted, the main emphasis of this study is the assessment of housing quality. Thus, although we do not suggest that our analysis is a detailed study of the dynamics of wealth accumulation and housing choice, it is important to consider the fundamental issues of homeownership and housing expenditure to establish a contextual basis for the rest of the analysis. For more detailed examination of wealth accumulation and housing dynamics, see Boehm and Schlottmann (2004) and the series of papers in Retsinas and Belsky (2002).

The Quality, Size, and Cost of Housing: The American Housing Survey 1998, 2002, and 2004

The data presented and analyzed in this article are from recent AHS samples for 41 SMSAs. Information is gathered for samples of approximately 5,000 households in each SMSA. Approximately 14 SMSAs are selected for each sampling year.[5] The most recently available SMSAs are for the sampling years 1998, 2002, and 2004; information from all these SMSAs is combined for this analysis.[6] We used the SMSA samples rather than the national version of the data set for two reasons. First, for the national sample, of the almost 50,000 units included in the data set, only about 4,000 are occupied by Hispanic households and slightly less than one-half of these households are owner occupants. Using the SMSA samples of the AHS makes it possible to obtain a larger total Hispanic sample size; specifically, approximately 17,968 Hispanic households are in the full sample used in this study.[7] Second, by using the SMSA samples we can identify the specific market in which housing decisions are being made. Market identification is not possible with the national sample.

Using the unique characteristic of the AHS, exhibit 1 provides measures of households' perceptions of the quality of the environment in which they live. Specifically, households are asked to rank the quality of both their structures and their neighborhood on an ordinal scale from 1 to 10 (where a rank of 1 is worst and a rank of 10 is best).[8] Exhibit 1 also reports values for several other variables of interest related to a household's housing experience. Specifically, tenure choice (owning or renting), housing value (for owners) or annual rent (for renters), total monthly housing costs, amount of mortgage debt (for owners), and household size are considered. To facilitate meaningful comparisons, the data are disaggregated along three additional dimensions based on our previous work with the AHS and the literature. Specifically, information is provided by income (relative to median income), by owners versus renters, and for recent movers into the area (approximately 6,446 of which are Hispanic households) who, it might be assumed, made a recent "active" housing choice.[9]

[5] Most of these SMSAs are also resampled periodically.

[6] The SMSAs included in the sample are, for 1998, Baltimore, MD, Birmingham, AL, Boston, MA, Cincinnati, OH-KY-IN, Houston, TX, Minneapolis-St. Paul, MN, Newport News-Hampton, VA, Oakland, CA, Providence-Pawtucket-Warwick, RI, Rochester, NY, Salt Lake City, UT, San Francisco, CA, San Jose, CA, Tampa-St. Petersburg, FL, and Washington, DC-MD-VA; for 2002, Anaheim-Santa Ana-Garden Grove, CA, Buffalo, NY, Charlotte, NC-SC, Columbus, OH, Dallas, TX, Fort Worth, TX, Kansas City, MO-KS, Miami, FL, Milwaukee, WI, Phoenix, AZ, Portland, OR-WA, Riverside-San Bernardino-Ontario, CA, and San Diego, CA; for 2004, Atlanta, GA, Cleveland, OH, Denver, CO, Hartford, CT, Indianapolis, IN, Memphis, TN-MS-AR, New Orleans, LA, Oklahoma City, OK, Pittsburgh, PA, Sacramento, CA, San Antonio, TX, Seattle-Everett, WA, and St. Louis, MO-IL.

[7] Because of the large numbers of White households in the sample assembled in this way, a random subsample of these households was selected to make the analysis more tractable.

[8] The determinants of these rankings are explored later in the article.

[9] Basing the definition on their previous work, the authors define low income as being at 80 percent or less of the median income. Results are not sensitive to moderate changes in this definition. Recent movers engaged in a move within the previous 12 months before the date of their interview.

Exhibit 1a

Housing Characteristics by Household Type[a] (1 of 2)

Household Type: All Households	Number of Observations	Mean Structural Quality	Mean Neighborhood Quality	Inadequate Housing (%)	Rank Neighborhood Poor (%)	Rank Structure Poor (%)	Household Type That Own (%)	Mean House Value or Monthly Rent ($)	Mean Monthly Housing Cost[b] ($)
White high-income owners	15,764	8.46	8.22	0.53	1.18	0.40	85.98	221,475	1,253
African-American high-income owners	4,302	8.43	7.99	1.19	2.00	0.67	74.31	142,664	1,038
Hispanic high-income owners	5,308	8.48	8.16	0.87	1.45	0.60	74.49	204,248	1,289
White low-income owners	9,856	8.44	8.14	1.13	2.00	0.89	60.84	147,289	683
African-American low-income owners	4,781	8.31	7.71	2.11	3.62	1.40	35.55	95,055	654
Hispanic low-income owners	4,121	8.36	8.02	2.11	2.74	1.14	38.01	128,681	774
White high-income renters	2,571	7.46	7.55	1.40	2.84	2.18	NA	865	972
African-American high-income renters	1,487	7.41	7.33	2.69	5.31	3.50	NA	694	806
Hispanic high-income renters	1,818	7.49	7.54	2.75	3.74	2.81	NA	807	906
White low-income renters	6,343	7.56	7.45	2.73	4.41	2.73	NA	606	663
African-American low-income renters	8,666	7.30	6.98	3.83	8.55	5.27	NA	496	547
Hispanic low-income renters	6,721	7.39	7.34	3.33	6.00	4.48	NA	592	647
Total households	**71,738**								

Exhibit 1a

Housing Characteristics by Household Type[a] (2 of 2)

Household Type: All Households	Number of Observations	Mean Structural Quality	Mean Neighborhood Quality	Inadequate Housing (%)	Rank Neighborhood Poor (%)	Rank Structure Poor (%)	Household Type That Own (%)	Mean House Value or Monthly Rent ($)	Mean Monthly Housing Cost[b] ($)
Recent Movers									
White high-income owners	2,548	8.52	8.31	0.55	0.90	0.24	64.46	240,004	1,504
African-American high-income owners	803	8.75	8.44	1.12	1.37	0.50	52.76	172,381	1,221
Hispanic high-income owners	1,151	8.61	8.36	0.61	1.04	0.52	54.32	211,303	1,451
White low-income owners	1,156	8.27	8.00	1.38	2.34	0.78	26.55	148,350	893
African-American low-income owners	635	8.54	8.12	1.10	1.89	0.94	12.68	107,547	804
Hispanic low-income owners	784	8.47	8.10	2.68	1.66	0.77	18.12	120,694	896
White high-income renters	1,405	7.51	7.53	1.85	2.42	1.71	NA	892	995
African-American high-income renters	719	7.55	7.42	1.95	5.98	3.06	NA	720	830
Hispanic high-income renters	968	7.53	7.59	2.58	3.20	2.48	NA	840	934
White low-income renters	3,198	7.48	7.33	2.41	4.38	2.53	NA	632	688
African-American low-income renters	4,372	7.32	6.99	3.34	8.60	4.85	NA	521	571
Hispanic low-income renters	3,543	7.44	7.38	2.71	5.84	4.06	NA	601	662
Total recent movers	**21,282**								

NA = Not applicable.

[a] *Low-income households are defined as those with 80 percent or less of the median income for the metropolitan statistical area in which the household resides.*

[b] *Housing cost includes the cost of all utilities, property taxes, insurance, rent, all mortgage payments, and other fees associated with occupancy.*

Note: For additional detail about housing cost, see the definition in exhibit 2 of this article.

Exhibit 1b

Housing Characteristics by Household Type[a] (1 of 2)

Household Type: All Households	Number of Observations	Mean Housing Cost[b] to Income Ratio (%)	Households Spending More Than 30% of Income on Housing (%)	Mean Amount of Debt on Owned Units ($)	Mean Unit Size in Square Feet	Mean Household Size	Mean Unit Square Feet to Household Size	Mean Housing Cost to Unit Square Feet ($)
White high-income owners	15,764	16.30	8.16	90,404	2,338	2.95	948	0.64
African-American high-income owners	4,302	16.12	7.88	69,442	2,262	3.15	901	0.72
Hispanic high-income owners	5,308	18.07	11.27	93,160	2,041	3.63	687	0.75
White low-income owners	9,856	32.98	40.44	35,509	1,806	1.98	1130	0.49
African-American low-income owners	4,781	34.92	46.29	35,164	1,820	2.35	1062	0.68
Hispanic low-income owners	4,121	36.20	49.36	45,871	1,558	3.17	681	0.63
White high-income renters	2,571	15.82	3.19	NA	1,262	2.40	635	0.93
African-American high-income renters	1,487	14.98	2.56	NA	1,232	2.93	522	1.02
Hispanic high-income renters	1,818	15.38	2.42	NA	1,157	3.51	413	0.95
White low-income renters	6,343	39.62	51.73	NA	955	1.81	640	0.91
African-American low-income renters	8,666	40.51	52.90	NA	998	2.32	574	0.92
Hispanic low-income renters	6,721	39.80	56.10	NA	902	3.07	391	0.91
Total households	**71,738**							

Exhibit 1b

Housing Characteristics by Household Type[a] (2 of 2)

Household Type: All Households	Number of Observations	Mean Housing Cost[b] to Income Ratio (%)	Households Spending More Than 30% of Income on Housing (%)	Mean Amount of Debt on Owned Units ($)	Mean Unit Size in Square Feet	Mean Household Size	Mean Unit Square Feet to Household Size	Mean Housing Cost to Unit Square Feet ($)
Recent Movers								
White high-income owners	2,548	19.38	12.72	131,055	2,395	2.88	969	0.75
African-American high-income owners	803	18.59	11.96	105,751	2,348	3.17	929	0.70
Hispanic high-income owners	1,151	21.04	17.38	122,094	2,046	3.57	689	0.83
White low-income owners	1,156	36.44	49.67	64,821	1,775	2.18	1049	0.63
African-American low-income owners	635	34.83	53.21	63,428	1,773	2.66	927	0.72
Hispanic low-income owners	784	38.27	58.19	65,687	1,519	3.51	563	0.74
White high-income renters	1,405	16.25	3.84	NA	1,238	2.38	612	0.93
African-American high-income renters	719	15.44	3.06	NA	1,231	2.89	524	0.95
Hispanic high-income renters	968	16.10	3.31	NA	1,165	3.28	440	0.94
White low-income renters	3,198	40.16	53.49	NA	941	1.89	617	0.91
African-American low-income renters	4,372	41.24	54.49	NA	1,003	2.39	567	0.89
Hispanic low-income renters	3,543	40.38	57.41	NA	906	3.03	392	0.91
Total recent movers	**21,282**							

NA = Not applicable.

[a] Low-income households are defined as those with 80 percent or less of the median income for the metropolitan statistical area in which the household resides.

[b] Housing cost includes the cost of all utilities, property taxes, insurance, rent, all mortgage payments, and other fees associated with occupancy.

Note: For additional details about housing cost, see the definition in exhibit 2 of this article.

Several interesting points appear in exhibit 1. Irrespective of either minority status or income level, the primary differential in both perceived neighborhood quality and housing quality stems from ownership status. Renters clearly perceive their situation as worse than that of owners. As shown for the quality dimensions of structure and neighborhood in exhibit 1a, the difference between renters and owners appears particularly important for the structural quality of the housing unit. The largest differentials between renters and owners in neighborhood quality and structural quality occur for low-income households. Some of the largest differentials occur for low-income Hispanic households. For low-income Hispanic households, comparing owners with renters, neighborhood quality ranges from 8.02 (owner) to 7.34 (renter). For structural quality, the difference is 8.36 to 7.39. In addition, rental units were classified as "inadequate" more often than were owner-occupied units.[10] In particular, for low-income renters, 2.73 percent of Whites, 3.83 percent of African Americans, and 3.33 percent of Hispanics were categorized as living in inadequate housing. For low-income owners, the percentages sorted by the same racial/ethnic categories were 1.13, 2.11, and 2.11 percent, respectively.

Given these positive factors associated with ownership, it is important to note that Hispanic and African-American households have a similar likelihood of owning, which is substantially lower than that of their White counterparts; this difference is much greater for lower income individuals. For the full sample, among low-income households, only 35.6 percent of African Americans and 38.0 percent of Hispanics own as compared with 60.8 percent of White households. For higher income households, these probabilities sorted by the same racial/ethnic categories are 74.3, 74.5, and 86.0 percent, respectively.

In addition to noting Whites' higher likelihood of ownership, it is important to note that both house value and rental cost for Hispanic and African-American households are lower than for White households. Hispanic homeowners' monthly housing cost is higher than that of White homeowners, however, even though Hispanics' house value is lower.[11] This observation is particularly true for low-income owners. Specifically, for the full sample, low-income Hispanic households' average monthly housing cost is $774, whereas low-income Whites spend an average of $683 on monthly housing costs. Conversely, comparable average home values are $128,681 for Hispanics and $147,298 for Whites. Note that this relationship holds true for recent movers, although the housing cost differential is not as great. These facts suggest that some significant differentials in financing may exist. The amount of mortgage debt could be higher and/or the terms, points, fees, and so on associated with the loans obtained by these Hispanic households could be less favorable. Developing this point further, low-income Hispanic owners have relatively high mortgage debt on owned units as compared with mortgage debt levels for other households. For the full sample,

[10] A variety of specific structural deficiencies are considered when designating a unit as being "moderately" or "severely" inadequate. For details about the way in which this categorization is made, see ICF Consulting (2004) for the definition of the variable ZADEQ in version 1.77 of the AHS codebook.

[11] As defined subsequently in exhibit 2, monthly housing costs include the cost of electricity, gas, and other heating fuels; water and sewer; real estate taxes; property insurance; condominium fees; mobile home park fees; homeowners association fees; rent; mortgage and home equity loan payments; other mortgage fees paid periodically; and expenditures for routine maintenance.

low-income Hispanic owners average more than $10,000 more in debt collateralized by their homes relative to comparable White households ($45,871 and $35,509, respectively).[12] In this regard, however, Hispanic recent movers do better, with little difference in debt levels compared with White recent movers. Is this higher debt among all Hispanic owners related to differentials in the amount borrowed using home financing related to home equity loans and junior mortgages or to less financial expertise in obtaining such loans, and so on? Whatever the reason, longer term Hispanic homeowners in this sample face a suggested negative dynamic.

We also considered another factor that might be expected to influence housing satisfaction: Hispanic households appear to be much more crowded than other households are. In addition, as with African-American low-income homeowners, Hispanic low-income homeowners pay significantly more in monthly housing cost per square foot than their White counterparts do. For low-income households in the full sample, Hispanic households average 681 square feet per person. Comparable African-American and White households average 1,062 and 1,130 square feet per person, respectively. For renters, the square-feet-per-person figures sorted by the same racial/ethnic categories are 391, 574, and 640, respectively. For recent movers, these differences are very similar. In several instances, the average number of square feet per person is higher for low-income owners than it is for high-income owners. It is likely the case that a higher proportion of retirees, who are still living in owner-occupied homes that they bought many years earlier when their families were larger and/or their incomes were higher, are in these samples. Regarding monthly mortgage cost per square foot, for the full sample, low-income Hispanic and African-American owners pay $0.63 and $0.68, respectively, per square foot, whereas White owners pay only $0.49. For recent movers, the comparable numbers sorted by the same racial/ethnic categories are $0.74, $0.72, and $0.63 respectively.

Although generalizations of data are difficult to do, overall, the results in exhibit 1 suggest that low-income African-American households are doing somewhat worse in terms of housing outcomes than low-income Hispanic households are. This statement is based on the observation that, across the board, African-American households have by far the lowest housing values and annual rents and slightly lower homeownership rates than other races/ethnicities. In addition, for the full sample, all African-American households have rankings of structural and neighborhood quality that are slightly lower. Using these same criteria, we observe that both African-American and Hispanic households appear to have less favorable housing outcomes than White households do.

As noted previously, because housing tenure and house value or rent influence the quality of housing services a household receives, in the next section we analyze the likelihood of homeownership for Hispanic households and their pattern of housing values or rents as compared with those of other racial/ethnic groups. The regression analysis allows for consideration of the significance and magnitude of being in a particular racial/ethnic group, controlling for other socioeconomic factors that might be expected to influence these outcomes. In addition, the analysis enables us to examine how various socioeconomic control variables differ across these groups and, therefore, how they affect their housing outcomes.

[12] These debt totals represent loan amounts at origination for all types of mortgage lending (that is, first mortgages, junior mortgages, and home equity loans).

The Likelihood of Homeownership and Differences in Housing Values and Rents

Our estimation approach to the likelihood of homeownership follows the original work of Boehm (1993) and the development of the logit approach contained in the exhaustive set of references in, for example, Boehm and Schlottmann (2004) and Retsinas and Belsky (2002). The likelihood of a household being an owner instead of a renter is hypothesized as a function of a standard set of socioeconomic variables, including income, savings, minority status, and dummy variables for the year in which the housing choice was made and the market in which the unit is located.[13] For the AHSs in 2002 and 2004, an additional variable is available, namely the time spent living in the United States. Exhibit 2 shows the complete set of variables included in the analysis.[14]

We use the entire sample and a sample restricted to recent movers. These two approaches bring a different perspective through which to evaluate the forces shaping the housing outcomes of households in the sample. Specifically, the full sample shows us how everyone is housed at a given point in time. This information enables us to observe differences in housing circumstances across income and racial groups that have occurred as a result of decades of evolution in the housing market conditions experienced by the households in the sample. Alternatively, a recent mover sample enables us to observe differential outcomes for households that have recently, actively made adjustments in their housing consumption based on their current socioeconomic characteristics and the current housing and mortgage market conditions. Each of these analyses is presented in turn in the following text.

Entire Sample

Three separate sets of regression results are shown (pair-wise) in the six columns of exhibit 3. These regression results include separate analyses for the probability of owning versus renting, the determinants of house value stratified by low- and high-income households, and the determinants of monthly housing cost stratified by low- and high-income renter households. The specification of the probability of homeownership, house value for owners, and monthly gross rental payment for renters is consistent with the general specifications in the literature.

The results shown in exhibit 3 are largely consistent with the literature; however, several observations are of particular interest. First, the primary reason for estimating these regressions is to determine if the substantial differences across racial/income groups in exhibit 1 would be present after we controlled for other factors that influence the choices of ownership versus rental tenure and, conditionally, upon that choice, to determine the house value (for owners) and the dollar amount of rent (for renters). Indeed, both African-American households and Hispanic households have substantially different outcomes than White households do, controlling for the SMSA in

[13] Because the AHS follows housing units (rather than households) over time, the definition of homeownership cannot be used to determine housing transitions or the number of homes the household has owned or rented. As noted previously, however, given the large differences illustrated in exhibit 1, our intent is to explore the extent to which such large differentials appear within a regression analysis of homeownership.

[14] Note that some selected variables are available only for certain subsamples. For example, the concept of "owned prior to the move" is available only for recent movers.

Exhibit 2

Variable Names and Definitions (1 of 2)

Variable Name	Variable Definition
Own Home	1 = if homeowner; 0 = if renter
Current House Value	Current house value in thousand dollar units
Monthly Housing Cost	Included are the costs of electricity, gas, other heating fuels, water and sewer, real estate taxes, property insurance, condominium fees, mobile home park fees, homeowner association fees, rent, mortgage and home equity loan payments, other mortgage fees paid periodically, and routine maintenance
Monthly Rent	Monthly rent in dollars
Rent Subsidy	1 = if rent is subsidized by the government; 0 = if otherwise
Total Mortgage Payments	Total dollar amount of mortgage payments including up to four mortgages and/or three home equity lines of credit
Unit—Condominium	1 = if housing unit is a condominium; 0 = if otherwise
Unit—Owned Manufactured	1 = if unit is manufactured housing; 0 = if otherwise
Not High School Graduate	1 = if did not graduate from high school; 0 = if otherwise
High School Graduate	1 = high school graduate; 0 = otherwise
Post High School	1 = some education after high school, but not a college graduate; 0 = otherwise
College Graduate	1 = college graduate or more; 0 = otherwise
Married	1 = married couple or partner present; 0 = otherwise
Single Female	1 = household head a single female; 0 = otherwise
Single Male	1 = household head a single male; 0 = otherwise
Household Size	Number of persons in household
Household Income	Household income in $10,000 units
Age 24 or Less	1 = age of household head less that 24 years of age; 0 = otherwise
Age 25–44	1 = age of household head 25 to 44 years of age; 0 = otherwise
Age 45–61	1 = age of household head 45 to 61 years of age; 0 = otherwise
Age 62 or More	1 = age of household head 62 years of age or more; 0 = otherwise
Savings 25K or More	1 = household has $25,000 or more in savings; 0 = otherwise
White[a, b]	1 = household's race designated to be White; 0 = otherwise
African-American[a, b]	1 = household's race designated to be African-American; 0 = otherwise
White Hispanic[a, b]	1 = household identified as Hispanic and White; 0 = otherwise
Non-White Hispanic[a, b]	1 = household identified as Hispanic and non-White; 0 = otherwise
Number of Years in Residence	Number of years household resided at its current location
First-Time Owner	1 = first home owned by the household; 0 =otherwise
Native-Born American[c]	1 = household head or partner a U.S. citizen and lived in the United States their entire life; 0 = otherwise
Less than 5 Years in United States[c]	1 = household head and partner lived in United States less than 5 years; 0 = otherwise

Exhibit 2

Variable Names and Definitions (2 of 2)

Variable Name	Variable Definition
5–12 Years in United States[c]	1 = household head and partner lived in United States 5 to 12 years; 0 = otherwise
13–22 Years in United States[c]	1 = household head and partner lived in United States 13 to 22 years; 0 = otherwise
23 Years or More in United States[c]	1 = household head and partner lived in United States 23 years or more; 0 = otherwise
Owned Prior to Move[d]	1 = household head was a homeowner prior to moving into current housing unit; 0 = otherwise
Metropolitan Areas	Households in the sample came from 41 SMSAs in three interview periods (1998, 2002, 2004); discrete variables indicating the SMSA in which each housing unit was located were included in regression analyses. For a complete list of the SMSAs included in the analysis, see appendix A .

SMSA = standard metropolitan statistical area.

[a] Because the American Housing Survey designates race and Hispanic ethnicity separately, many White and non-White individuals identify themselves as Hispanic. This split is represented in the categorization of Hispanics as White and non-White in the table.

[b] The race of the spouse (or partner) was considered when identifying the race of the household. For mixed-race couples, if either the head or spouse was Hispanic, the household was considered to be Hispanic; for other couples, where one partner was African-American, the household was considered to be African-American.

[c] Available only for 2002 and 2004 sample years.

[d] Available only for recent mover sample.

which these households reside and the household's age profile, income, education, and so on. African-American and Hispanic households are less likely to own, and owners exhibit lower levels of housing values, while renters have lower levels of annual rents. These trends suggest a systematic problem for minority households. Regarding Hispanics, the AHS, because it asks questions about race separate from Hispanic ethnicity, allows us a unique opportunity to compare results for Hispanic households that have different racial characteristics. Consequently, Hispanic households were split into two distinct groups: White and non-White Hispanics.[15] Non-White Hispanics have less desirable housing outcomes than White Hispanics do. As shown in exhibit 3, low-income non-White Hispanics have the lowest likelihood of homeownership and the lowest housing value. Although it is not clear whether this result is suggestive of discrimination or rather is the result of correlation with some omitted variable, it is the first time we have seen this difference empirically demonstrated, and it clearly merits additional investigation.

[15] This designation was based on the householder's categorization for single individuals. For married couples, if one individual was White and the other Hispanic or African American, the household was deemed Hispanic or African American, respectively. For cases in which a householder and spouse were both Hispanic, if either the spouse or the householder was classified as a non-White Hispanic, the household was designated as non-White Hispanic. If a householder or spouse was Hispanic and the other African American, the household was classified as African American. For the full sample, approximately 64 percent of low-income Hispanics are reported to be White and 36 percent are non-White. Among high-income Hispanics, 71 percent are White and 29 percent are non-White. For the recent movers, 59 percent of low-income Hispanics are White and 41 percent are non-White. For their high-income counterparts, the percentages are 62 and 38 percent, respectively.

Exhibit 3

Sample: All Households in All Years
Regression Coefficients and Significance[a, b, c] (1 of 2)

Variable Name	Low Income, P(Own)	High Income, P(Own)	Low-Income Owner, House Value[d]	High-Income Owner, House Value[d]	Low-Income Owner, Housing Cost	High-Income Owner, Housing Cost	Low-Income Renter, Rent	High-Income Renter, Rent
Intercept	– 0.90365 *	1.15341 *	265.1007 *	304.5289 *	467.0726 *	775.1462 *	733.2642 *	1150.5191 *
Rent Subsidy	NA	NA	NA	NA	NA	NA	– 44.6759 *	– 77.6438 **
Total Mortgage Payments	NA	NA	NA	NA	0.9214 *	0.8243 *	NA	NA
Unit—Condominium	NA	NA	NA	NA	– 14.6278	– 93.8084 *	NA	NA
Unit—Owned Manufactured	NA	NA	NA	NA	95.9540 *	– 69.7088 *	NA	NA
High School Graduate	0.17628 *	0.30287 *	11.4106 *	12.6865 *	NA	NA	33.2714 *	98.1926 *
Post High School	0.27570 *	0.47035 *	21.0954 *	24.4424 *	NA	NA	69.8501 *	150.8448 *
College Graduate	0.40019 *	0.68698 *	59.6001 *	70.7723 *	NA	NA	121.7508 *	243.9352 *
Single Female	– 0.78472 *	– 1.08672 *	– 19.9748 *	– 30.9336 *	NA	NA	12.8566 *	– 15.4230
Single Male	– 0.95726 *	– 1.42484 *	– 25.9315 *	– 23.9932 *	NA	NA	– 8.0430	– 42.3257 *
Household Size	0.07337 *	0.07926 *	2.5617 *	3.8244 *	NA	NA	29.5515 *	31.2130 *
Household Income	0.36443 *	0.02682 *	1.3073 **	3.4340 *	NA	NA	32.2427 *	1.7973 *
Age 24 or Less	– 1.70622 *	– 1.62107 *	34.5308 *	10.4148	NA	NA	32.2511 *	– 25.3692
Age 25–44	– 0.91547 *	– 0.87961 *	0.1594	– 7.2805 *	NA	NA	– 2.8043	– 30.4830 *
Age 62 or More	1.19256 *	0.84593 *	7.8439 *	14.4785 *	NA	NA	23.5471 *	89.0619 *
Savings 25K or More	1.16893 *	0.69443 *	27.9968 *	26.3942 *	NA	NA	136.9097 *	11.5115 *

Exhibit 3

Sample: All Households in All Years
Regression Coefficients and Significance[a, b, c] (2 of 2)

Variable Name	Low Income, P(Own)	High Income, P(Own)	Low-Income Owner, House Value[d]	High-Income Owner, House Value[d]	Low-Income Owner, Housing Cost	High-Income Owner, Housing Cost	Low-Income Renter, Rent	High-Income Renter, Rent
African-American	– 0.76399 *	– 0.64752 *	– 20.1132 *	– 35.0772 *	NA	NA	– 59.2936 *	– 109.3235 *
White Hispanic	– 0.62149 *	– 0.46376 *	– 19.7677 *	– 23.7147 *	NA	NA	– 63.6912 *	– 80.3219 *
Non-White Hispanic	– 0.86910 *	– 0.67916 *	– 28.8447 *	– 45.0185 *	NA	NA	– 72.6176 *	– 147.4588 *
Number of Years in Residence	NA	NA	0.1543 **	– 0.8198 *	NA	NA	– 5.0728 *	– 13.6543 *
First-Time Owner	NA	NA	25.2690 *	58.3705 *	NA	NA	NA	NA
R^2	0.21927 [e]	0.15975 [e]	0.3267	0.3723	0.64260	0.6694	0.31530	0.39370
Number of observations	40,488	31,250	18,758	25,374	18,758	25,374	21,730	5,876

NA = Not applicable.

[a] The P(Own) equations were estimated using logit analysis.

*[b] *, **, and *** represent significance at the 1- , 5- , and 10-percent levels, respectively.*

[c] All regressions include discrete variables indicating in which of 41 standard metropolitan statistical areas (SMSAs) the housing units were located (over the 3-year time period: 1998, 2002, and 2004). For a complete list of these SMSAs, see appendix A.

[d] House value in thousand dollar units.

[e] For the logit equations, the R^2 is computed as 1- (unrestricted log-likelihood function/restricted log-likelihood function).

Second, the negative effect of a lack of savings as it relates to required downpayment constraints and the probability of homeownership is demonstrated in exhibit 3. Although the discrete variable indicating whether a household has $25,000 or more in savings is an arbitrary way to categorize the household's savings, it does identify those people who in general have exhibited a much higher propensity to save.[16] As the literature suggests, the ability to accumulate wealth is a critical factor in the ability to achieve homeownership. As discussed by Golding (2002), estimates from the U.S. Census Bureau suggest that reducing origination costs just $1,000 could help an additional 116,000 renters attain homeownership. The difficulty of lower income households in overcoming increases in downpayment requirements should not be understated.

These households have difficulty accumulating savings to purchase a home. For example, Di (2001) discusses trends in wealth that include data for renters with lower incomes. These data, from the Survey of Consumer Finances, clearly suggest that what might appear to be modest changes in fixed payments associated with a home purchase are difficult for these households to afford. For example, among Hispanic renters, the average savings (or wealth) was $2,000. This figure for savings falls to $1,661 for African-American renters.[17] Quercia, McCarthy, and Wachter's (2002) formal analysis and empirical estimates reinforce these statements.[18]

Third, the positive effect of rent subsidies in lowering rents for low-income households is seen in exhibit 3. Given the low levels of household savings among lower income households (discussed previously), programs such as rent subsidies have the potential to positively affect savings and/or expenditures on other necessities by reducing a household's required monthly outlays for rental payments.

Magnitude of Effects

To more fully explore the results discussed previously, exhibits 4 through 6 provide evidence on the variable means and the effect of estimated coefficients on several dimensions of housing choice: the likelihood of homeownership, house value for owners, and rental payment for renters. In exhibit 4, probabilities of ownership are calculated at the sample means for all variables except the specific variable listed, which is evaluated at the mean for each minority group and Whites.[19, 20]

[16] This definition of savings is based on the specific question in the AHS.

[17] See figure 10 in Di (2001).

[18] Savings also impacts the value of the house homeowners can afford to purchase and, in addition, the quality (as measured by cost) of rental units.

[19] These percentages were calculated using coefficient estimates from a logit model of homeownership. For example, in the case of non-White Hispanic households, the likelihood of homeownership was calculated with all variables included in the regression set at the overall sample mean except those for the household's race (that is, White, African American, White Hispanic, non-White Hispanic). In the case of race, this variable was first set at 1 for a particular minority group (for example, non-White Hispanics) and 0 for all other racial groups. Subsequently, the probability was recalculated with all the race variables set at 0, which represents White households that are the excluded group in the analysis. The difference in these two probability calculations represents the impact of being in the particular minority group as compared with a White household on the likelihood of homeownership. Similar calculations and interpretations can be made for other variables.

[20] Note that for the Hispanic households, rather than using the proportions of White or non-White Hispanics, as presented in the exhibits, a value of 1 was used to denote each category to make the magnitudes that were calculated comparable with the calculation for African Americans without having to combine the non-White and White Hispanics in a single group.

The primary result of note is the magnitude of negative effects of minority status on the likelihood of homeownership. The negative effect of race/ethnicity itself on the likelihood of homeownership is quite similar between non-White Hispanic households and African-American households: -40.53 and -39.22 percent (panel A), respectively, for low-income households and -10.55 and 9.66 percent (panel B), respectively, for high-income households. The effects of race are dramatically smaller for higher income households, but, in either case, they dominate the effects of other factors.

Exhibit 4

Sample: All Households in All Years
Variable Means and Effect of Variables on the Likelihood of Homeownership (1 of 2)

Panel A: Low-Income Households					
Variable Name	Sample Mean			$Pr(Own)_{African\text{-}American}$ Minus $Pr(Own)_{White}$ [a, b] (%)	$Pr(Own)_{Hispanic}$ Minus $Pr(Own)_{White}$ [a, b] (%)
	White	African-American	Hispanic		
Own Home	0.60843	0.35554	0.38010	NA	NA
Intercept	NA	NA	NA	NA	NA
High School Graduate	0.29897	0.29910	0.25835	0.001	– 0.390
Post High School	0.30551	0.29903	0.20679	– 0.098	– 1.482
College Graduate	0.22483	0.11423	0.09334	– 2.413	– 2.868
Single Female	0.43706	0.58065	0.30788	– 6.110	5.548
Single Male	0.23662	0.22392	0.19452	0.662	2.197
Household Size	1.91216	2.33331	3.10764	1.681	4.783
Household Income	2.44268	2.05510	2.42986	– 7.677	– 0.256
Age 24 or Less	0.06803	0.08136	0.09408	– 1.240	– 2.421
Age 25–44	0.29977	0.43861	0.52518	– 6.943	– 11.229
Age 62 or More	0.39330	0.20406	0.15505	– 12.322	– 15.469
Savings 25K or More	0.08877	0.01153	0.01817	– 4.922	– 4.501
African-American	0.00000	1.00000	0.00000	– 40.529	0.000
White Hispanic	0.00000	0.00000	0.63752	0.000	– 28.501
Non-White Hispanic	0.00000	0.00000	0.36248	0.000	– 39.218
All metropolitan areas[c]				8.514	– 0.200
Number of observations	16,199	13,447	10,842		

Panel B: High-Income Households					
Variable Name	Sample Mean			$Pr(Own)_{African\text{-}American}$ Minus $Pr(Own)_{White}$ [a, b] (%)	$Pr(Own)_{Hispanic}$ Minus $Pr(Own)_{White}$ [a, b] (%)
	White	African-American	Hispanic		
Own Home	0.85978	0.74313	0.74488	NA	NA
Intercept	NA	NA	NA	NA	NA
High School Graduate	0.19302	0.21247	0.21765	0.083	0.106
Post High School	0.28890	0.34807	0.31504	0.394	0.175
College Graduate	0.46905	0.33495	0.29820	– 1.315	– 1.690
Single Female	0.12893	0.24598	0.11563	– 1.840	0.199
Single Male	0.14475	0.14528	0.13261	– 0.010	0.241
Household Size	2.87118	3.09691	3.60132	0.257	0.821
Household Income	10.48242	8.74979	9.62220	– 0.668	– 0.329

Exhibit 4

Sample: All Households in All Years
Variable Means and Effect of Variables on the Likelihood of Homeownership (2 of 2)

Panel B: High-Income Households (continued)					
Variable Name	Sample Mean			$Pr(Own)_{African\text{-}American}$ Minus $Pr(Own)_{White}$ [a, b] (%)	$Pr(Own)_{Hispanic}$ Minus $Pr(Own)_{White}$ [a, b] (%)
	White	African-American	Hispanic		
Age 24 or Less	0.01445	0.02505	0.02722	– 0.242	– 0.292
Age 25–44	0.44816	0.48886	0.57732	– 0.488	– 1.592
Age 62 or More	0.12621	0.09121	0.06582	– 0.418	– 0.727
Savings 25K or More	0.02062	0.00432	0.00603	– 0.160	– 0.143
African-American	0.00000	1.00000	0.00000	– 10.548	0.000
White Hispanic	0.00000	0.00000	0.70601	0.000	– 6.161
Non-White Hispanic	0.00000	0.00000	0.29399	0.000	– 9.661
All metropolitan areas[c]				0.671	– 1.781
Number of observations	18,335	5,789	7,126		

NA = Not applicable.

[a] Probabilities are calculated at the means for the entire sample (all Whites, African-Americans, and Hispanics) except for the variable in question, which is evaluated at the mean for the denoted minority group and Whites, respectively.

[b] $Pr(Own) = 1 / (1 – e^{-X\beta})$, where Xß = a vector representing the sum of the product individual independent variable values (Xs) and estimated coefficients (ßs). $Pr(Own)_{minority}$ = the probability of owning given all the variables in the regression are evaluated at the overall sample mean except the particular variable in question, which is evaluated at the mean for the minority households. Pr(Own)White = the probability of owning given all the variables in the regression are evaluated at the overall sample mean except the particular variable in question, which is evaluated at the mean for the White households. $Pr(Own)_{minority} – Pr(Own)_{White}$ is expressed as a percentage of Pr(Own), the predicted average likelihood of ownership calculated at the mean for the overall sample. Thus, if for a given variable, xj, $Pr(Own)_{minority} = 0.40$ and $Pr(Own)_{White} = 0.45$ and Pr(Own) = 0.42, then the calculation for variable xj is [(0.40 – 0.45) /0.42] x 100 = 11.9 percent.

[c] "All metropolitan areas" represents the cumulative impact of a set of categorical variables corresponding to the different SMSAs in which the households are located.

Exhibit 5 presents similar results for the house value models for homeowners. A number of differences in the characteristics of Hispanics and African Americans lead to substantial reductions in the value of the housing they occupy.[21] For example, particularly in the low-income group (exhibit 5a), lower levels of educational attainment for Hispanics and African Americans are correlated with lower valued owned homes. Specifically, for Hispanic households their house values are $8,523.22 ($590.86 + $1,599.66 + $6,332.70) lower than those of low-income White owners. For African-American households, the difference is $4,542.20 ($502.57 + $118.97 + $3,920.66). Other

[21] Because the regression coefficients in this analysis were estimated using a sample that pools households of all three ethnic/racial groups, the implicit assumption being made is that the coefficients corresponding to the various independent variables (for example, education, income, age) have the same impact across all ethnic groups. This assumption may not be the case. The assumption could be relaxed by stratifying the samples into White, African-American, and Hispanic subsamples. Given that the primary purpose of estimating these equations was to demonstrate that significant racial differences still exist when controlling for various other characteristics that might influence the demand for housing services, we chose not to run separate regressions for each racial group. This type of stratification, however, is employed in the second part of the article in which the factors affecting households' perceptions of the structural quality of their dwelling and the neighborhood in which it is located are investigated.

observations can be found by merely examining the differences in sample means. For example, it is noteworthy that for White households a substantially higher proportion of the households in the sample have heads that are more than 62 years old, suggesting they are in the low-income subsample because of retirement. As one might expect, their house values are much higher than those of low-income, working-age households. Again, focusing on the low-income group, those with substantial savings have higher house values, as one might expect. The largest effect on house value for both high- and low-income households, controlling for as many socioeconomic charac-

Exhibit 5a

Sample: All Households in All Years
Variable Means and Effects of Variables on House Value
Low-Income Homeowners

Variable Name	Sample Mean			House Value	House Value
	White	African-American	Hispanic	(African American Mean -White Mean) x Coefficient[a]	(Hispanic Mean -White Mean) x Coefficient[a]
				($)	($)
Current House Value	147.28920	95.05469	128.68114	NA	NA
Monthly Housing Cost	683.4819	653.5064	773.6894	NA	NA
Total Mortgage Payments	341.46408	363.21125	463.47852	NA	NA
Unit—Condominium	0.08127	0.03451	0.07450	NA	NA
Unit—Owned Manufactured	0.07599	0.01360	0.07037	NA	NA
High School Graduate	0.31240	0.26835	0.26062	(502.57)	(590.86)
Post High School	0.29616	0.29052	0.22033	(118.97)	(1,599.66)
College Graduate	0.21763	0.15185	0.11138	(3,920.66)	(6,332.70)
Single Female	0.39945	0.50617	0.25285	(2,131.67)	2,928.32
Single Male	0.17644	0.18113	0.13079	(121.69)	1,183.70
Household Size	1.97524	2.35411	3.16671	970.56	3,052.22
Hosuehold Income	2.54560	2.41994	2.71158	(164.27)	217.00
Age 24 or Less	0.02232	0.02426	0.02766	67.03	184.45
Age 25–44	0.21652	0.29283	0.42344	12.16	32.98
Age 62 or More	0.51228	0.36101	0.28076	(1,186.50)	(1,816.02)
Savings 25K or More	0.12226	0.02384	0.03688	(2,755.33)	(2,390.26)
Number of Years in Residence	18.54799	16.65175	12.19655	(292.50)	(979.73)
First-Time Owner	0.55875	0.27798	0.35598	(7,094.80)	(5,123.66)
African-American	0.00000	1.00000	0.00000	(20,113.18)	—[b]
White Hispanic	0.00000	0.00000	0.71099	—	(19,767.67)[b]
Non-White Hispanic	0.00000	0.00000	0.28901	—	(28,844.68)[b]
All metropolitan areas[c]	NA	NA	NA	(14,930.12)	15,042.99
Number of observations	9,856	4,781	4,121		

NA = Not applicable.

[a] Regression coefficients are presented in exhibit 3. This calculation for a given variable, x_j is $(x_{jm} - x_{jw}) \times \beta_j$, where x_{jm} = the minority mean for variable j, x_{jw} = the White mean for variable j, β_j = the regression coefficient for variable j.

[b] Effect calculated based on a value of 1 for the racial category in question and 0 for all other alternatives.

[c] "All metropolitan areas" represents the cumulative impact of a set of categorical variables corresponding to the different SMSAs in which the households are located.

Exhibit 5b

Sample: All Households in All Years
Variable Means and Effects of Variables on House Value
High-Income Homeowners

Variable Name	Sample Mean			House Value	House Value
	White	African-American	Hispanic	(African American Mean -White Mean) x Coefficient[a]	(Hispanic Mean -White Mean) x Coefficient[a]
				($)	($)
Current House Value	221.4752	142.6643	204.2477	NA	NA
Monthly Housing Cost	1252.61	1037.63	1289.08	NA	NA
Total Mortgage Payments	904.06236	726.67911	949.99642	NA	NA
Unit—Condominium	0.04796	0.03231	0.05350	NA	NA
Unit—Owned Manufactured	0.01662	0.00604	0.01771	NA	NA
High School Graduate	0.19075	0.2101	0.2087	245.91	228.24
Post High School	0.28749	0.3387	0.3244	1,251.18	902.55
College Graduate	0.47437	0.3491	0.3229	(8,862.96)	(10,719.40)
Single Female	0.11361	0.2194	0.0921	(3,273.38)	664.71
Single Male	0.10962	0.1172	0.0820	(180.86)	663.77
Household Size	2.94722	3.1530	3.6336	786.80	2,624.89
Hosuehold Income	10.79164	8.7928	10.1724	(6,864.04)	(2,126.32)
Age 24 or Less	0.00907	0.0149	0.0128	60.46	38.95
Age 25–44	0.41994	0.4421	0.5373	(161.45)	(854.43)
Age 62 or More	0.13759	0.1102	0.0829	(396.87)	(791.95)
Savings 25K or More	0.02220	0.0049	0.0073	(457.17)	(392.09)
Number of Years in Residence	11.02582	10.6446	8.6486	312.52	1,948.71
First-Time Owner	0.64660	0.4000	0.5049	(14,391.44)	(8,271.19)
African-American	0.00000	1.0000	0.0000	(35,077.24)	NA
White Hispanic	0.00000	0.0000	0.7340	NA	(23,714.68)
Non-White Hispanic	0.00000	0.0000	0.2660	NA	(45,018.53)
All metropolitan areas[c]	NA	NA	NA	(11,751.70)	28,278.59
Number of observations	15,764	4,302	5,308		

NA = Not applicable.

[a] Regression coefficients are presented in exhibit 3. This calculation for a given variable, x_j is $(x_{jm} - x_{jw}) \times \beta_j$, where x_{jm} = the minority mean for variable j, x_{jw} = the White mean for variable j, β_j = the regression coefficient for variable j.

[b] Effect calculated based on a value of 1 for the racial category in question and 0 for all other alternatives.

[c] "All metropolitan areas" represents the cumulative impact of a set of categorical variables corresponding to the different SMSAs in which the households are located.

teristics as possible, is race. For example, low-income African-American households' average house value is $20,113.18 lower than that of Whites. For White and non-White Hispanics, these figures are $19,767.67 and $28,848.68, respectively. For high-income households, these differentials are comparable (exhibit 5b). This observation suggests that substantial differences exist in the current value of houses purchased by minorities, even after our sample is stratified by income, and controls are included in the regression for the market in which the dwelling was located, the time when

the value was observed, and the major socioeconomic factors thought to influence the value of a family's home purchase.

Exhibit 6 shows that, for renters, significant household differences by minority status exist in the basic rents paid by households in the sample. Minority households have substantially lower rents than White households do. Also, non-White Hispanics have slightly lower rents than either their high- or low-income African-American counterparts do. Specifically, the differential in annual rental cost when comparing with White households is $871 for low-income non-White Hispanics and $1,770 for high-income non-White Hispanics. For African-American households, these differences are $712 and $1,312, respectively.

Collectively, the results in exhibits 4 through 6 demonstrate the importance of racial differences per se (controlling for other socioeconomic differences and differences in the markets in which the choices were made) as determinants of house value and rental expenditures for renters. They reinforce the arguments made previously in the discussion of mean characteristics (exhibit 1) in which the mean house values for owners or rental payments are always the highest for Whites regardless

Exhibit 6

Sample: All Households in All Years
Variable Means and Effects of Variables on Annual Rent (1 of 2)

Panel A: Low-Income Renters					
Variable Name	Sample Mean			Annualized (African-American Mean – White Mean) x Coefficient[a] ($)	Annualized (Hispanic Mean – White Mean) x Coefficient[a] ($)
	White	African-American	Hispanic		
Monthly Rent	605.8988	496.2181	592.2403	NA	NA
Intercept	NA	NA	NA	NA	NA
Rent Subsidy	0.05959	0.10835	0.05535	(26.14)	2.28
High School Graduate	0.27810	0.31606	0.25696	15.16	(8.44)
Post High School	0.32004	0.30372	0.19848	(13.68)	(101.89)
College Graduate	0.23601	0.09347	0.08228	(208.25)	(224.60)
Single Female	0.49551	0.62174	0.34162	19.48	(23.74)
Single Male	0.33013	0.24752	0.23360	7.97	9.32
Household Size	1.81413	2.32183	3.07142	180.04	445.86
Household Income	2.28276	1.85383	2.25711	(165.96)	(9.92)
Age 24 or Less	0.13905	0.11285	0.13480	(10.14)	(1.64)
Age 25–44	0.42913	0.51904	0.58756	(3.03)	(5.33)
Age 62 or More	0.20842	0.11747	0.07796	(25.70)	(36.86)
Savings 25K or More	0.03673	0.00473	0.00670	(52.58)	(49.35)
Number of Years in Residence	4.26060	3.86049	3.05148	24.36	73.60
African-American	0.00000	1.00000	0.00000	(711.52)	—
White Hispanic	0.00000	0.00000	0.59247	—	(764.29)
Non-White Hispanic	0.00000	0.00000	0.40753	—	(871.41)
All metropolitan areas[b]				(346.17)	574.77
Number of observations	6,343	8,666	6,721		

Exhibit 6

Sample: All Households in All Years
Variable Means and Effects of Variables on Annual Rent (2 of 2)

Panel B: High-Income Renters					
Variable Name	Sample Mean			Annualized (African-American Mean – White Mean) x Coefficient[a] ($)	Annualized (Hispanic Mean – White Mean) x Coefficient[a] ($)
	White	African-American	Hispanic		
Monthly Rent	864.9844	693.5057	807.3124	NA	NA
Intercept	NA	NA	NA	NA	NA
Rent Subsidy	0.00467	0.02017	0.01155	(14.45)	(6.41)
High School Graduate	0.20692	0.21923	0.24367	14.50	43.30
Post High School	0.29755	0.37525	0.28768	140.65	(17.87)
College Graduate	0.43641	0.29388	0.22607	(417.20)	(615.69)
Single Female	0.22287	0.32280	0.18427	(18.49)	7.14
Single Male	0.36017	0.22663	0.28053	67.83	40.45
Household Size	2.40490	2.93477	3.50715	198.47	412.85
Household Income	8.58649	8.62539	8.01568	0.84	(12.31)
Age 24 or Less	0.04745	0.05447	0.06931	(2.14)	(6.65)
Age 25–44	0.62116	0.62408	0.69417	(1.07)	(26.71)
Age 62 or More	0.05640	0.03631	0.01595	(21.46)	(43.23)
Savings 25K or More	0.01089	0.00269	0.00220	(1.13)	(1.20)
Number of Years in Residence	3.23221	3.53867	2.79428	(50.21)	71.75
African American	0.00000	1.00000	0.00000	(1,311.88)	—
White Hispanic	0.00000	0.00000	0.62431	—	(963.86)
Non-White Hispanic	0.00000	0.00000	0.37569	—	(1,769.51)
All metropolitan areas[b]				(641.99)	729.03
Number of observations	2,571	1,487	1,818		

NA = Not applicable.

[a] Regression coefficients are presented in exhibit 3. This calculation for a given variable, x_j, is $(x_{jm} - x_{jw}) \times \beta_j$, where xjm = the minority mean for variable j, x_{jw} = the white mean for variable j, and β_j = the regression coefficient for variable j.

[b] "All metropolitan areas" represents the cumulative impact of a set of categorical variables corresponding to the different SMSAs in which the households are located.

of whether they were high or low income, and African-American households' house values and rental payments are substantially lower than those of both their White and Hispanic counterparts.

Recent Movers

To more fully explore the issues for households assumed to be faced with a recent housing decision, exhibits 7 through 10 present results only for recent movers. As stated earlier, consideration of this subsample of households is potentially important for two related reasons. First, it represents how minority and other households are being treated today as they make active housing choices, as compared with a presentation of the cumulative outcome of housing choices that were made

(or not made) over decades. Second, because these choices have been made recently, household income, household size, and other socioeconomic factors represent measures of the households' situations at the time when these housing choices were actively made. These exhibits include an additional variable in the analysis as defined in exhibit 2: whether the household was a homeowner before the recent move.

In general, the results for recent movers are similar to those for the full sample based on this smaller set of observations; however, several points in the analysis for recent movers are of particular interest. As stated previously, a primary motivation for running regressions (exhibit 7) and calculating the magnitude of the effect of variables on the likelihood of ownership, housing values for owners, and annual rental cost for renters (exhibits 8 through 10) is to demonstrate the importance of race, controlling for other factors influencing these choices. As previously demonstrated, race is particularly important in each of these outcomes. It is important to note, however, that the effect of race cannot be construed as a result of some form of discrimination. Although discrimination could play a role in producing this result, it could also be partly the result of omitted variables. For instance, using the AHS data, household wealth cannot be specified as well as one would like. In addition, it is not clear that Hispanic and African-American households would have the same preference for homeownership and/or the same level of demand for housing services, as is the case for comparable White households. Nonetheless, insights can be gained by considering any subtle differences that exist across the different racial/ethnic groups.

Regarding the effect on the likelihood of ownership (exhibit 8), African Americans appear to experience more of a negative effect than Hispanics do, and non-White Hispanics no longer appear to systematically be doing worse than White Hispanics. In particular, low-income African Americans have a 52.33-percent lower chance of owning a home and, for high-income African Americans, this differential is only 5.37 percent. For low- and high-income White Hispanics, these differentials are 38.20 and 4.17 percent, respectively; for low- and high-income non-White Hispanics, these differentials are estimated at 23.03 and 3.39 percent, respectively. The fact that non-White Hispanics have a lower differential than Whites is the opposite of what was observed for the full sample.

For housing value, no clear change is evident in the calculated differentials. Both high- and low-income African Americans and Hispanics continue to have substantially lower house values than Whites have. The same is true of annual rent for renters.

A result of interest involves the consistent sign and significance of previous tenure (which can be included only in recent mover sample) in all of the estimated equations. As noted in several recent papers such as Belsky and Duda (2002) and Boehm and Schlottmann (2002), asset accumulation through previous homeownership is an important determinant of future homeownership. Consistently, the results for recent movers confirm that previous homeownership is a significant determinant of current homeownership, house value, and, if the recent movers are renting, the value of the rental unit. Although they are indirect evidence, these results lend support to the importance of programs designed to increase homeownership as a means of wealth accumulation, which could enable a household to move to obtain better, more highly valued housing in the future.

Exhibit 7

Sample: Recent Movers in All Years
Regression Coefficients and Significance[a, b, c] (1 of 2)

Variable Name	Low-Income, P(Own)	High-Income, P(Own)	Low-Income Owner, House Value[d]	High-Income Owner, House Value[d]	Low-Income Owner, Housing Cost	High-Income Owner, Housing Cost	Low-Income Renter, Rent	High-Income Renter, Rent
Intercept	– 2.6648 *	– 0.122352	239.6721 *	301.1626 *	458.3242 *	603.5285 *	775.8281 *	1191.2327 *
Rent Subsidy	NA	NA	NA	NA	NA	NA	– 25.6661 *	– 117.5344 **
Total Mortgage Payments	NA	NA	NA	NA	0.9568 *	1.0006 *	NA	NA
Unit—Condominium	NA	NA	NA	NA	– 1.3803	– 36.0383 ***	NA	NA
Unit—Owned Manufactured	NA	NA	NA	NA	124.6671 *	80.6640 **	NA	NA
High School Graduate	0.0605	0.284679 *	10.6494 ***	19.0405 **	NA	NA	29.7014 *	131.1436 *
Post High School	0.1809 **	0.363289 *	22.1824 *	34.4826 *	NA	NA	73.2485 *	173.9658 *
College Graduate	0.4315 *	0.707306 *	47.3261 *	71.3781 *	NA	NA	120.3864 *	279.5982 *
Single Female	– 0.6657 *	– 1.009692 *	– 22.6617 *	– 37.4740 *	NA	NA	18.2430 *	– 22.2923
Single Male	– 0.8659 *	– 1.270501 *	– 24.3034 *	– 25.3587 *	NA	NA	– 1.5905	– 36.0999 *
Household Size	0.1071 *	0.064878 *	1.9295	9.2230 *	NA	NA	34.1079 *	46.0567 *
Hosuehold Income	0.4289 *	0.013798 *	1.2115	5.9081 *	NA	NA	30.1751 *	2.1258 *
Age 24 or Less	– 1.1114 *	– 0.837417 *	4.1801	– 16.3486	NA	NA	17.4452 **	– 22.6096
Age 25–44	– 0.2998 *	– 0.204607 *	– 5.5756	– 15.0986 *	NA	NA	1.1432	– 21.0127
Age 62 or More	0.8016 *	0.443105 *	– 1.5401	– 13.9301	NA	NA	32.6108 *	66.8954 *
Savings 25K or More	0.7714 *	– 0.197007	61.9855 *	23.9694	NA	NA	134.1262 *	37.6346

Exhibit 7

Sample: Recent Movers in All Years
Regression Coefficients and Significance[a, b, c] (2 of 2)

Variable Name	Low-Income, P(Own)	High-Income, P(Own)	Low-Income Owner, House Value[d]	High-Income Owner, House Value[d]	Low-Income Owner, Housing Cost	High-Income Owner, Housing Cost	Low-Income Renter, Rent	High-Income Renter, Rent
African-American	– 0.6498 *	– 0.334796 *	– 15.6557 *	– 22.5373 *	NA	NA	– 61.9148 *	– 115.4088 *
White Hispanic	– 0.5460 *	– 0.288677 *	– 32.2758 *	– 23.7357 *	NA	NA	– 70.3688 *	– 66.0502 *
Non-White Hispanic	– 0.3921 *	– 0.267641 *	– 24.0538 *	– 48.6101 *	NA	NA	– 78.8632 *	– 144.4279 *
Number of Years in Residence	NA	NA	– 3.4167	– 11.1044 *	NA	NA	– 11.3390 *	– 31.3817 *
First-Time Owner	NA	NA	20.4978 *	39.3487 *	NA	NA	NA	NA
Owned Prior to Move	0.8201 *	0.963640 *	11.0657 **	37.5928 *	NA	NA	22.9222 *	32.3176 **
R^2	0.16307 [e]	0.14979 [e]	0.2913	0.2913	0.2913	0.2913	0.3346	0.4222
Number of observations	13688	7594	2543	3940	2575	4502	11113	3092

NA = Not applicable.

[a] The P(Own) equations were estimated using logit analysis.

*[b] *, **, and *** represent significance at the 1- , 5- , and 10-percent levels, respectively.*

[c] All regressions include discrete variables indicating in which of 41 standard metropolitan statistical areas (SMSAs) the housing units were located (over the 3-year time period: 1998, 2002, and 2004). For a complete list of these SMSAs, see appendix A.

[d] House value in thousand dollar units.

[e] For the logit equations, the R^2 is computed as 1- (unrestricted log-likelihood function/restricted log-likelihood function).

Exhibit 8

Sample: Recent Movers in All Years
Variable Means and Effect of Variables on the Likelihood of Homeownership (1 of 2)

Panel A: Low-Income Households					
Variable Name	Sample Mean			$Pr(Own)_{African\text{-}American}$ Minus $Pr(Own)_{White}$ [a, b] (%)	$Pr(Own)_{Hispanic}$ Minus $Pr(Own)_{White}$ [a, b] (%)
	White	African-American	Hispanic		
Own Home	0.26550	0.12682	0.18119	NA	NA
Intercept	NA	NA	NA	NA	NA
High School Graduate	0.25999	0.31196	0.27340	0.268	0.069
Post High School	0.34819	0.33034	0.21562	– 0.277	– 2.042
College Graduate	0.26412	0.11604	0.08643	– 5.516	– 6.589
Single Female	0.45223	0.60835	0.31754	– 8.604	7.957
Single Male	0.32154	0.24506	0.22787	5.585	6.877
Household Size	1.96716	2.42820	3.11786	4.117	10.556
Household Income	2.48910	2.02979	2.39491	– 16.655	– 3.610
Age 24 or Less	0.18833	0.15898	0.17518	2.784	1.239
Age 25–44	0.48048	0.57360	0.60827	– 2.398	– 3.278
Age 62 or More	0.12517	0.05652	0.04553	– 4.740	– 5.482
Savings 25K or More	0.03836	0.00479	0.00855	– 2.216	– 1.970
Owned Prior to Move	0.32843	0.17775	0.18119	– 10.714	– 10.481
African-American	0.00000	1.00000	0.00000	– 52.331	0.000
White Hispanic	0.00000	0.00000	0.59787	0.000	– 38.195
Non-White Hispanic	0.00000	0.00000	0.40213	0.000	– 23.034
All metropolitan areas[c]				7.937	2.236
Number of observations	4,354	5,007	4,327		

Exhibit 8

Sample: Recent Movers in All Years
Variable Means and Effect of Variables on the Likelihood of Homeownership (2 of 2)

Panel B: High-Income Households					
Variable Name	**Sample Mean**			**$Pr(Own)_{African\text{-}American}$ Minus $Pr(Own)_{White}$ [a, b] (%)**	**$Pr(Own)_{Hispanic}$ Minus $Pr(Own)_{White}$ [a, b] (%)**
	White	**African-American**	**Hispanic**		
Own Home	0.64457	0.52760	0.54318	NA	NA
Intercept	NA	NA	NA	NA	NA
High School Graduate	0.17126	0.20499	0.22322	0.144	0.221
Post High School	0.29168	0.37582	0.31524	0.455	0.128
College Graduate	0.49456	0.33771	0.29873	– 1.654	– 2.085
Single Female	0.15153	0.25033	0.14960	– 1.525	0.029
Single Male	0.23096	0.18988	0.20104	0.778	0.570
Household Size	2.70023	3.03351	3.43841	0.325	0.714
Household Income	10.13987	8.90115	8.72166	– 0.256	– 0.293
Age 24 or Less	0.04022	0.05519	0.06135	– 0.187	– 0.265
Age 25–44	0.65343	0.68003	0.71071	– 0.081	– 0.176
Age 62 or More	0.04225	0.02234	0.01982	– 0.132	– 0.149
Savings 25K or More	0.01568	0.00329	0.00378	0.037	0.035
Owned Prior to Move	0.47129	0.29238	0.33129	– 2.606	– 2.012
African-American	0.00000	1.00000	0.00000	– 5.372	0.000
White Hispanic	0.00000	0.00000	0.66730	0.000	– 4.169
Non-White Hispanic	0.00000	0.00000	0.33270	0.000	– 3.389
All metropolitan areas[c]				0.848	– 0.291
Number of observations	3,953	1,522	2,119		

NA = Not applicable.

[a] Probabilities are calculated at the means for the entire sample (all Whites, African-Americans, and Hispanics) except for the variable in question, which is evaluated at the mean for the denoted minority group and Whites, respectively.

[b] $Pr(Own) = 1 / (1 – e^{-X\beta})$, where Xß= a vector representing the sum of the product individual independent variable values (Xs) and estimated coefficients (ßs). $Pr(Own)_{minority}$ = the probability of owning given all the variables in the regression are evaluated at the overall sample mean except the particular variable in question, which is evaluated at the mean for the minority households. $Pr(Own)_{White}$ = the probability of owning given all the variables in the regression are evaluated at the overall sample mean except the particular variable in question, which is evaluated at the mean for the white households. $Pr(Own)_{minority} – Pr(Own)_{White}$ is expressed as a percentage of Pr(Own), the predicted average likelihood of ownership calculated at the mean for the overall sample. Thus, if for a given variable, xj, $Pr(Own)_{minority} = 0.40$ and $Pr(Own)_{White} = 0.45$ and Pr(Own) = 0.42, then the calculation for variable xj is [(0.40 – 0.45) /0.42] x 100 = 11.9 percent.

[c] "All metropolitan areas" represents the cumulative impact of a set of categorical variables corresponding to the different SMSAs in which the households are located.

Exhibit 9a

Sample: Recent Movers in All Years
Variable Means and Effects of Variables on House Value
Low-Income Homeowners

Variable Name	Sample Mean			House Value	House Value
	White	African-American	Hispanic	(African American Mean -White Mean) x Coefficient[a]	(Hispanic Mean -White Mean) x Coefficient[a]
				($)	($)
Current House Value	148.350	107.547	120.694	NA	NA
Monthly Housing Cost	893.242	803.674	896.477	NA	NA
Total Mortgage Payments	578.87	555.26	619.07	NA	NA
Unit—Condominium	0.12889	0.07559	0.09949	NA	NA
Unit—Owned Manufactured	0.11851	0.02205	0.11480	NA	NA
High School Graduate	0.25692	0.24409	0.27168	(136.59)	157.22
Post High School	0.33045	0.36063	0.23980	669.47	(2,010.92)
College Graduate	0.29585	0.22992	0.10842	(3,120.05)	(8,870.31)
Single Female	0.39014	0.51654	0.20663	(2,864.38)	4,158.56
Single Male	0.22059	0.19528	0.14668	615.18	1,796.13
Household Size	2.17561	2.66457	3.50765	943.47	2,570.23
Household Income	2.90528	2.90860	2.93063	4.02	30.71
Age 24 or Less	0.07612	0.05669	0.07526	(81.23)	(3.63)
Age 25–44	0.46107	0.60157	0.65051	(783.38)	(1,056.22)
Age 62 or More	0.20675	0.09606	0.08673	170.47	184.84
Savings 25K or More	0.06055	0.01575	0.01786	(2,777.30)	(2,646.56)
Number of Years in Residence	1.00433	0.97953	0.99235	84.73	40.93
First-Time Owner	0.54844	0.29291	0.33801	(5,237.79)	(4,313.40)
Owned Prior to Move	0.49481	0.25984	0.30357	(2,600.07)	(2,116.18)
African-American	0.00000	1.00000	0.00000	(15,655.73)	—[b]
White Hispanic	0.00000	0.00000	0.59566	—	(32,275.81)[b]
Non-White Hispanic	0.00000	0.00000	0.40434	—	(24,053.82)[b]
All metropolitan areas[c]	NA	NA	NA	(10,004.17)	13,536.26
Number of observations	1,140	627	776		

NA = Not applicable.

[a] Regression coefficients are presented in exhibit 3. This calculation for a given variable, x_j is $(x_{jm} - x_{jw}) \times \beta_j$, where xjm = the minority mean for variable j, x_{jw} = the White mean for variable j, ßj = the regression coefficient for variable j.

[b] Effect calculated based on a value of 1 for the racial category in question and 0 for all other alternatives.

[c] "All metropolitan areas" represents the cumulative impact of a set of categorical variables corresponding to the different SMSAs in which the households are located.

Exhibit 9b

Sample: Recent Movers in All Years
Variable Means and Effects of Variables on House Value
High-Income Homeowners

Variable Name	Sample Mean			House Value	House Value
	White	African-American	Hispanic	(African American Mean -White Mean) x Coefficient[a]	(Hispanic Mean -White Mean) x Coefficient[a]
				($)	($)
Current House Value	240.00	172.38	211.30	NA	NA
Monthly Housing Cost	1503.63	1220.67	1451.26	NA	NA
Intercept	NA	NA	NA	NA	NA
Total Mortgage Payments	1176.53	951.12	1139.82	NA	NA
Unit—Condominium	0.07575	0.04981	0.08080	NA	NA
Unit—Owned Manufactured	0.02002	0.00125	0.02172	NA	NA
High School Graduate	0.15816	0.19303	0.21894	663.81	1,157.22
Post High School	0.27669	0.35866	0.33015	2,826.45	1,843.44
College Graduate	0.52630	0.37858	0.33884	(10,543.61)	(13,380.50)
Single Female	0.11264	0.20672	0.10513	(3,525.83)	281.48
Single Male	0.15031	0.13574	0.11295	369.55	947.62
Household Size	2.87637	3.16563	3.57428	2,667.80	6,436.81
Household Income	10.92931	9.11381	9.48721	(10,726.05)	(8,519.98)
Age 24 or Less	0.02237	0.03362	0.03301	(183.98)	(174.02)
Age 25–44	0.64560	0.66874	0.70895	(349.35)	(956.41)
Age 62 or More	0.05024	0.02864	0.02780	300.79	312.50
Savings 25K or More	0.01648	0.00125	0.00608	(365.25)	(249.33)
Number of Years in Residence	1.05769	1.01494	1.03301	474.69	274.03
First-Time Owner	0.68407	0.42964	0.53345	(10,011.37)	(5,926.57)
Owned Prior to Move	0.57653	0.35866	0.44570	(8,190.55)	(4,918.31)
African-American	0.00000	1.00000	0.00000	(22,537.31)	—[b]
White Hispanic	0.00000	0.00000	0.68028	—	(23,735.67)[b]
Non-White Hispanic	0.00000	0.00000	0.31972	—	(48,610.08)[b]
All metropolitan areas[c]	NA	NA	NA	(8,102.69)	26,123.00
Number of observations	2,537	800	776		

NA = Not applicable.

[a] Regression coefficients are presented in exhibit 3. This calculation for a given variable, x_j is $(x_{jm} - x_{jw}) \times \beta_j$, where xjm = the minority mean for variable j, x_{jw} = the White mean for variable j, ßj = the regression coefficient for variable j.

[b] Effect calculated based on a value of 1 for the racial category in question and 0 for all other alternatives.

[c] "All metropolitan areas" represents the cumulative impact of a set of categorical variables corresponding to the different SMSAs in which the households are located.

Exhibit 10

Sample: Recent Movers in All Years
Variable Means and Effects of Variables on Annual Rent (1 of 2)

Panel A: Low-Income Renters					
Variable Name	Sample Mean			Annualized (African-American Mean – White Mean) x Coefficient[a]	Annualized (Hispanic Mean – White Mean) x Coefficient[a]
	White	African-American	Hispanic		
Monthly Rent	631.72	520.84	600.54	NA	NA
Intercept	NA	NA	NA	NA	NA
Rent Subsidy	0.04534	0.09927	0.04177	(16.61)	1.10
High School Graduate	0.26110	0.32182	0.27378	21.64	4.52
Post High School	0.35460	0.32594	0.21027	(25.19)	(126.86)
College Graduate	0.25266	0.09950	0.08157	(221.26)	(247.16)
Single Female	0.47467	0.62168	0.34208	32.18	(29.03)
Single Male	0.35804	0.25229	0.24584	2.02	2.14
Household Size	1.89181	2.39387	3.03161	205.49	466.52
Household Income	2.33865	1.90215	2.27636	(158.06)	(22.56)
Age 24 or Less	0.22889	0.17383	0.19729	(11.53)	(6.62)
Age 25–44	0.48749	0.56953	0.59893	1.13	1.53
Age 62 or More	0.09568	0.05078	0.03641	(17.57)	(23.20)
Savings 25K or More	0.03033	0.00320	0.00649	(43.66)	(38.37)
Number of Years in Residence	0.80394	0.81016	0.77900	(0.85)	3.39
Owned Prior to Move	0.26829	0.16583	0.15411	(28.18)	(31.41)
African-American	0.00000	1.00000	0.00000	(742.98)	—
White Hispanic	0.00000	0.00000	0.59836	—	(844.43)
Non-White Hispanic	0.00000	0.00000	0.40164	—	(946.36)
All metropolitan areas[c]	NA	NA	NA	(327.19)	557.13
Number of observations	3,198	4,372	3,543		

Exhibit 10

Sample: Recent Movers in All Years
Variable Means and Effects of Variables on Annual Rent (2 of 2)

Panel B: High-Income Renters					
Variable Name	Sample Mean			Annualized (African-American Mean – White Mean) x Coefficient[a]	Annualized (Hispanic Mean – White Mean) x Coefficient[a]
	White	African-American	Hispanic		
Monthly Rent	891.51	719.57	840.01	NA	NA
Intercept	NA	NA	NA	NA	NA
Rent Subsidy	0.00285	0.01669	0.01033	(19.52)	(10.55)
High School Graduate	0.19502	0.21836	0.22831	36.73	52.39
Post High School	0.31886	0.39499	0.29752	158.93	(44.55)
College Graduate	0.43701	0.29207	0.25103	(486.29)	(623.99)
Single Female	0.22206	0.29903	0.20248	(20.59)	5.24
Single Male	0.37722	0.25035	0.30579	54.96	30.95
Household Size	2.38078	2.88595	3.27686	279.20	495.24
Hosuehold Income	8.70822	8.66364	7.81138	(1.14)	(22.88)
Age 24 or Less	0.07260	0.07928	0.09504	(1.81)	(6.09)
Age 25–44	0.66762	0.69263	0.71281	(6.31)	(11.40)
Age 62 or More	0.02776	0.01530	0.01033	(10.00)	(13.99)
Savings 25K or More	0.01423	0.00556	0.00103	(3.92)	(5.96)
Number of Years in Residence	0.85765	0.79138	0.79752	24.96	22.64
Owned Prior to Move	0.28043	0.21836	0.19525	(24.07)	(33.03)
African-American	0.00000	1.00000	0.00000	(1,384.91)	—
White Hispanic	0.00000	0.00000	0.65186	—	(792.60)
Non-White Hispanic	0.00000	0.00000	0.34814	—	(1,733.13)
All metropolitan areas[c]	NA	NA	NA	(659.53)	667.98
Number of observations	1,405	719	968		

NA = Not applicable.

[a] Regression coefficients are presented in exhibit 3. This calculation for a given variable, x_j is $(x_{jm} - x_{jw}) \times \beta_j$, where xjm = the minority mean for variable j, x_{jw} = the White mean for variable j, ßj = the regression coefficient for variable j.

[b] Effect calculated based on a value of 1 for the racial category in question and 0 for all other alternatives.

[c] "All metropolitan areas" represents the cumulative impact of a set of categorical variables corresponding to the different SMSAs in which the households are located.

Time in the United States: Effects on the Likelihood of Homeownership, Housing Values, and Rents

As shown in exhibit 2, the AHS in 2002 and 2004 has an additional variable of interest, namely the length of time a nonnative-born resident has been in this country. The literature on immigrant assimilation generally considers time spent in the United States as a major factor (see the recent literature review by Waters and Jiménez, 2005). Because Hispanic households are immigrating to this country at an increasingly rapid rate, and because length of residence might influence the effectiveness with which a household could function in the housing and mortgage markets, we selected a sample that included only households from the 2002 and 2004 sample periods. This selection was made to observe the effect of length of time in the United States on housing choices. It was our expectation that a discrete set of classifications would work better than a continuous variable due to the nonlinear nature of a household's learning curve. Consequently, we developed a classification scheme for length of residence in the United States (5 years or less, 5 to 12 years, 13 to 22 years, and 23 years or more) by dividing the observed distribution of this variable for nonnatural-born residents into quartiles. Subsequently, we estimated the same set of regressions discussed in the third section for both the full sample and for recent movers using the 2002 and 2004 AHS files to take advantage of this potentially insightful information.[22]

Exhibit 11 provides a summary of the effects on housing outcomes of time spent in the United States. The increase in the probability of homeownership as time in the United States increases for both low- and high-income households is striking for the full sample. For low-income households, holding income, age, education, marital status, and so on constant, both remaining in this country less than 5 years and living in the country between 5 and 12 years decrease the probability of owning; the coefficient values are -0.73896 and -0.42444, respectively. For high-income households, the coefficient values are -0.9279 and -0.4859, respectively.[23] All coefficients are statistically significant at the 1-percent level. To the extent that increased time spent in the United States can affect earned income, significantly lower rents are associated with more recent immigrants.

For recent movers, the negative effects are much smaller. Specifically, the coefficients for households that have been in the country 5 years or less are -0.1895 for low-income households and -0.40923 for households with higher incomes. Only the latter effect is statistically significant. For those households that have been in the United States between 5 and 12 years, both coefficients are insignificant and one has a positive sign. These results suggest a dynamic that may be at work. Recent movers represent households that have made an adjustment in their housing consumption and, therefore, are more likely to have moved closer to a traditional housing equilibrium situation. Therefore, they are more likely to be owners, and, whether owners or renters, closer to their optimal level of housing expenditure (housing value for owners, rent for renters) given their income, family size, and other characteristics. Their recent adjustment in housing consumption might be expected to diminish differences in their housing situation that primarily resulted from

[22] Selected exhibits of these regressions appear in appendix B.

[23] Note that, because of the nonlinear nature of the logit probability model, these coefficient magnitudes do not represent the exact change in the probability of ownership associated with these variables. Nonetheless, the values are relatively large as compared with many of the other variables included in the regression.

a lack of information about U.S. markets when they first immigrated. The top panel of exhibit 11 shows clearly that the households that are recent arrivals have worse housing outcomes compared with other households, but these differences are much smaller among those recent arrivals that also recently moved. These results suggest that if recent arrivals are able to move, they improve their housing circumstances and so are not at the same disadvantage over time.[24]

Exhibit 11

Time Spent in the United States for Nonnative-Born Citizens Living in the United States Their Entire Lives
Regression Coefficients and Significance[a, b, c]

Sample: All Households in 2002 and 2004						
Variable Name	**Low Income, P(Own)**	**High Income, P(Own)**	**Low-Income Owner, House Value[d]**	**High-Income Owner, House Value[d]**	**Low-Income Renter, Rent**	**High-Income Renter, Rent**
Less Than 5 Years in United States	– 0.73896 *	– 0.9279 *	– 9.9162	0.4730	– 38.2796 *	– 97.8302 *
5–12 Years in United States	– 0.42444 *	– 0.4859 *	– 7.5731	– 7.3579	– 26.2431 *	– 64.3877 **
13–22 Years in United States	0.06040	0.0426	– 7.3530	6.9505	– 17.0748	– 69.7892 **
23 Years or More in United States	0.30797 *	0.3750 *	4.1590	0.9481	– 12.6175	– 5.9086
Number of observations	26,476	19,723	12,389	15,700	13,992	3,543
Sample: Recent Movers in 2002 and 2004						
Variable Name	**Low Income, P(Own)**	**High Income, P(Own)**	**Low-Income Owner, House Value[d]**	**High-Income Owner, House Value[d]**	**Low-Income Renter, Rent**	**High-Income Renter, Rent**
Less Than 5 Years in United States	– 0.1895	– 0.40923 *	– 1.1540	– 4.4248	– 63.6214 *	– 97.6543 *
5–12 Years in United States	0.1502	– 0.11495	– 3.6726	– 2.6956	– 36.2107 *	– 41.7562
13–22 Years in United States	0.4860 *	0.28948	5.6428	– 15.8701	– 20.8422	– 67.6456
23 Years or More in United States	0.4204 **	0.36927	30.4118 **	– 10.2522	– 23.1130	– 35.6294
Number of observations	9,244	4,997	1,817	2,626	7,405	1,947

[a] The P(Own) equations were estimated using logit analysis.

*[b] *, **, and *** represent significance at the 1- , 5- , and 10-percent levels, respectively.*

[c] These regressions include all the variables in regressions estimated for the full sample. Appendix B contains the complete results for these regressions.

[d] House value in thousand dollar units.

[24] The AHS is not, of course, a longitudinal household survey. This argument implies that, over time, the household experiences some type of (positive) work history, additional financial knowledge of the housing system, and so on.

Neighborhood and Structural Quality

The results discussed previously for the likelihood of homeownership for minority households and their pattern of housing expenditures provide a context for a more detailed analysis of housing quality. In particular, minority households have lower likelihoods of ownership and lower levels of housing expenditure on both owned and rented units for both higher and lower income households. Thus, minority households might be expected to rank their circumstances somewhat lower than those of White households overall, and the individual factors that combine to produce the housing services these households receive could be quite different depending on the racial/ethnic group to which a household belongs.

The purpose of this section is to analyze the relative importance of various individual structural and neighborhood attributes in determining households' perceptions of overall dwelling and neighborhood quality. In addition, we present results separately for households that are owners and those that are renters.

As noted, the AHS data contain detailed information on the structural characteristics of the house, the characteristics of the neighborhood in which the house is located, the current cost of housing services, the demographic characteristics of the resident of the dwelling at the time of the interview, and two indices that measure the resident's satisfaction with his or her neighborhood and the quality of the structure in which he or she resides on an ordinal scale from 1 to 10. Basic characteristics of these data have been presented previously in the second section (the quality, size, and cost of housing: AHS 1998, 2002, 2004).

Conceptual Model

Most of the research considering the relative importance of individual structural and other (for example, neighborhood, public service, location) housing characteristics on household preferences has been implemented by estimating hedonic price models. In this approach, sales price or contract rent is regressed on a set of variables that describe the structure and its environment. Unfortunately, the hedonic approach has often been criticized because it assumes that consumer preferences are identical. In reality, however, consumer preferences may not be identical. For example, some individuals may not mind cracks in walls or peeling paint while others would find them quite objectionable. On the margin, if a household that ends up occupying a given dwelling is indifferent to these structural defects, then they will be uncorrelated with rent or value, even though most people would consider them to be bothersome.

In lieu of the hedonic approach, we employ the estimating technique in Boehm and Ihlanfeldt (1991), which reveals the importance of individual neighborhood characteristics on the overall quality of the neighborhood. In this analysis, the AHS 10-point scale is interpreted to be an ordinal utility index.[25] This approach has two primary advantages. First, for each household group, estimates represent the group average rather than the preferences of the marginal purchaser of housing services. Second, by focusing on perceptions rather than the relationship between some objective characteristics and dwelling rent/price, we can identify more clearly the factors that influence the way people feel about their living environment.

[25] See appendix C for a detailed description of the assumptions underlying this estimation technique.

Variable Definitions

A great deal of structural information is provided for each housing unit included in the AHS, including structure age; unit size (used to construct a measure of crowding); availability and age of major appliances; type and condition of heating, air-conditioning, plumbing, and electrical systems; and structural problems with the roof, internal and external walls, windows, and foundation. In addition, a detailed set of neighborhood factors is included in the questions that relate to such issues as crime, noise, litter, abandoned buildings, general deterioration, and so on. Exhibit 12 contains variable names and definitions for all the variables included in the analysis.[26]

Exhibit 12

Structural and Neighborhood Quality
Variable Names and Definitions (1 of 3)

Variable Name	Variable Definition
Structural	
Structure Quality	Housing structural quality ranking: 0 = worst, 9 = best[a]
Structure Age	Age of the structure in years
Porch	1 = housing unit has a porch; 0 = otherwise
Garage	1 = housing unit has a garage or carport; 0 = otherwise
Equipment	Number of the following items the housing unit has at least one of: refrigerator, garbage disposal, stove/oven, dishwasher, washer/dryer
Bathroom and Water	1 = unit has a private toilet; 0 = otherwise
	1 = unit has hot and cold piped water; 0 = otherwise
Septic or Cesspool	1 = unit is connected to a public sewer or septic system; 0 = otherwise
Central Air	1 = unit has central air conditioning; 0 = otherwise
Structural Problems	Number of structural problems observed by the enumerator: sagging roof, missing roof materials, holes in roof, missing wall material or siding, sloping exterior walls, broken windows, bars on windows, and/or crumbling foundation
Exterior Leaks	1 = exterior leak in the past 12 months; 0 = otherwise
Interior Leaks	1 = interior leak in the past 12 months; 0 = otherwise
Interior Deterioration	1 = cracks or holes in walls or ceiling, holes in floor, or broken plaster or peeling paint more than 1 square foot; 0 = otherwise
Water Breakdowns	Number of water source breakdowns in the past 90 days
Toilet Breakdowns	Number of toilet breakdowns in the past 90 days
Sewer Breakdowns	Number of public sewer breakdowns in the past 90 days
Inadequate Wiring	1 = inadequate electrical wiring; 0 = otherwise
Blown Fuses	Number of times fuses blew or breakers tripped in the past 90 days
Heating Breakdowns	Number of heat breakdowns last winter lasting 6 hours or more
	1 = steam, electric, heat pump, or central warm air furnace; 0 = otherwise
Built-in Electric Heat	1 = other built-in electric floor, wall, or heaters; 0 = otherwise

[26] Often when one incorporates many structural variables in estimating an equation, multicollinearity can be a significant concern. Fortunately, this issue does not appear to be a significant issue in our low-income household samples.

Exhibit 12

Structural and Neighborhood Quality
Variable Names and Definitions (2 of 3)

Variable Name	Variable Definition
Lowest Quality Heat	1 = space heaters, stoves, fireplaces, or no heat; 0 = otherwise
Vermin Present	1 = presence of rats or mice in building in the past 90 days; 0 = otherwise
Water Not Safe	1 = water is not safe to drink; 0 = otherwise
Rooms to Household Size	Number of rooms in the housing unit divided by the number of individuals in the household.
Unit Manufactured	1 = housing unit was manufactured; 0 = otherwise
Neighborhood	
Neighborhood Quality	Housing neighborhood quality ranking: 0 = worst, 9 = besta
Lowrise Buildings	1 = enumerator observed single-family or other lowrise buildings within 1/2 block of unit; 0 = otherwise
Midrise Buildings	1 = enumerator observed midrise residential buildings within 1/2 block of unit; 0 = otherwise
Highrise Buildings	1 = enumerator observed highrise residential buildings within 1/2 block of unit; 0 = otherwise
Mobile Homes	1 = enumerator observed mobile homes within 1/2 block of unit; 0 = otherwise
Commercial Buildings	1 = enumerator observed commercial/institutional/industrial buildings within 1/2 block of unit; 0 = otherwise
Parking Lots	1 = enumerator observed residential parking lots within 1/2 block of unit; 0 = otherwise
Water	1 = enumerator observed a body of water within 1/2 block of unit; 0 = otherwise
Green Space	1 = enumerator observed open space/park/woods/farm/ranch within 1/2 block of unit; 0 = otherwise
Older Buildings	1 = enumerator observed buildings in the area are predominantly older than the unit; 0= otherwise
Newer Buildings	1 = enumerator observed buildings in the area are predominantly younger than the unit; 0= otherwise
Abandoned Buildings	1 = enumerator observed abandoned buildings within 1/2 block of unit; 0 = otherwise
Bars on Windows	1 = enumerator observed bars on windows of buildings within 1/2 block of unit; 0 = otherwise
Road Repairs Needed	1 = enumerator observed roads in need of repairs within 1/2 block of unit; 0 = otherwise
Junk	1 = enumerator observed trash, litter, or junk accumulated in the neighborhood; 0 = otherwise
Crime Problem	1 = resident feels crime in the neighborhood is bothersome; 0 = otherwise
Noise Problem	1 = resident feels noise in the neighborhood is bothersome; 0 = otherwise
Litter Problem	1 = resident feels litter or housing deterioration in the neighborhood is bothersome; 0 = otherwise

Exhibit 12

Structural and Neighborhood Quality
Variable Names and Definitions (3 of 3)

Variable Name	Variable Definition
Poor Services	1 = resident feels poor city/county services in the neighborhood are bothersome; 0 = otherwise
Property Use Problem	1 = resident feels undesirable nonresidential uses in the neighborhood are bothersome; 0 = otherwise
Odor Problem	1 = resident feels odor in the neighborhood is bothersome; 0 = otherwise
Neighbor Problem	1 = resident feels people in the neighborhood are bothersome; 0 = otherwise
Other Problem	1 = resident feels some other feature in the neighborhood is bothersome; 0 = otherwise
Schools Inadequate	1 = schools in the area are inadequate; 0 = otherwise
Shopping Inadequate	1 = resident feels shopping in the area is inadequate; 0 = otherwise
Public Transit Good	1 = resident feels public transportation in the area is adequate; 0 = otherwise
Police Inadequate	1 = resident feels dissatisfied with police services; 0 = otherwise

[a] *In the American Housing Survey data, both structural and neighborhood quality are ordinal rankings with a range of 1 to 10. For the estimation software, the first category needs to be 0. Consequently, the means in this table are based on the normalized rankings between 0 and 9.*

Results

Exhibits 13 through 16 present the four separate sets of results for the dimensions of housing quality and neighborhood quality for both owners and renters. Separate equations are estimated for African-American, Hispanic, and White households.[27] For ease of exposition, we first consider the results for owners and then for renters.

Owners

Exhibit 13 shows owners' assessments of characteristics, or variables, that affect structural quality. These variables shed light on the sources of satisfaction (and dissatisfaction) with existing housing both overall and for specific minority groups. For each variable, the exhibit provides both the estimated regression coefficients and the mean values by household type.

In general, all households react in a similar manner to negative aspects of their owner-occupied homes. In exhibit 13, when one considers which variables have a significant effect on household rankings of the structural quality of their dwellings, variables such as external leaks, internal leaks, and vermin problems are viewed as lowering the quality of housing services. Households that are

[27] As part of the racial/ethnic stratification, we decided not to split the Hispanic sample into White and non-White subsets for several reasons. First, the more data stratifications employed in the analysis, the more difficult and cumbersome it becomes to present all the results. Second, each stratification of the data reduces the sample size for a given regression. Finally, the most important variables demonstrated to influence structural and neighborhood rankings were relatively similar across the racial/ethnic groups currently employed.

Exhibit 13

Structural Quality of Owned Units
Ordinal Probit Coefficients and Means (1 of 3)

Variable Name	Hispanic Coefficients[a, b, c]	African-American Coefficients[a, b, c]	White Coefficients[a, b, c]	Hispanic Low Income Means	African-American Low Income Means	White Low Income Means	Hispanic High Income Means	African-American High Income Means	White High Income Means
Structure Quality[c]	NA	NA	NA	7.3608	7.3068	7.4446	7.4761	7.4354	7.4566
Intercept	1.8867 *	2.62347 *	2.1667 *	NA	NA	NA	NA	NA	NA
Structure Age	– 0.0033 *	– 0.00130 **	– 0.0021 *	39.8492	45.5429	40.2947	29.7078	33.0196	31.5746
Porch	0.0941 *	0.02462	0.1014 *	0.8437	0.8488	0.8837	0.9007	0.8809	0.9237
Garage	0.0973 *	0.09097 *	0.1513 *	0.7069	0.5840	0.7714	0.8450	0.7490	0.8693
Equipment	0.0244 ***	0.01183	0.0543 *	3.8758	3.6593	4.1133	4.4998	4.2745	4.5790
Bathroom and Water	0.9096 **	0.15702	0.4428	0.9978	0.9978	0.9996	0.9996	0.9995	0.9999
Septic or Cesspool	0.1447 *	0.16032 *	0.2858 *	0.0682	0.0611	0.1946	0.0856	0.0544	0.1964
Central Air	0.1185 *	0.11540 *	0.0758 *	0.5770	0.5906	0.6179	0.7195	0.7584	0.7078
Structural Problems	– 0.1025 *	– 0.13808 *	– 0.1903 *	0.4315	0.5442	0.2304	0.2438	0.3266	0.1741
Exterior Leaks	– 0.1917 *	– 0.10193 *	– 0.1008 *	0.1030	0.1551	0.1356	0.1062	0.1551	0.1612
Interior Leaks	– 0.2090 *	– 0.14695 *	– 0.1351 *	0.0809	0.1004	0.0722	0.1099	0.1080	0.0917
Interior Deterioration	– 0.2423 *	– 0.42731 *	– 0.3240 *	0.0921	0.1175	0.0604	0.0678	0.0730	0.0547
Water Breakdowns	– 0.0484	0.06335	– 0.0741 *	0.0301	0.0263	0.0340	0.0295	0.0232	0.0287
Toilet Breakdowns	– 0.0785 ***	0.02758	– 0.1518 *	0.0296	0.0309	0.0111	0.0191	0.0251	0.0103

Exhibit 13

Structural Quality of Owned Units
Ordinal Probit Coefficients and Means (2 of 3)

Variable Name	Hispanic Coefficients[a, b, c]	African-American Coefficients[a, b, c]	White Coefficients[a, b, c]	Hispanic Low Income Means	African-American Low Income Means	White Low Income Means	Hispanic High Income Means	African-American High Income Means	White High Income Means
Sewer Breakdowns	0.0615	– 0.10718 ***	– 0.0607	0.0249	0.0247	0.0119	0.0158	0.0227	0.0088
Inadequate Wiring	– 0.0708	0.02800	– 0.1072 ***	0.0189	0.0232	0.0136	0.0143	0.0128	0.0114
Blown Fuses	– 0.0355 *	– 0.01321	– 0.0132 **	0.2127	0.3427	0.3510	0.3352	0.4470	0.4821
Heating Breakdowns	– 0.0711	– 0.02606	– 0.0741 **	0.0269	0.0453	0.0260	0.0306	0.0372	0.0223
Built-in Electric Heat	0.0432	– 0.04149	– 0.0721 **	0.0938	0.0613	0.0518	0.0478	0.0365	0.0342
Lowest Quality Heat	– 0.1035 **	– 0.03467	– 0.1114 **	0.1072	0.0626	0.0279	0.0299	0.0237	0.0133
Vermin Present	– 0.1405 *	– 0.08251 *	– 0.0706 *	0.1879	0.2578	0.2024	0.1727	0.1897	0.2112
Water Not Safe	– 0.0383	– 0.08100 **	– 0.1277 *	0.2426	0.1341	0.0846	0.1895	0.1317	0.0756
Rooms to Household Size	0.0617 *	0.02785 *	0.0610 *	2.4742	3.5113	3.8290	2.2516	2.7552	2.9218
Unit Manufactured	– 0.3604 *	– 0.08190	– 0.2910 *	0.0709	0.0133	0.0764	0.0179	0.0060	0.0164

Exhibit 13

Structural Quality of Owned Units
Ordinal Probit Coefficients and Means (3 of 3)

Variable Name	Hispanic Coefficients[a, b, c]	African-American Coefficients[a, b, c]	White Coefficients[a, b, c]	Hispanic Low Income Means	African-American Low Income Means	White Low Income Means	Hispanic High Income Means	African-American High Income Means	White High Income Means
Number of observations	9,207	8,709	24,920	4,019	4,570	9,511	5,188	4,139	15,409
Log likelihood fn	– 14565.14	– 14033.8	– 39019.04						
Chi-squared	776.8221	703.9435	1953.349						
Degrees of freedom	23	23	23						

NA = Not applicable.

[a] Not presented in this table is a set of "threshold" parameters corresponding to n-1 ordinal categories (for example, structural quality has rankings from 0 to 9).

*[b] *, **, and *** represent significance at the 1- , 5- , and 10-percent levels, respectively. In addition, 8 "threshold" parameters (μjs) and one intercept term are estimated. All these parameters are significant at the 1-percent level.*

[c] In the American Housing Survey data, both structural and neighborhood quality are ordinal rankings with a range of 1 to 10. For the estimation software, the first category needs to be 0. Consequently, the means in this table are based on the normalized rankings between 0 and 9.

on a public sewer system with a home's toilet systems and other plumbing working satisfactorily and that have a central heating system (as opposed to space heaters) have increased perceptions of quality. Although these statements might seem predictable, the results shown in exhibit 13, in general, dispel any myth of significant household differences in housing quality perceptions. To summarize, regardless of race/ethnicity, American households in general appear to agree on what makes good owner-occupied housing.

Significant issues should be noted, however, when comparing the mean quality levels by individual characteristics for households by minority status. In each exhibit, the mean values presented represent the average characteristic value observed for each racial group, stratified further into high- and low-income subgroups. Major structural problems and water-quality issues are much worse for Hispanic households and African-American households than they are for White households.[28] In exhibit 13, 43.2 percent of low-income Hispanics and 54.4 percent of low-income African Americans occupy owned homes with major structural problems, as compared with only 23.0 percent of low-income Whites. Similarly, 24.3 percent of low-income Hispanics occupy owned homes with water that is not safe to drink. This percentage is substantially higher than that of both low-income African-American households, at 13.4 percent, and low-income White households, at 8.5 percent. Although lower in magnitude, comparable differences exist for higher income households as well. The deterioration of interior facilities appears much worse for low-income minority homeowners, at 9.2 and 11.8 percent, respectively, for Hispanics and African Americans, as compared with 6.0 percent for Whites. Similarly, low-income Hispanic homeowners are substantially more likely to have lower quality heating sources (that is, space heaters, stoves, fireplaces, or no heat), with 10.7 percent of households falling into this category as compared with 6.3 percent of low-income African Americans and only 2.8 percent of low-income Whites. Finally, both low- and high-income Hispanics face more crowding. Low-income Hispanic households average 2.5 rooms per person; in contrast, African-American and White households have more than a room more of space per person, averaging 3.5 and 3.8 rooms per person, respectively.

Exhibit 14 presents results for owners' determinants of neighborhood quality. As with structural characteristics, the results for the parameter estimates of the effect of individual characteristics on neighborhood quality (the first three columns) are relatively consistent in terms of the consistency of the sign, statistical significance, and magnitudes of these coefficients. These coefficient estimates demonstrate whether and to what extent various factors affect households' neighborhood rankings. Examining homeowners by minority status, general consistency is evident in the factors that matter—crime problems, litter problems, noise problems, roads in need of repair, junk and abandoned buildings—all creating undesirable neighborhoods. Similarly, neighborhoods with features such as green space and newer buildings are more desirable for all racial/ethnic groups.

As with structural characteristics, however, significant differences appear in household means of individual neighborhood characteristics by minority status. These differences appear particularly among low-income homeowners. Low-income Hispanic and African-American households consider inadequate policing to be more of an issue than White households do. Specifically, 10.7 percent

[28] As defined in exhibit 12, structural problems include a number of conditions identified by survey enumerators—specifically, sagging roof, missing roof materials, holes in roof, missing wall material or siding, sloping exterior walls, broken windows, bars on windows, and/or crumbling foundation.

Exhibit 14

Neighborhood Quality of Owned Units
Ordinal Probit Coefficients and Means (1 of 2)

Variable Name	Hispanic Coefficients[a, b, c]	African-American Coefficients[a, b, c]	White Coefficients[a, b, c]	Hispanic Low Income Means	African-American Low Income Means	White Low Income Means	Hispanic High Income Means	African-American High Income Means	White High Income Means
Neighborhood Quality[c]	NA	NA	NA	7.0331	6.7352	7.1712	7.1717	6.9983	7.2378
Intercept	3.4329 *	3.3047 *	3.5253 *	NA	NA	NA	NA	NA	NA
Lowrise Buildings	– 0.1160 *	– 0.1369 *	– 0.1582 *	0.2446	0.2790	0.2094	0.2088	0.2402	0.1604
Midrise Buildings	0.1827 **	0.0271	0.0213	0.0239	0.0317	0.0197	0.0177	0.0239	0.0151
Highrise Buildings	0.0472	0.1137	0.2059 *	0.0127	0.0103	0.0099	0.0075	0.0080	0.0064
Mobile Homes	– 0.0799 **	0.0761	– 0.2335 *	0.1028	0.0359	0.1058	0.0457	0.0259	0.0397
Commercial Buildings	– 0.0280	– 0.0373	– 0.0590 *	0.2797	0.2796	0.1970	0.1991	0.2431	0.1553
Parking Lots	– 0.0944 **	– 0.0012	– 0.0748 *	0.1368	0.1243	0.1340	0.1126	0.1087	0.1036
Water	0.0687 ***	0.0731 ***	0.0731 *	0.0928	0.0842	0.1727	0.1457	0.1384	0.2055
Green Space	0.0872 *	0.0874 *	0.1388 *	0.2379	0.2718	0.3567	0.3279	0.3276	0.4204
Older Buildings	– 0.0653 ***	0.0799 **	0.0156	0.0970	0.0954	0.1193	0.0634	0.0626	0.0788
Newer Buildings	0.0560	0.0862 **	0.0544 **	0.0637	0.0613	0.0752	0.0750	0.0732	0.0830
Abandoned Buildings	– 0.2478 *	– 0.2605 *	– 0.3268 *	0.0605	0.1497	0.0383	0.0372	0.0727	0.0238
Bars on Windows	– 0.0773 **	– 0.0349	– 0.1230 *	0.1956	0.2652	0.0539	0.1214	0.1759	0.0429
Road Repairs Needed	– 0.1402 *	– 0.1943 *	– 0.1587 *	0.3976	0.4928	0.3474	0.3167	0.3842	0.3126
Junk	– 0.3469 *	– 0.4381 *	– 0.4049 *	0.1053	0.1611	0.0841	0.0738	0.1020	0.0600
Crime Problem	– 0.5695 *	– 0.5320 *	– 0.5651 *	0.1257	0.1759	0.0877	0.1097	0.1206	0.0863
Noise Problem	– 0.3671 *	– 0.4047 *	– 0.4324 *	0.1483	0.1729	0.1356	0.1378	0.1256	0.1199
Litter Problem	– 0.5235 *	– 0.3155 *	– 0.4101 *	0.0251	0.0457	0.0216	0.0262	0.0319	0.0164

Exhibit 14

Neighborhood Quality of Owned Units
Ordinal Probit Coefficients and Means (2 of 2)

Variable Name	Hispanic Coefficients[a, b, c]	African-American Coefficients[a, b, c]	White Coefficients[a, b, c]	Hispanic Low Income Means	African-American Low Income Means	White Low Income Means	Hispanic High Income Means	African-American High Income Means	White High Income Means
Poor Services	– 0.1396	– 0.0181	– 0.0457	0.0144	0.0341	0.0088	0.0145	0.0239	0.0103
Odor Problem	– 0.3092 *	– 0.2122 *	– 0.2700 *	0.0075	0.0140	0.0076	0.0100	0.0106	0.0094
Property Use Problem	– 0.1966 ***	0.0921	– 0.2534 *	0.0455	0.0532	0.0339	0.0380	0.0350	0.0278
Neighbor Problem	– 0.4434 *	– 0.4685 *	– 0.6488 *	0.0530	0.0611	0.0453	0.0445	0.0505	0.0397
Other Problem	– 0.2979 *	– 0.2163 *	– 0.3151 *	0.1120	0.1138	0.1018	0.1297	0.1317	0.1120
Schools Inadequate	– 0.3504 *	– 0.3497 *	– 0.3003 *	0.0296	0.0306	0.0139	0.0412	0.0466	0.0275
Shopping Inadequate	– 0.0988 *	– 0.0890 *	– 0.0346 ***	0.1197	0.2066	0.1276	0.0921	0.1438	0.1041
Public Transit Good	– 0.0627 *	– 0.0541 **	– 0.0410 *	0.5272	0.5267	0.3356	0.4329	0.4148	0.3087
Police Inadequate	– 0.2684 *	– 0.3317 *	– 0.2202 *	0.1070	0.1245	0.0584	0.0779	0.0778	0.0513
Number of observations	9,207	8,709	24,920	4,019	4,570	9,511	5,188	4,139	15,409
Log likelihood fn	– 15322.75	– 15022.43	– 40756.8						
Chi-squared	1957.959	2365.287	4748.447						
Degrees of freedom	26	26	26						

NA = Not applicable.

[a] Not presented in this table is a set of "threshold" parameters corresponding to n-1 ordinal categories (for example, structural quality has rankings from 0 to 9). Thus, 8 "threshold" parameters (μjs) and one intercept term are estimated. All these parameters are significant at the 1-percent level.

*[b] *, **, and *** represent significance at the 1- , 5- , and 10-percent levels, respectively.*

[c] In the American Housing Survey data, both structural and neighborhood quality are ordinal rankings with a range of 1 to 10. For the estimation software, the first category needs to be 0. Consequently, the means in this table are based on the normalized rankings between 0 and 9.

of low-income Hispanic households and 12.5 percent of low-income African-American households consider police protection inadequate, compared with 5.8 percent of low-income White households. This trend is consistent with the observation that both minority groups have added concerns regarding the perceptions of crime problems within their neighborhood. In particular, 12.6 and 17.6 percent of low-income Hispanics and African Americans, respectively, perceive crime to be a problem, whereas only 8.8 percent of low-income Whites share this concern. Also, both high- and low-income White households have greater access to green space. In particular, on average, only 23.8 percent of low-income Hispanics and 27.2 percent of low-income African Americans have open green space within one-half block of their units, compared with 35.7 percent of low-income Whites. Consistent with central city locations, low-income African-American households tend to have more nearby abandoned buildings, which appear to exhibit a negative effect on neighborhood quality. Approximately 15 percent of low-income African Americans live near abandoned buildings as compared with 6.1 percent of low-income Hispanics and 3.8 percent of low-income Whites.

Renters

The results for renters, both for structural quality and neighborhood quality, are, in general, remarkably similar to the results for owners. In addition, perceptions of quality, as measured by the sign and statistical significance of the estimated coefficients shown in exhibit 15, are consistent across minority status as they were for owners. Significant characteristics that affect structural quality include external leaks, internal leaks, and vermin problems—all of which lower the perceived quality of rental housing. Similarly, households with well-functioning plumbing, heating systems, and other infrastructure systems all clearly rank their housing quality higher.

When considering differences in the average structural characteristics that affect the quality of housing services provided in rental units, the primary differences are remarkably similar to that of homeowners. Specifically, major structural problems are much more prevalent in units rented by minorities than in units rented by Whites. For low-income Hispanic and African-American renters, 48.4 and 51.8 percent, respectively, of the rental units have major structural problems. For low-income White renters, this number is only 34.3 percent. Similarly, units rented by low-income Hispanics and African Americans have higher percentages of major interior deterioration than do units rented by Whites—12.9, 15.0, and 9.9 percent, respectively. Also, for both the higher and lower income groups, Hispanic renters are much more likely than African-American or White renters to have the lowest quality heating options, water that is not safe to drink, and to be substantially more crowded in their units. In particular, for low-income Hispanic renters, 10.6 percent have low-quality heating, 31.3 percent have water that is not safe to drink, and, on average, this cohort has only 1.8 rooms per person as compared with approximately 2.5 rooms per person for other households.

Exhibit 16 presents results for renters' determinants of neighborhood quality. Factors that influence renters' perceptions of neighborhood quality are consistent with those factors affecting owners. In addition, these factors are similar across households by minority status. Crime problems, litter problems, noise problems, roads in need of repair, junk and abandoned buildings, and so on, create undesirable neighborhoods. A neighborhood with amenities such as green space and newer buildings is more desirable.

Exhibit 15

Structural Quality of Rental Units
Ordinal Probit Coefficients and Means (1 of 2)

Variable Name	Hispanic Coefficients[a, b, c]	African-American Coefficients[a, b, c]	White Coefficients[a, b, c]	Hispanic Low Income Means	African-American Low Income Means	White Low Income Means	Hispanic High Income Means	African-American High Income Means	White High Income Means
Structure Quality[c]	NA	NA	NA	6.3932	6.3020	6.5586	6.4866	6.4107	6.4653
Intercept	1.1346 *	1.6290 *	2.1585 *	NA	NA	NA	NA	NA	NA
Structure Age	0.0001	0.0004	– 0.0011 **	40.1208	43.2640	40.6971	35.3555	35.4121	37.2146
Porch	0.1216 *	0.0945 *	0.0380	0.6486	0.6468	0.6568	0.7984	0.7665	0.7937
Garage	0.0621 **	0.1130 **	0.0280	0.3558	0.1963	0.3258	0.5465	0.3760	0.5375
Equipment	0.0741 *	0.0466 *	0.0350 *	3.2515	3.1867	3.4355	3.8231	3.9027	4.0341
Bathroom and Water	0.9466 *	0.4981 *	0.3936 **	0.9965	0.9960	0.9959	0.9994	0.9993	0.9992
Septic or Cesspool	0.1452 ***	0.1398	0.2026 *	0.0178	0.0114	0.0520	0.0252	0.0111	0.0512
Central Air	0.0551 ***	0.0338	0.0034	0.4704	0.5109	0.4395	0.5571	0.6824	0.5502
Structural Problems	– 0.1488 *	– 0.1395 *	– 0.1556 *	0.4839	0.5183	0.3432	0.4003	0.4163	0.3130
Exterior Leaks	– 0.1597 *	– 0.1338 *	– 0.1309 *	0.0992	0.1226	0.1130	0.0974	0.1487	0.1313
Interior Leaks	– 0.2739 *	– 0.2481 *	– 0.2486 *	0.1322	0.1564	0.1176	0.1607	0.1619	0.1305
Interior Deterioration	– 0.3376 *	– 0.4371 *	– 0.4773 *	0.1290	0.1500	0.0994	0.0890	0.1140	0.0936
Water Breakdowns	– 0.0909 *	– 0.0713 *	– 0.1479 *	0.0696	0.0579	0.0592	0.0633	0.0688	0.0678
Toilet Breakdowns	– 0.1571 *	– 0.0954 *	– 0.0770	0.0562	0.0680	0.0268	0.0392	0.0403	0.0294
Sewer Breakdowns	– 0.0869 **	– 0.0835 **	– 0.0188	0.0315	0.0362	0.0145	0.0140	0.0299	0.0198
Inadequate Wiring	– 0.2379 *	– 0.3235 *	– 0.3029 *	0.0337	0.0351	0.0280	0.0241	0.0236	0.0186

Exhibit 15

Structural Quality of Rental Units
Ordinal Probit Coefficients and Means (2 of 2)

Variable Name	Hispanic Coefficients[a, b, c]	African-American Coefficients[a, b, c]	White Coefficients[a, b, c]	Hispanic Low Income Means	African-American Low Income Means	White Low Income Means	Hispanic High Income Means	African-American High Income Means	White High Income Means
Blown Fuses	– 0.0337 **	– 0.0216 ***	– 0.0114	0.1737	0.2661	0.2869	0.2794	0.3426	0.3566
Heating Breakdowns	– 0.0392	– 0.0543 *	– 0.1128 *	0.0464	0.0830	0.0477	0.0319	0.0507	0.0341
Built-in Electric Heat	– 0.0278	– 0.0644 **	– 0.0980 *	0.1916	0.1022	0.1538	0.1445	0.0730	0.1111
Lowest Quality Heat	– 0.0621	– 0.1313 *	– 0.1119 **	0.1056	0.0494	0.0347	0.0711	0.0271	0.0218
Vermin Present	– 0.1541 *	– 0.2194 *	– 0.2194 *	0.1388	0.1737	0.1076	0.1310	0.1258	0.0980
Water Not Safe	– 0.0254	– 0.1820	– 0.2306 *	0.3126	0.1598	0.1203	0.2772	0.1779	0.1115
Rooms to Household Size	0.0876 *	0.0652 *	0.0869 *	1.7766	2.4541	2.7757	1.6911	2.0772	2.5124
Number of observations	8,366	9,764	8,599	6,580	8,325	6,078	1,786	1,439	2,521
Log likelihood fn	– 15621.99	– 18553.46	– 15552.12						
Chi-squared	1184.50	1569.755	1067.849						
Degrees of freedom	22	22	22						

NA = Not applicable.

[a] *Not presented in this table is a set of "threshold" parameters corresponding to n-1 ordinal categories (for example, structural quality has rankings from 0 to 9). Thus, 8 "threshold" parameters (μjs) and one intercept term are estimated. All these parameters are significant at the 1-percent level.*

[b] **, **, and *** represent significance at the 1- , 5- , and 10-percent levels, respectively.*

[c] *In the American Housing Survey data, both structural and neighborhood quality are ordinal rankings with a range of 1 to 10. For the estimation software, the first category needs to be 0. Consequently, the means in this table are based on the normalized rankings between 0 and 9.*

Exhibit 16

Neighborhood Quality of Rental Units
Ordinal Probit Coefficients and Means (1 of 2)

Variable Name	Hispanic Coefficients[a, b, c]	African-American Coefficients[a, b, c]	White Coefficients[a, b, c]	Hispanic Low Income Means	African-American Low Income Means	White Low Income Means	Hispanic High Income Means	African-American High Income Means	White High Income Means
Neighborhood Quality[c]	NA	NA	NA	6.3555	6.0049	6.4717	6.5414	6.3398	6.5593
Intercept	2.9305 *	2.9592 *	3.3706 *	NA	NA	NA	NA	NA	NA
Lowrise Buildings	– 0.1503 *	– 0.1294 *	– 0.1404 *	0.7068	0.7082	0.6757	0.6176	0.6623	0.6283
Midrise Buildings	– 0.0239	0.1165 *	0.1186 *	0.0891	0.1170	0.1158	0.0778	0.0910	0.0881
Highrise Buildings	0.0379	0.0238	0.0741	0.0394	0.0633	0.0456	0.0353	0.0424	0.0325
Mobile Homes	– 0.0146	0.0712	– 0.1587 *	0.0509	0.0237	0.0457	0.0442	0.0229	0.0309
Commercial Buildings	0.0266	0.0268	– 0.0531 **	0.5260	0.5313	0.4808	0.4692	0.4767	0.4038
Parking Lots	0.0329	0.0145	– 0.0581 **	0.4353	0.4532	0.4732	0.3897	0.4225	0.3990
Water	0.0509	0.0564	0.0454	0.0916	0.0897	0.1479	0.1366	0.1508	0.1928
Green Space	0.0884 *	0.0414 **	0.1441 **	0.2553	0.2924	0.3351	0.3007	0.3259	0.3689
Older Buildings	– 0.0558 ***	– 0.0478	– 0.0610 ***	0.1470	0.1398	0.1420	0.1125	0.1070	0.1095
Newer Buildings	0.0963 **	0.1346 *	0.1164 *	0.0676	0.0770	0.0867	0.0829	0.0890	0.0877
Abandoned Buildings	– 0.2049 *	– 0.1731 *	– 0.3060 *	0.0894	0.1594	0.0610	0.0622	0.0952	0.0464
Bars on Windows	0.0297	– 0.0139	– 0.0994 **	0.1655	0.2022	0.0806	0.1305	0.1494	0.0793
Road Repairs Needed	– 0.1839 *	– 0.1592 *	– 0.1848 *	0.4339	0.5032	0.3799	0.3712	0.4315	0.3249
Junk	– 0.3921 *	– 0.4288 *	– 0.4268 *	0.1825	0.2223	0.1436	0.1366	0.1550	0.0889
Crime Problem	– 0.7448 *	– 0.7501 *	– 0.6471 *	0.1626	0.2072	0.1451	0.1450	0.1654	0.1111
Noise Problem	– 0.3295 *	– 0.3939 *	– 0.4389 *	0.1597	0.1886	0.1749	0.1545	0.1564	0.1698
Litter Problem	– 0.1885 **	– 0.1710 *	– 0.2924 *	0.0240	0.0329	0.0196	0.0230	0.0285	0.0167

Exhibit 16

Neighborhood Quality of Rental Units
Ordinal Probit Coefficients and Means (2 of 2)

Variable Name	Hispanic Coefficients[a, b, c]	African-American Coefficients[a, b, c]	White Coefficients[a, b, c]	Hispanic Low Income Means	African-American Low Income Means	White Low Income Means	Hispanic High Income Means	African-American High Income Means	White High Income Means
Poor Services	0.0308	– 0.0589	0.0737	0.0119	0.0222	0.0094	0.0078	0.0097	0.0083
Odor Problem	– 0.1067 **	– 0.2525 *	– 0.2257 *	0.0065	0.0092	0.0059	0.0073	0.0056	0.0075
Property Use Problem	– 0.1767	0.0809	0.0335	0.0590	0.0708	0.0451	0.0504	0.0514	0.0329
Neighbor Problem	– 0.4037 *	– 0.4975 *	– 0.5157 *	0.0622	0.0668	0.0545	0.0588	0.0618	0.0440
Other Problem	– 0.1563 *	– 0.2593 *	– 0.2502 *	0.0886	0.0949	0.0905	0.1086	0.1001	0.0944
Schools Inadequate	– 0.3976 *	– 0.2415 *	– 0.3392 *	0.0281	0.0381	0.0146	0.0269	0.0354	0.0179
Shopping Inadequate	– 0.0431	– 0.1797 *	– 0.0126 *	0.0913	0.1529	0.0944	0.0789	0.1015	0.0651
Public Transit Good	0.0285	– 0.0203	0.0374	0.6480	0.6671	0.4956	0.5588	0.5594	0.4463
Police Inadequate	– 0.2919 *	– 0.3539 *	– 0.3722 *	0.1035	0.1174	0.0548	0.0711	0.0792	0.0389
Number of observations	8,366	9,764	8,599	6,580	8,325	6,078	1,786	1,439	2,521
Log likelihood fn	– 15537.9	– 18439.01	– 15592.07						
Chi-squared	2183.674	3535.939	2309.241						
Degrees of freedom	26	26	26						

NA = Not applicable.

[a] *Not presented in this table is a set of "threshold" parameters corresponding to n-1 ordinal categories (for example, structural quality has rankings from 0 to 9). Thus, 8 "threshold" parameters (μjs) and one intercept term are estimated. All these parameters are significant at the 1-percent level.*

[b] **, **, and *** represent significance at the 1- , 5- , and 10-percent levels, respectively.*

[c] *In the American Housing Survey data, both structural and neighborhood quality are ordinal rankings with a range of 1 to 10. For the estimation software, the first category needs to be 0. Consequently, the means in this table are based on the normalized rankings between 0 and 9.*

Based on mean values, Hispanic and African-American households that rent report higher levels of police inadequacy, poorer roads, and abandoned buildings; these results are similar to those for owners. In particular, for both lower and higher income renters, approximately twice as many renter households felt police protection was inadequate compared with owners. For low-income renters, this proportion amounted to 10.4 percent for Hispanics, 11.7 percent for African Americans, and only about 5.5 percent for Whites. Regarding road repairs, for low-income renters, 43.4 percent of Hispanics and 50.3 percent of African Americans said roads in their neighborhoods were in need of repair, but only 38.0 percent of Whites reported that need. Almost 16 percent of low-income African-American renters have abandoned buildings in their neighborhoods, but only 8.9 percent of Hispanic and 6.1 percent of White low-income renters note a similar problem in their neighborhoods.

The study shows a remarkable consistency between owners and renters regarding the basic factors that play a role in affecting the quality of their housing experience regarding both structure and neighborhood. In simple terms, this result suggests that to implement sound housing policy, policymakers can concentrate on a consistent set of housing and neighborhood factors. In addition, differences in a number of key characteristics, for both owners and renters, suggest ways in which gaps between minority and White housing circumstances could be improved. In particular, both lower income African-American and Hispanic households' housing experiences could be better if major structural problems and interior deterioration could be reduced. Such a goal is consistent with stricter building code enforcement, perhaps through point-of-turnover inspection requirements and/or tax incentive programs, which encourage maintenance and improvements. Similarly, for both minority groups, implementing programs to improve relations with the police and reduce crime could help reduce the gap between their perceived problems in these areas and the perceptions of White households regarding crime problems. In addition, accessible green spaces and fewer abandoned buildings would also enhance minority households' perceptions of their neighborhoods. For lower income Hispanic households' perceptions of housing quality to be on a par with those of other racial/ethnic groups, problems with poor-quality water need to be addressed, crowded conditions need to be overcome, and inadequate heating systems need to be improved.

Conclusions

A substantial amount of recent academic and policy research has been conducted in an attempt to understand how to expand the homeownership opportunities for minority households. What becomes quite clear from this literature is that, in addressing this question from a policy perspective, analysts and policymakers need to develop a better understanding of differences in the housing situations faced by households with different racial/ethnic backgrounds (that is, Hispanic, African-American, and White backgrounds). These stakeholders need to understand how much better the quality of housing services is when provided by owned housing as compared with rental housing, and what it is specifically about households' housing situations that prompts observed differences in the perceived quality of the housing services they receive. In addition, analysts and policymakers need to gain an understanding of how perceptions of service quality differ for Hispanic households as compared with other households.

One key to better understanding Hispanics' circumstances relative to those of other race/ethnicities is finding enough Hispanic households to observe. To this end, using a set of recent standard metropolitan statistical area samples of the American Housing Survey provided many more Hispanic households (17,968 full sample and 6,446 recent movers) than previously available in other data sets with extensive housing information. In this context, this study investigates several ways in which housing circumstances differ for Hispanics as compared with other racial/ethnic groups across a number of different housing markets.

Our preliminary analysis of housing quality, size, and cost in exhibits 1a and 1b yields several observations:

- Irrespective of either minority status or income level, the primary differential in both perceived neighborhood quality and housing quality stems from ownership status. Owners clearly perceive their situation as better than renters do. As shown for the quality dimensions of structure and neighborhood in exhibit 1a, the difference between owners and renters appears particularly important for the structural quality of the housing unit (as compared with the quality of the neighborhood). Given this situation, it is not surprising that renters' housing situations are categorized as inadequate more often than those of owners.
- Low-income households, particularly Hispanics, experience the largest differentials between renters' and owners' average rankings of neighborhood and dwelling structural quality. For low-income Hispanics, average structural quality ranges from 8.36 for owners to 7.39 for renters; for neighborhood quality, the figures are 8.02 for owners and 7.34 for renters.
- White households have a higher proportion of homeownership, White owners have higher house values, and White renters have higher rental costs than comparable minority households have.
- Hispanic households, particularly low-income households, have higher levels of mortgage debt than White households do. Given the fact that their house values are lower than Whites, this trend suggests a substantial difference in borrowing and/or loan terms for Hispanics.
- Hispanic households appear to be much more crowded than other households and, as with African-American households, pay substantially more in housing cost per square foot than White households do.
- In this sample, housing outcomes are generally worse for African-American households than they are for Hispanic households. Specifically, both high- and low-income African-American households are observed to have slightly lower rates of ownership and substantially lower valued homes and lower rents compared with high- and low-income Hispanic households.

The assessment of quality does not, of course, occur within a vacuum but rather within the context of basic household decisions regarding homeownership and the amount to spend on an apartment or an owned home. To place the results for housing quality within both the context of the literature and our data, we also analyzed the likelihood of homeownership for Hispanic households and their pattern of housing values and rents. For example, as noted in the literature, different racial/ethnic groups may have different understandings of, access to, and proclivity to

use financial markets and institutions for both saving and borrowing. For Hispanic households, differentials in socioeconomic factors could have a significant effect on the timing and likelihood of homeownership and the level of housing values and rents. Our results suggest systematic problems for minority households, including the following:

- It is important to note that minority households have a lower likelihood of owning, lower house value for owners, and lower rental costs for renters compared with White households, controlling for the socioeconomic characteristics of the household and the market in which these housing choices were made.
- Even though house value is lower for Hispanic homeowners compared with White homeowners, Hispanics' associated monthly housing cost is higher. This trend is particularly true for low-income owners. This observation suggests some significant differentials in factors such as loan-to-value ratios and/or other mortgage terms, points, fees, and so on. Of course, these issues can be examined directly with the AHS. Such a comparison of mortgage characteristics across racial groups using the same AHS database is the subject of another article that is part of this research project (Boehm and Schlottman, 2007).
- For the full sample, which, in comparison with recent movers, represents housing and mortgage market decisions made over a longer period of time, Hispanic owners (particularly low-income owners) have relatively high mortgage debt on owned units compared with other households. In this regard, however, recent Hispanic movers do better; that is, their average level of debt is much closer to that of their White counterparts. This observation raises the question of whether this outcome may be related to differentials in home financing related to junior mortgages, home equity loans, refinancing loans, less financial expertise in obtaining loans, and so on. Specifically, do mortgage terms and the use of mortgage financing differ between Hispanic households and other racial/ethnic households?
- Recent immigrants are significantly less likely to be owners and, when they rent, they have significantly lower rental payments. If recent immigrants achieve ownership, however, their expenditure levels do not appear to be substantially different than other households who have not recently immigrated.
- On a positive note, rent subsidies had a significant effect on lowering rents for low-income households. In the regression analysis of rent levels, rent subsidies had coefficient estimates that were negative and statistically significant for both recent movers and the full sample of households.
- The results for households' assessments of both structural quality and neighborhood quality are important for housing policy in that a fundamental unanimity exists regarding the characteristics that define quality.

In general, all households react in a similar manner to structural problems with their owner-occupied homes. Having external leaks, internal leaks, vermin problems, major structural problems, interior deterioration, and so on, is viewed as lowering the quality of housing. For example, households that are on public sewer systems with well-functioning toilets and other satisfactorily working plumbing and that have central heating systems instead of space heaters perceive their housing

to be of higher quality than that of households without these services. Although these statements might seem predictable, the results shown in exhibit 13 generally dispel any notion of significant household differences in housing quality perceptions. To summarize, American households agree on what defines good-quality housing.

Substantial differences are apparent, however, in the mean quality levels by individual characteristics for households across minority status. Issues of poor water quality are much worse for Hispanic households than for African-American or White households. Similarly, low-income Hispanic households face more crowding and are more likely to have the poorest quality heating. Also, the deterioration of interior facilities (that is, cracks, holes in walls or ceilings, holes in the floor, or broken plaster or peeling paint) and major structural problems appear much worse for minority households than for White households.

Similar comments regarding structural quality are applicable to the results for determinants of neighborhood quality. Again, the results for neighborhood quality are consistent across households by minority status in defining a good neighborhood versus a bad neighborhood. Crime problems, litter problems, noise problems, roads in need of repair, junk and abandoned buildings, and so on, create undesirable neighborhoods. A neighborhood with green space, newer buildings, and similar amenities is more desirable. Once again, American households in general seem to agree on what makes good neighborhoods. As with structure, however, a few substantial differences are apparent in neighborhood characteristics across racial/ethnic groups. Most notably, crime and inadequate police protection are more likely to be perceived by African Americans and Hispanics, particularly those who have lower incomes. For those who own their homes, green space is less likely to be near minority-owned homes. Consistent with their greater tendency to live in inner-city locations, both African-American owners and renters are more likely to have abandoned buildings nearby. Finally, minority renters appear to be located in neighborhoods in which road repairs are more likely to be a concern.

In summary, although Hispanic and African-American households' housing experience is not as positive yet as that of their White counterparts, this analysis has demonstrated more specifically the exact magnitude and nature of those differences for a relatively large cross-section of households. Developing a better understanding of the specifics of such differences will improve our ability to take actions that promote equal housing opportunities for all Americans.

Appendix A
List of Standard Metropolitan Statistical Areas in the American Housing Survey for 1998, 2002, and 2004

Exhibit A-1

American Housing Survey SMSA Sample Information

Sample Year	SMSA Code	SMSA Name	SMSA Median Income ($)
2004	0520	Atlanta, GA	69,000
2004	1680	Cleveland, OH	59,900
2004	2080	Denver, CO	69,500
2004	3280	Hartford, CT	73,900
2004	3480	Indianapolis, IN	63,800
2004	4920	Memphis, TN-AR	54,100
2004	5560	New Orleans, LA	49,900
2004	5880	Oklahoma City, OK	52,100
2004	6280	Pittsburgh, PA	55,100
2004	6920	Sacramento, CA	64,100
2004	7040	St. Louis, MO-IL	65,900
2004	7240	San Antonio, TX	51,500
2004	7600	Seattle-Everett, WA	71,900
2002	0360	Anaheim-Santa Ana-Garden Grove, CA	75,600
2002	1280	Buffalo, NY	50,800
2002	1520	Charlotte, NC	64,100
2002	1840	Columbus, OH	63,400
2002	1920	Dallas, TX	66,500
2002	2800	Fort Worth, TX	61,300
2002	3760	Kansas City, MO-KS	64,500
2002	5000	Miami, FL	48,200
2002	5080	Milwaukee, WI	67,200
2002	6200	Phoenix, AZ	57,900
2002	6440	Portland, OR-WA	57,200
2002	7280	San Bernardino-Riverside-Ontario, CA	50,300
2002	7320	San Diego, CA	60,100
1998	0720	Baltimore, MD	55,600
1998	1000	Birmingham, AL	44,000
1998	1120	Boston, MA	60,000
1998	1640	Cincinnati, OH-KY-IN	51,500
1998	3360	Houston, TX	50,400
1998	5120	Minneapolis-St. Paul, MN	60,800
1998	5680	Newport News-Hampton, VA	44,600
1998	5775	Oakland, CA*	63,300
1998	6480	Providence-Pawtucket-Warwick, RI-MA	46,900
1998	6840	Rochester, NY	48,800
1998	7160	Salt Lake City, UT	48,200
1998	7360	San Francisco, CA *	68,600
1998	7400	San Jose, CA	77,200
1998	8280	Tampa-St. Petersburg, FL	42,000
1998	8840	Washington, DC-MD-VA	72,300

SMSA = standard metropolitan statistical area.

** Although Oakland, CA and San Francisco, CA are one SMSA, HUD has split them into two separate American Housing Survey metropolitan samples and assigned them the SMSA codes shown.*

Appendix B
Selected Regression Exhibits for the American Housing Survey Sample 2002 and 2004: Time Spent in the United States

Exhibit B-1

Sample: All Households in 2002 and 2004
Regression Coefficients and Significance[a, b, c] (1 of 2)

Variable Name	Low Income, P(Own)	High Income, P(Own)	Low-Income Owner, House Value[d]	High-Income Owner, House Value[d]	Low-Income Owner, Housing Cost	High-Income Owner, Housing Cost	Low-Income Renter, Rent	High-Income Renter, Rent
Own Home	NA	NA	NA	NA	NA	NA	NA	NA
Intercept	– 0.93807 *	1.3472 *	260.5866 *	297.9933 *	467.2980 *	835.0965 *	749.1402 *	1186.8850 *
Rent Subsidy	NA	NA	NA	NA	NA	NA	– 26.5670 *	– 103.5764 ***
Total Mortgage Payments	NA	NA	NA	NA	0.9271 *	0.7921 *	NA	NA
Unit—Condominium	NA	NA	NA	NA	– 38.7510 **	– 157.5712 *	NA	NA
Unit—Owned Manufactured	NA	NA	NA	NA	112.1992 *	– 111.8529 *	NA	NA
High School Graduate	0.13110 *	0.2485 *	10.6687 *	14.8738 *	NA	NA	31.6601 *	88.6468 *
Post High School	0.20977 *	0.4138 *	21.4922 *	27.3006 *	NA	NA	69.6483 *	130.3886 *
College Graduate	0.43251 *	0.7140 *	62.7798 *	79.6498 *	NA	NA	116.0044 *	228.5309 *
Single Female	– 0.78937 *	– 1.1302 *	– 20.9859 *	– 35.4732 *	NA	NA	7.7141	– 32.0119 **
Single Male	– 0.97450 *	– 1.5390 *	– 25.3775 *	– 21.6512 *	NA	NA	– 12.3569 ***	– 43.8872 *
Household Size	0.09292 *	0.0753 *	3.3776 *	4.6903 *	NA	NA	29.8159 *	31.9178 *
Hosuehold Income	0.37088 *	0.0179 *	2.1299 **	3.2234 *	NA	NA	31.7760 *	1.2966 *
Age 24 or Less	– 1.71783 *	– 1.6312 *	30.1190 *	3.8044	NA	NA	31.8218 *	– 16.5469 *
Age 25–44	– 0.84239 *	– 0.8045 *	– 0.2646	– 7.0191 **	NA	NA	– 0.4523	– 20.7899 *
Age 62 or More	1.15089 *	0.6484 *	8.7331 *	15.5786 *	NA	NA	27.1972 *	81.5269 *
Savings 25K or More	1.23352 *	10.5870	29.8835 *	69.0976	NA	NA	162.1297 *	NA
African-American	– 0.74192 *	– 0.6794 *	– 20.7580 *	– 36.3103 *	NA	NA	– 53.8819 *	– 97.2112 *
White Hispanic	– 0.51505 *	– 0.4069 *	– 21.4140 *	– 24.4089 *	NA	NA	– 61.3960 *	– 78.5908 *
Non-White Hispanic	– 0.76231 *	– 0.6482 *	– 26.5512 *	– 43.9960 *	NA	NA	– 66.0189 *	– 146.4973 *
Number of Years in Residence	NA	NA	0.0756	– 1.2049 *	NA	NA	– 5.8669 *	– 14.7361 *

Exhibit B-1

Sample: All Households in 2002 and 2004
Regression Coefficients and Significance[a, b, c] (2 of 2)

Variable Name	Low Income, P(Own)	High Income, P(Own)	Low-Income Owner, House Value[d]	High-Income Owner, House Value[d]	Low-Income Owner, Housing Cost	High-Income Owner, Housing Cost	Low-Income Renter, Rent	High-Income Renter, Rent
First-Time Owner	NA	NA	27.4957 *	66.1191 *	NA	NA	NA	NA
Less Than 5 Years in United States	– 0.73896 *	– 0.9279 *	– 9.9162	0.4730	NA	NA	– 38.2796 *	– 97.8302 *
5–12 Years in United States	– 0.42444 *	– 0.4859 *	– 7.5731	– 7.3579	NA	NA	– 26.2431 *	– 64.3877 **
13–22 Years in United States	0.06040	0.0426	– 7.3530	6.9505	NA	NA	– 17.0748	– 69.7892 **
23 Years or More in United States	0.30797 *	0.3750 *	4.1590	0.9481	NA	NA	– 12.6175	– 5.9086
R^2	0.21946[e]	0.16186[e]	0.27400	0.31670	0.57830	0.59900	0.26850	0.30890
Number of observations	26,476	19,723	12,389	15,700	12,484	16,180	13,992	3,543

NA = Not applicable.

[a] The P(Own) equations were estimated using logit analysis.

*[b] *, **, and *** represent significance at the 1- , 5- , and 10-percent levels, respectively.*

[c] All regressions include discrete variables indicating in which of 41 standard metropolitan statistical areas (SMSAs) the housing units were located (over the 3-year time period: 1998, 2002, and 2004). For a complete list of these SMSAs, see appendix A.

[d] House value in thousand dollar units.

[e] For the logit equations, the R^2 is computed as 1- (unrestricted 1n likelihood function/restricted 1n likelihood function).

Exhibit B-2

Sample: Recent Movers in 2002 and 2004
Regression Coefficients and Significance[a, b, c] (1 of 2)

Variable Name	Low Income, P(Own)	High Income, P(Own)	Low-Income Owner, House Value[d]	High-Income Owner, House Value[d]	Low-Income Owner, Housing Cost	High-Income Owner, Housing Cost	Low-Income Renter, Rent	High-Income Renter, Rent
Intercept	– 2.9225 *	0.04901	241.3872 *	290.7388 *	461.4482 *	588.8785 *	794.3608 *	1214.8268 *
Rent Subsidy	NA	NA	NA	NA	NA	NA	– 8.2941	– 146.6555 ***
Total Mortgage Payments	NA	NA	NA	NA	0.9582 *	1.0094 *	NA	NA
Unit—Condominium	NA	NA	NA	NA	– 17.3624	– 43.1631	NA	NA
Unit—Owned Manufactured	NA	NA	NA	NA	134.9881 *	100.5689 ***	NA	NA
High School Graduate	0.1318	0.24007 ***	6.9391	18.3246	NA	NA	25.6676 *	121.9683 *
Post High School	0.2585 *	0.27938 **	25.4592 *	36.8824 *	NA	NA	68.5882 *	160.6264 *
College Graduate	0.6124 *	0.73281 *	51.1914 *	78.0295 *	NA	NA	110.4100 *	264.4750 *
Single Female	– 0.6385 *	– 1.07405 *	– 27.1984 *	– 38.7168 *	NA	NA	8.3580	– 40.7509 **
Single Male	– 0.9046 *	– 1.32240 *	– 25.6838 *	– 20.4932 **	NA	NA	– 9.7115	– 43.8524 **
Household Size	0.1263 *	0.05309 **	1.8553	12.2060 *	NA	NA	35.2973 *	49.5141 *
Hosuehold Income	0.4455 *	0.00849 **	1.1981	5.7208 *	NA	NA	28.7280 *	1.5382 *
Age 24 or Less	– 1.0926 *	– 0.74512 *	3.5019	– 21.7522	NA	NA	16.1503 ***	– 17.9498
Age 25–44	– 0.3189 *	– 0.20922 *	– 7.0459	– 18.0600 **	NA	NA	3.8745	– 20.6127
Age 62 or More	0.8506 *	0.36176 ***	– 1.8535	– 13.5326	NA	NA	32.8029 **	56.5439
Savings 25K or More	0.7376 *	11.02229	62.9920 *	281.0762 **	NA	NA	147.7788 *	NA
African-American	– 0.6716 *	– 0.37539 *	– 16.4175 **	– 24.2182 *	NA	NA	– 57.4875 *	– 109.1982 *
White Hispanic	– 0.6052 *	– 0.25999 *	– 39.8952 *	– 20.9416 **	NA	NA	– 65.1228 *	– 77.1629 *
Non-White Hispanic	– 0.3632 *	– 0.20809 ***	– 28.4852 *	– 44.9420 *	NA	NA	– 66.8850 *	– 150.6409 *
Number of Years in Residence	NA	NA	– 3.9505	– 14.0587 *	NA	NA	– 7.3104 ***	– 23.8713 **
First-Time Owner	NA	NA	22.9903 *	41.7715 *	NA	NA	NA	NA
Owned Prior to Move	0.8715 *	0.95431 *	11.8052 ***	44.7192 *	NA	NA	25.3926 *	42.9647 **

Exhibit B-2

Sample: Recent Movers in 2002 and 2004
Regression Coefficients and Significance[a, b, c] (2 of 2)

Variable Name	Low Income, P(Own)	High Income, P(Own)	Low-Income Owner, House Value[d]	High-Income Owner, House Value[d]	Low-Income Owner, Housing Cost	High-Income Owner, Housing Cost	Low-Income Renter, Rent	High-Income Renter, Rent
Less Than 5 Years in United States	– 0.1895	– 0.40923 *	– 1.1540	– 4.4248	NA	NA	– 63.6214 *	– 97.6543 *
5–12 Years in United States	0.1502	– 0.11495	– 3.6726	– 2.6956	NA	NA	– 36.2107 *	– 41.7562
13–22 Years in United States	0.4860 *	0.28948	5.6428	– 15.8701	NA	NA	– 20.8422	– 67.6456
23 Years or More in United States	0.4204 **	0.36927	30.4118 **	– 10.2522	NA	NA	– 23.1130	– 35.6294
R^2	0.17793 [e]	0.14900	0.27080 [e]	0.34970	0.74710	0.83630	0.28360	0.33390
Number of observations	9,244	4,997	1,817	2,626	1,839	3,050	7,405	1,947

NA = Not applicable.

[a] The P(Own) equations were estimated using logit analysis.

*[b] *, **, and *** represent significance at the 1- , 5- , and 10-percent levels, respectively.*

[c] All regressions include discrete variables indicating in which of 41 standard metropolitan statistical areas (SMSAs) the housing units were located (over the 3-year time period: 1998, 2002, and 2004). For a complete list of these SMSAs, see appendix A.

[d] House value in thousand dollar units.

[e] For the logit equations, the R^2 is computed as 1- (unrestricted 1n likelihood function/restricted 1n likelihood function).

Exhibit B-3

Sample: All Households in 2002 and 2004
Variable Means and Effect of Variables on the Likelihood of Homeownership (1 of 2)

Panel A: Low-Income Households					
Variable Name	Sample Mean			$Pr(Own)_{African\text{-}American}$ Minus $Pr(Own)_{White}$ [a, b] (%)	$Pr(Own)_{Hispanic}$ Minus $Pr(Own)_{White}$ [a, b] (%)
	White	African-American	Hispanic		
Own Home	0.62133	0.36959	0.39590	NA	NA
Intercept	NA	NA	NA	NA	NA
High School Graduate	0.30008	0.30927	0.26118	0.064	– 0.273
Post High School	0.31375	0.30715	0.19832	– 0.074	– 1.296
College Graduate	0.22372	0.11500	0.09002	– 2.519	– 3.097
Single Female	0.43903	0.58020	0.31082	– 5.940	5.436
Single Male	0.23942	0.22660	0.19375	0.668	2.384
Household Size	1.89741	2.36042	3.13337	2.299	6.152
Household Income	2.60348	2.17358	2.48295	– 8.524	– 2.400
Age 24 or Less	0.06735	0.08325	0.09385	– 1.464	– 2.438
Age 25–44	0.28580	0.43309	0.51926	– 6.657	– 10.524
Age 62 or More	0.39123	0.18944	0.15559	– 12.453	– 14.521
Savings 25K or More	0.07606	0.01047	0.01593	– 4.334	– 3.974
African-American	0.00000	1.00000	0.00000	– 38.766	0.000
White Hispanic	0.00000	0.00000	0.68400	0.000	– 23.282
Non-White Hispanic	0.00000	0.00000	0.31600	0.000	– 33.618
Less Than 5 Years in United States	0.00749	0.01811	0.16473	– 0.421	– 6.211
5–12 Years in United States	0.00770	0.01834	0.13966	– 0.242	– 2.997
13–22 Years in United States	0.00628	0.01646	0.10780	0.033	0.328
23 Years or More in United States	0.02978	0.01023	0.10027	– 0.322	1.163
All metropolitan areas[c]				9.092	0.548
Number of observations	9,874	8,504	8,098		

Exhibit B-3

Sample: All Households in 2002 and 2004
Variable Means and Effect of Variables on the Likelihood of Homeownership (2 of 2)

Panel B: High-Income Households					
Variable Name	Sample Mean			$Pr(Own)_{African\text{-}American}$ Minus $Pr(Own)_{White}$ [a, b] (%)	$Pr(Own)_{Hispanic}$ Minus $Pr(Own)_{White}$ [a, b] (%)
	White	African-American	Hispanic		
Own Home	0.87049	0.75728	0.75998	NA	NA
Intercept	NA	NA	NA	NA	NA
High School Graduate	0.18327	0.20717	0.22205	0.080	0.130
Post High School	0.30449	0.35806	0.31946	0.298	0.084
College Graduate	0.46760	0.34127	0.28655	– 1.212	– 1.762
Single Female	0.13374	0.24328	0.11178	– 1.728	0.328
Single Male	0.14801	0.14698	0.13580	0.022	0.253
Household Size	2.85843	3.11422	3.60356	0.262	0.752
Household Income	11.62895	9.58385	9.89870	– 0.495	– 0.418
Age 24 or Less	0.01537	0.02464	0.02591	– 0.204	– 0.232
Age 25–44	0.42645	0.49720	0.57291	– 0.761	– 1.610
Age 62 or More	0.12914	0.08567	0.06771	– 0.380	– 0.539
Savings 25K or More	0.00018	0.00028	0.00095	0.014	0.109
African-American	0.00000	1.00000	0.00000	– 10.714	0.000
White Hispanic	0.00000	0.00000	0.74579	0.000	– 5.266
Non-White Hispanic	0.00000	0.00000	0.25421	0.000	– 9.066
Less Than 5 Years in United States	0.00644	0.01316	0.08436	– 0.083	– 0.987
5–12 Years in United States	0.00801	0.01960	0.08133	– 0.076	– 0.483
13–22 Years in United States	0.00884	0.02492	0.07963	0.009	0.041
23 Years or More in United States	0.01997	0.01764	0.08057	– 0.012	0.305
All metropolitan areas[c]				1.082	– 1.147
Number of observations	10,864	3,572	5,287		

NA = Not applicable.

[a] Probabilities are calculated at the means for the entire sample (all Whites, African-Americans, and Hispanics) except for the variable in question, which is evaluated at the mean for the denoted minority group and Whites, respectively.

[b] $Pr(Own) = 1 / (1 – e^{-X\beta})$, where Xß = a vector representing the sum of the product individual independent variable values (Xs) and estimated coefficients (ßs). $Pr(Own)_{minority}$ = the probability of owning given all the variables in the regression are evaluated at the overall sample mean except the particular variable in question, which is evaluated at the mean for the minority households. $Pr(Own)_{White}$ = the probability of owning given all the variables in the regression are evaluated at the overall sample mean except the particular variable in question, which is evaluated at the mean for the white households. $Pr(Own)_{minority} – Pr(Own)_{White}$ is expressed as a percentage of Pr(Own), the predicted average likelihood of ownership calculated at the mean for the mean for the overall sample. Thus, if for a given variable, xj, $Pr(Own)_{minority} = 0.40$ and $Pr(Own)_{White} = 0.45$ and Pr(Own) = 0.42, then the calculation for variable xj is [(0.40 – 0.45) /0.42] x 100 = 11.9 percent.

[c] "All metropolitan areas" represents the cumulative impact of a set of categorical variables corresponding to the different SMSAs in which the households are located.

Exhibit B-4

Sample: Recent Movers in 2002 and 2004
Variable Means and Effect of Variables on the Likelihood of Homeownership (1 of 2)

Panel A: Low-Income Households					
Variable Name	Sample Mean			$Pr(Own)_{African\text{-}American}$ Minus $Pr(Own)_{White}$[a, b] (%)	$Pr(Own)_{Hispanic}$ Minus $Pr(Own)_{White}$[a, b] (%)
	White	African-American	Hispanic		
Own Home	0.28587	0.13251	0.19182	NA	NA
Intercept	NA	NA	NA	NA	NA
High School Graduate	0.26256	0.31957	0.27820	0.641	0.176
Post High School	0.35652	0.33898	0.21088	– 0.390	– 3.202
College Graduate	0.26402	0.11525	0.08177	– 7.914	– 9.627
Single Female	0.46249	0.61418	0.31817	– 7.993	8.129
Single Male	0.31755	0.24468	0.23025	5.552	6.683
Household Size	1.94792	2.42958	3.13987	5.030	12.853
Household Income	2.64539	2.11357	2.47053	– 20.113	– 6.987
Age 24 or Less	0.18318	0.15747	0.17522	2.398	0.737
Age 25–44	0.46103	0.56857	0.60467	– 2.948	– 3.922
Age 62 or More	0.13693	0.05239	0.04580	– 6.206	– 6.677
Savings 25K or More	0.03423	0.00431	0.00769	– 1.887	– 1.676
Owned Prior to Move	0.33758	0.18367	0.18598	– 11.660	– 11.493
African-American	0.00000	1.00000	0.00000	– 53.615	0.000
White Hispanic	0.00000	0.00000	0.63172	0.000	– 43.064
Non-White Hispanic	0.00000	0.00000	0.36828	0.000	– 18.601
Less Than 5 Years in United States	0.01092	0.02681	0.20873	– 0.259	– 3.188
5–12 Years in United States	0.01165	0.02496	0.15955	0.170	1.899
13–22 Years in United States	0.01020	0.01572	0.08884	0.227	3.271
23 Years or More in United States	0.01493	0.00555	0.04857	– 0.335	1.209
All metropolitan areas[c]				10.607	5.458
Number of observations	2,746	3,245	3,253		

Exhibit B-4

Sample: Recent Movers in 2002 and 2004
Variable Means and Effect of Variables on the Likelihood of Homeownership (2 of 2)

Panel B: High-Income Households					
Variable Name	Sample Mean			$Pr(Own)_{African\text{-}American}$ Minus $Pr(Own)_{White}$ [a, b] (%)	$Pr(Own)_{Hispanic}$ Minus $Pr(Own)_{White}$ [a, b] (%)
	White	African-American	Hispanic		
Own Home	0.66278	0.55118	0.56871	NA	NA
Intercept	NA	NA	NA	NA	NA
High School Graduate	0.17152	0.20472	0.22799	0.291	0.494
Post High School	0.30225	0.37303	0.32742	0.720	0.257
College Graduate	0.48210	0.34843	0.27866	– 3.554	– 5.446
Single Female	0.15612	0.24409	0.14123	– 3.476	0.580
Single Male	0.24938	0.19980	0.20963	2.389	1.919
Household Size	2.68984	3.00591	3.44142	0.613	1.454
Household Income	11.15228	9.87937	8.73692	– 0.394	– 0.749
Age 24 or Less	0.04788	0.05315	0.06016	– 0.143	– 0.334
Age 25–44	0.63031	0.67323	0.70044	– 0.327	– 0.535
Age 62 or More	0.04455	0.02953	0.02217	– 0.198	– 0.295
Savings 25K or More	0.00042	0.00000	0.00063	– 0.167	0.087
Owned Prior to Move	0.48834	0.31791	0.34642	– 5.938	– 4.927
African-American	0.00000	1.00000	0.00000	– 14.033	0.000
White Hispanic	0.00000	0.00000	0.68524	0.000	– 8.861
Non-White Hispanic	0.00000	0.00000	0.31476	0.000	– 5.613
Less Than 5 Years in United States	0.01207	0.01476	0.13300	– 0.040	– 1.809
5–12 Years in United States	0.00958	0.02657	0.09816	– 0.071	– 0.372
13–22 Years in United States	0.00791	0.02362	0.07220	0.166	0.678
23 Years or More in United States	0.01707	0.01280	0.04180	– 0.058	0.333
All metropolitan areas[c]				2.434	– 0.553
Number of observations	2,402	1,016	1,579		

NA = Not applicable.

[a] Probabilities are calculated at the means for the entire sample (all Whites, African-Americans, and Hispanics) except for the variable in question, which is evaluated at the mean for the denoted minority group and Whites, respectively.

[b] $Pr(Own) = 1 / (1 – e^{-X\beta})$, where Xß = a vector representing the sum of the product individual independent variable values (Xs) and estimated coefficients (ßs). $Pr(Own)_{minority}$ = the probability of owning given all the variables in the regression are evaluated at the overall sample mean except the particular variable in question, which is evaluated at the mean for the minority households. $Pr(Own)_{White}$ = the probability of owning given all the variables in the regression are evaluated at the overall sample mean except the particular variable in question, which is evaluated at the mean for the white households. $Pr(Own)_{minority} – Pr(Own)_{White}$ is expressed as a percentage of Pr(Own), the predicted average likelihood of ownership calculated at the mean for the mean for the overall sample. Thus, if for a given variable, xj, $Pr(Own)_{minority} = 0.40$ and $Pr(Own)_{White} = 0.45$ and Pr(Own) = 0.42, then the calculation for variable xj is [(0.40 – 0.45) /0.42] x 100 = 11.9 percent.

[c] "All metropolitan areas" represents the cumulative impact of a set of categorical variables corresponding to the different SMSAs in which the households are located.

Appendix C
Assumptions Underlying Models Interpreting American Housing Survey 10-Point Satisfaction Scale as Ordinal Utility Level

The American Housing Survey (AHS) 10-point scale is interpreted to be an ordinal utility index.

Assuming that utility functions are strongly separable, the *j* th household's utility from its dwelling (U_j^N) can be expressed as a function of individual structural attributes ($X_i i = 1, \ldots, k$),

$$U_j^{NG} = u_j (X_1 \ldots . , X_k) \; (j = 1, \ldots , s), \tag{1}$$

where *G* represents a group identification variable. We hypothesize homogenous preference functions for households within a particular group but permit these functions to differ among groups. The utility function for households within the same group then can be defined over the set of structural attributes and, assuming it is linear in its parameters, can be expressed as

$$U_j^{NG} = u_j^G (\mathbf{X}) = \Sigma \beta_i X_{ij} + \varepsilon_j , \tag{2}$$

with the stochastic term ε_j accounting for the influence of unobserved attributes of the neighborhood and random deviations in preferences from the average of the subgroup. It is assumed that the ε_j are distributed normally ($N(0, \sigma^2 I)$).

In principle, the ordinary least-squares (OLS) regression model could be employed to estimate the relationship between utility and observed structural attributes. This model assumes an interval-level dependent variable, however, which would require a cardinal measure of utility.

Such a measure is not available; however, our data do provide an ordinal version of U_j^N for which the OLS model is satisfied. Households were asked to rank the overall quality of their dwelling on a 10-point scale, with "1" indicating worst and "10" best. We assume that greater utility levels from either the structure or the neighborhood are concomitant with higher rankings. This quality ranking therefore provides a utility measure of ordinal strength, namely I.

An estimating equation using I_j in lieu of U_j^N as the dependent variable can be derived by first noting that in the general case, if there are Z distinct structure/neighborhood rankings (R_m, $m = 1, \ldots, Z$), there must be Z + 1 hypothetical category boundaries (α_m, $m = 0, \ldots, Z$) such that the j_{it} household ranks its dwelling or neighborhood as a "1" (R_1) if $\alpha_0 < U_j^N < \alpha_1$ as a "2" (R_2) if $\alpha_1 < U_j^N < \alpha_2$, etc. In other words, we observe the *m*th ranking if the true (but nonobservable) value of cardinal utility falls within that category's boundaries (α_{m-1}, α_m). Because it has been assumed that U_j^N is normally distributed, the probability of observing the *m*th rank by the *j*th household can be expressed as

$$P(R_{mj}) = F[(U_j^N - \alpha_{m-1})/ \sigma] - F[(U_j^N - \alpha_m)/ \sigma] \tag{3}$$

where *F* is the cumulative standard normal density function. Following the convention of setting $\alpha_0 = -\infty$, $\alpha_1 = 0$, and $\sigma^2 = 1$ and substituting from (2), then (3) can be rewritten as

$$P(R_{mj}) = F[\Sigma \beta_i X_{ij} - \alpha_{m-1}] - F[\Sigma \beta_i X_{ij} - \alpha_m]. \tag{4}$$

Equation (4) estimates the conditional probability of observing a particular structure or neighborhood ranking. McKelvey and Zavoina (1975) have provided a model (namely, N-chotomous multivariate probit) that simultaneously provides estimates of the β and α vectors of (4) that are minimum variance and consistent. Furthermore, because the parameter estimates are obtained by maximum likelihood techniques, they are known to be asymptotically normally distributed, allowing for standard statistical tests.[29]

Acknowledgments

The authors acknowledge the financial assistance of the U.S. Department of Housing and Urban Development (HUD) in supporting this research. The authors thank Chris Herbert and anonymous reviewers from HUD for helpful suggestions in developing the research concept of this article.

Authors

Thomas P. Boehm is a professor of finance and Regions Bank Scholar at The University of Tennessee.

Alan Schlottmann is a professor of economics at the University of Nevada, Las Vegas and a senior research fellow at Claremont Graduate University.

References

Belsky, Eric S., and Mark Duda. 2002. "Asset Appreciation, Timing of Purchase and Sales, and Returns to Low-Income Homeownership." In *Low-Income Homeownership: Examining the Unexamined Goal,* edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: Brookings Institution Press.

Boehm, Thomas P. 1993. "Income, Wealth Accumulation, and First Time Homeownership: An Intertemporal Analysis," *Journal of Housing Economics* 8: 217–232.

Boehm, Thomas P., and Keith R. Ihlanfeldt. 1991. "The Revelation of Neighborhood Preferences: An N-Chotomous Multivariate Probit Approach," *Journal of Housing Economics* 1 (1): 33–59.

Boehm, Thomas P., and Alan M. Schlottmann. 2007. "Mortgage Pricing Differentials Across Hispanic, African-American, and White Households: Evidence From the American Housing Survey," *Cityscape* 9 (2): 93–136.

———. 2004. "The Dynamics of Race, Income, and Homeownership," *Journal of Urban Economics* 55: 113–130.

[29] In surveys such as the AHS, household responses are preferences as expressed by an ordinal ranking. In this regard, the "unit distance" between the set of observed values (as contrasted to traditional statistical analyses of metric data) is not significant. Thus, the estimation procedure uses an additional set of "variables" (break points) that merely preserve the ranking criterion. Because these coefficients have no economic or policy interpretation they are suppressed in exhibits 13 through 16.

———. 2002. "Housing and Wealth Accumulation: Intergenerational Impacts." In *Low-Income Homeownership: Examining the Unexamined Goal*, edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: Brookings Institution Press: 407–426.

———. 1999. "Does Home Ownership by Parents Have an Economic Impact on Their Children?" *Journal of Housing Economics* 8: 217–232.

Cortes, Alvaro, Christopher E. Herbert, Erin Wilson, and Elizabeth Clay. 2006. *Improving Homeownership Opportunities for Hispanic Families: A Review of the Literature*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Di, Zhu Xaio. 2001. The Role of Housing as a Component of Household Wealth. Working Paper 01-6. Cambridge, MA: Harvard University, Joint Center for Housing Studies.

Golding, Edward L. 2002. "Overcoming Borrowing Constraints: Introduction." In *Low-Income Homeownership: Examining the Unexamined Goal*, edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: Brookings Institution Press: 105–110.

Herbert, Christopher E., Donald 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.

ICF Consulting. 2004. *Codebook for the American Housing Survey, Public Use File: 1997 and Later. Version 1.77*. Fairfax, VA: ICF Consulting.

McKelvey, Richard, and William Zavoina. 1975. "A Statistical Model for the Analysis of Ordinal Level Dependent Variables," *Journal of Mathematical Sociology* 4: 103–120.

Quercia, Roberto G., George W. McCarthy, and Susan M. Wachter. 2002. The Impacts of Affordable Lending Efforts on Homeownership Rates. Working paper. University of Pennsylvania, Zell/Lurie Real Estate Center.

Retsinas, Nicolas P., and Eric S. Belsky. 2002. "Examining the Unexamined Goal." In *Low-Income Homeownership: Examining the Unexamined Goal,* edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: Brookings Institution Press.

U.S. Department of Housing and Urban Development (HUD). 2005. *U.S. Housing Market Conditions, 3rd Quarter 2005*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

———. 2006. *U.S. Housing Market Conditions, 4th Quarter 2005*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Waters, Mary C., and Tomás R. Jiménez. 2005. "Assessing Immigrant Assimilation: New Empirical and Theoretical Challenges," *Annual Review of Sociology* 31: 105–125.

Is Manufactured Owned Housing a Good Alternative for Low-Income Households? Evidence From the American Housing Survey

Thomas P. Boehm
The University of Tennessee

Alan Schlottmann
University of Nevada, Las Vegas

Abstract

In terms of developing a housing policy that would improve the quality of housing for lower income households, it seems appropriate to explore the merits of an often-ignored alternative, namely manufactured owned housing. This article employs data from the American Housing Survey (AHS) collected between 1993 and 2001 to compare manufactured owned housing with rented housing and traditional owned housing as a tenure alternative for low-income households. Our results contradict several preconceived notions regarding manufactured owned housing. For example, manufactured owned housing is found to be a low-cost housing alternative. Importantly, it is observed to have higher average quality rankings across both the neighborhood and structural dimensions of housing services than rented housing does (even when the sample is stratified by metropolitan and nonmetropolitan location). Furthermore, those factors that contribute to lower structural quality or lower neighborhood quality, as well as changes in those quality measures over time, are similar between manufactured owned housing and traditional owned housing.

Introduction

Research on homelessness by Quigley, Raphael, and Smolensky (2001), Mansur et al. (2000), and others have focused on the crucial role of housing prices in denying access to housing services and homeownership. This literature reinforces the concerns by HUD (2001) and others about the availability of "affordable housing"; that is, housing that costs no more than 30 percent of the occupant's household income or is available for less than the median price in a given housing market.[1] With the well-recognized increase in income inequality during the 1980s (see, for example, Reed, Glenn-Haber, and Mameesh, 1996) and the increases in rents in the 1990s for those in the bottom quarter of the income distribution who, in addition, faced falling real incomes (HUD, 2001), the issue of promoting homeownership among low-income households faces significant hurdles.[2]

These concerns about housing affordability for low-income households appear to be difficult to resolve by developing policy options that focus only on traditional owned housing and/or rented housing units. In terms of developing a housing policy that would improve the quality of housing for lower income households, it seems appropriate to explore the merits of an often-ignored alternative, namely manufactured owned housing.[3]

Although the manufactured housing industry has struggled over the years with excess inventory, manufactured housing generally has become an increasingly important part of the new housing mix; approximately 14 to 20 percent of new housing starts are manufactured housing (see Beamish et al., 2001; Manufactured Housing Institute, 2003).[4, 5] Belsky and Duda (2002a) clearly document that manufactured housing was a significant factor in the low-income homeownership boom of the 1990s. As noted in Joint Center for Housing Studies (JCHS) (2003) and discussed in detail in Beamish et al. (2001) and Apgar et al. (2002), however, manufactured housing is still often viewed with caution in many communities.[6] As discussed by Genz (2001), this bias has lead to neglect of issues that are important to this housing option and the households that it serves, particularly

[1] As noted by the U.S. Department of Housing and Urban Development (HUD), this 30-percent guideline is deceptive in that the remaining household income for low-income households is associated with minimal consumer expenditures.

[2] The studies discussed in Retsinas and Belsky (2002b) strongly suggest the efficacy of promoting homeownership for low-income households.

[3] Manufactured housing is often termed "mobile homes" and represents a type of factory-built housing manufactured in compliance with HUD codes. It forms part of the spectrum of so-called factory homes that include modular homes, panelized homes, and precut homes. Although the manufacturing and construction distinction is often related to the percentage of the home completed on site versus off site, for public policy purposes, it is important to recognize that manufactured homes often face different local ordinances. For a discussion of these issues, see HUD (2001) and Apgar et al. (2002).

[4] As a result of low interest rates making traditional "stick-built" housing more affordable, shipments of new manufactured housing units have recently reached a 45-year low. For more on this issue, see HUD (2004): p. 6. The U.S. Census Bureau maintains excellent website access to historical statistics on manufactured housing based on HUD-sponsored surveys.

[5] The range of percentages reflects differences in the product mix of increasingly popular double-wide units versus single sections, the use of manufactured homes as vacation units that vary cyclically with the economy over time, and so on.

[6] This caution is related to perceptions that manufactured housing is not "good" housing for the community. Most of the studies in this area are based on surveys and questionnaires of perceptions. Excellent summaries of these studies appear in Beamish et al. (2001) and Apgar et al. (2002) and, as noted previously, the consequences are explored in Genz (2001).

low-income households with little wealth. Most of the available literature, however, focuses on community perceptions of the manufactured housing alternative, resulting special (and often controversial) zoning provisions, and associated land use issues. The actual experience of households in manufactured owned housing, the mobility of these households, and documented effects on family wealth accumulation of this housing alternative are generally missing from the literature.

These observations provide the justification and point of departure for the research questions addressed in this article. Specifically, we employ recent versions of the American Housing Survey (AHS) over the period 1993 to 2001 to compare manufactured owned housing with conventional traditional owned housing and rented housing.

The economics literature on housing has done little to compare factors that influence households' overall ordinal ranking of either the structural quality of their dwelling or the quality of their neighborhood for manufactured owned housing compared with traditional tenure choice alternatives (site-built, owned housing and rented housing).[7] This observation is particularly true for low-income households. As noted previously, the common perception from questionnaire studies and surveys is that manufactured housing is of low quality and is generally undesirable, even though the cost may be relatively low. These surveys, however, beg four important issues:

First, in general, are the same factors important in determining structural quality ranking across tenure type (that is, manufactured owned housing, traditional owned housing, and rented housing)? In this regard, the dynamics of the household's perception of housing quality should be addressed rather than relying on a single cross-section. It is possible that perceived structural quality could deteriorate more rapidly with manufactured owned housing than with the other tenure alternatives (traditional owned housing and rented housing). Such a change in perception could lead to increased mobility by low-income households, which itself is costly and may have negative implications for neighborhood stability in urban areas.

Second, are any differential factors determining neighborhood quality across tenure types? Certainly, neighborhood characteristics are just as important as structural characteristics in determining the level of services received by the occupants of a given residence.

Third, particularly for low-income households, is manufactured owned housing a relatively low-cost and high-quality source of housing services compared with traditional owned housing and rented housing?

Fourth, a fundamental perception of manufactured owned housing is that it will not perform well as an investment vehicle compared with traditional owned housing. To what extent is this perception true?

[7] An exception is the study by Boehm (1995). This study, however, considers only a cross-section of units at a particular point in time and its underlying data are more than a decade old. In addition, it ignores neighborhood characteristics and other issues, such as the asset effect of manufactured owned housing.

Research Issues Addressed in This Article

Initially, we present comparisons of the housing and neighborhood quality rankings and total housing costs across the three tenure types and several time periods (specifically, 1993, 1997, and 2001). These comparisons enable us to see if manufactured owned housing generally appears to be a good value (average quality rankings relative to total housing cost per period) as compared with the other tenure types (traditional owned housing and rented housing) and the extent to which this relationship has remained stable over time. We also consider unit size (in square feet) and break out several individual components of housing cost and compare them as well.

In the second stage of the analysis, we consider the effect of various factors that might influence perceived housing and neighborhood quality for a given tenure type across time. An ordinal probit analysis is used to provide estimates of factors that determine the ordinal structural and neighborhood rankings. Separate equations are estimated for each tenure type: manufactured owned housing, traditional owned housing, and rented housing. In the structural quality equation, various measures of specific structural problems either reported by the resident or observed by the individual administering the survey are included as independent variables. Comparable measures of neighborhood problems make up the set of independent variables in the neighborhood quality equation. This analysis enables us to determine if any differences occur, on average, across tenure types and over time in the importance of various factors that determine how households feel about their structures and the associated neighborhoods.

Third, we consider changes in perceived structural quality and neighborhood quality over time and across tenure types. A practical consideration that arises is that structural and neighborhood ranking changes can only be observed for households that stay in the unit until the next interview period, because the AHS follows housing units rather than households. Given the nature of the AHS, however, it is insightful to observe changes in structural and neighborhood ranking over a longer interval than 2 years.[8] Consequently, we consider 2-year intervals over the period 1993 to 2001 (1993 to 1995, 1995 to 1997, and so on) and 1993 to 1997 and 1997 to 2001 as 4-year intervals. Changes in the structural and neighborhood rankings are related to changes in the detailed structural and neighborhood characteristics included in the AHS.

In the fourth stage, household mobility is modeled to estimate the role of neighborhood stability across tenure type. Specifically, separate mobility equations are estimated for manufactured owned housing, traditional owned housing, and rented housing. Based on the literature, mobility is hypothesized to be a function of three factors: (1) disequilibrium in housing consumption (for example, overcrowding measured by a high persons-per-room ratio or high housing costs relative to household income), (2) factors affecting the cost of moving (for example, older individuals find it more difficult to move than younger ones do), and (3) the quality of the structure and neighborhood in which the household resides before the move. Duration modeling of the mobility choice made by households across housing type is used to investigate adjustments to the level and type of housing consumption as households move from their existing housing. Specifically, we are able

[8] Specifically, the AHS follows housing units rather than households per se over time. Thus, the number of observations falls over the 4-year intervals if households move in 2 years.

to consider the ways in which the dynamics of this process differ for manufactured owned housing and traditional owned housing. In particular, we are able to consider the ways in which the dynamics of this process imply differentials in neighborhood stability.

In the final stage of the analysis, we compare appreciation in property value among three types of ownership: (1) manufactured owned housing in which both the land and structure are owned, (2) manufactured owned housing in which only the structure is owned, and (3) traditional owned housing. Using price data available over time in the AHS allows us to consider differences in appreciation across these ownership categories.

Major Empirical Results and Policy Implications: A Summary

The research results provide new evidence on the question about whether manufactured owned housing is a good alternative for low-income households. Information on area median income suggests that low-income households represent households at 80 percent or below the area median income.[9] Our results contradict several preconceived notions regarding manufactured owned housing as revealed in survey studies. Several noteworthy results are presented in the following text.

1. Manufactured owned housing is a viable alternative for low-income households from the perspective of the consumption of housing services. This observation is true from the perceptions about both perceived structural quality and neighborhood quality.

2. Across all time periods, in terms of included measures of neighborhood quality and structural quality, owned manufactured owned housing is perceived to be (ranked) higher quality than rented housing. This observation holds true even when the sample is stratified by metropolitan and nonmetropolitan location.

   In addition, the cost of manufactured owned housing, even for recent movers, is much lower than other alternatives, including renting.

3. Those factors that contribute to either lower structural quality or lower neighborhood quality are similar between manufactured owned housing and traditional owned housing.

   Communities do not have to develop bifurcated public policies to include manufactured owned housing in the community housing mix. For example, crime is a perceived negative across all housing types.

   Owners of manufactured housing have the same concerns about structural quality as do owners of traditional housing.

4. No evidence supports the idea that perceived structural quality deterioration occurs over time more with manufactured housing than with traditional housing.

   A properly planned manufactured housing development does not "automatically" imply deterioration over time.

[9] In the AHS, HUD assigns area median income status to every household in the national sample in each sampling year. It is important to note that results presented in this article do not vary for alternative definitions of low income, such as 75 or 90 percent of the area median income.

5. A major result of the analysis is that ownership of both manufactured housing and traditional housing is associated with neighborhood stability (that is, a decreasing likelihood to move over time).

   If a tendency for a type of housing to be associated with high mobility relative to all housing choices is apparent, it is rented housing, not manufactured owned housing.

   Manufactured owned housing does not lead to increased instability of neighborhoods.

6. The potential for appreciation of manufactured owned housing is clearly bifurcated on the ownership of the land (lot). Even recognizing the limitations of the price appreciation data in this article, three observations appear worthy of note.

   As a general statement, manufactured owned housing in which the lot is not owned (with the unit) is not an investment in any sense.

   In cases in which the land is owned, manufactured owned housing can yield appreciation amounts that are not dissimilar from those of traditional owned housing; however, data from the AHS suggests that rates of appreciation vary significantly across manufactured owned housing units, which may indicate these homes are riskier investments. This result might also be partially attributable to the smaller number of observations for these homes in the data.

   In many cases, manufactured owned housing is a lower cost alternative for low-income households than rented housing. This housing option could enable low-income households to potentially save toward the preferred investment alternative, namely traditional owned housing.

The American Housing Survey 1993 to 2001: Quality, Size, and Cost of Housing by Tenure Type for Low-Income Households

According to data from the 1993-to-2001 national files of the AHS, manufactured owned housing appears to be providing many lower income households with a relatively low-cost, high-quality, alternative living environment.[10] Exhibit 1 presents a comparison of housing quality and housing cost across tenure type for the full sample and a subsample of lower income households that have recently moved into their current housing unit. For comparison purposes, this information is provided separately for the three time periods (sample waves) of 1993, 1997, and 2001.

Exhibit 1 uses the unique characteristic of the AHS in that it provides measures of the household's perceptions of the quality of its living situation.[11] Specifically, households are asked to rank the quality of both their structures and their neighborhoods on an ordinal scale from 1 to 10 (where a rank of 1 is worst and a rank of 10 is best). Although, as might be expected, traditional owned housing receives the highest rankings, on average, owners of manufactured housing ranked their

[10] As noted, low-income households represent households at 80 percent or below the median income for any time period at a location. Modest changes in this definition do not alter results reported here.

[11] The appendix to this article provides basic data compilations similar to those presented in the three panels of exhibit 1 across the dimensions of metropolitan areas and nonmetropolitan areas. Basic results presented here are similar across these added dimensions.

Exhibit 1a

1993 Quality, Size, and Cost of Housing by Tenure Type for Low-Income Households[a]

Housing Tenure Type	Mean Housing Rank[b]	Mean Neighborhood Rank[b]	Opinion of House Poor[c] (%)	Opinion of Neighborhood Poor[c] (%)	Structures Moderately or Severely Inadequate[d] (%)	Mean Number of Rooms	Mean Square Feet in Unit
Traditional owned housing	8.588	8.258	0.864	3.028	2.140	5.893	1,751.15
Manufactured owned housing	8.109	8.134	2.211	4.643	1.842	4.798	1,003.45
Rented housing	7.600	7.298	3.955	8.574	2.792	4.162	989.29

Housing Tenure Type	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)
	All Households			Recent In-Movers[e]		
Traditional owned housing	420.61	18,331	34.55	555.41	21,816	45.02
Manufactured owned housing	305.13	15,783	30.06	339.25	16,817	33.22
Rented housing	461.04	15,753	56.05	478.07	17,088	56.88

[a] *Low-income households have incomes below 80 percent of the median for a particular year and area.*

[b] *Housing rank and neighborhood rank are measured using an ordinal scale from 1 to 10, with 10 being the best.*

[c] *A ranking of 1, 2, or 3 was deemed poor.*

[d] *Interviewers ranked structures as adequate, moderately inadequate, or severely inadequate.*

[e] *Any household that moved into its dwelling unit in the last 2 years before the interview was deemed as a recent in-mover.*

Exhibit 1b

1997 Quality, Size, and Cost of Housing by Tenure Type for Low-Income Households[a]

Housing Tenure Type	Mean Housing Rank[b]	Mean Neighborhood Rank[b]	Opinion of House Poor[c] (%)	Opinion of Neighborhood Poor[c] (%)	Structures Moderately or Severely Inadequate[d] (%)	Mean Number of Rooms	Mean Square Feet in Unit
Traditional owned housing	8.405	8.168	0.949	2.357	1.554	5.930	1,805.96
Manufactured owned housing	7.832	7.920	3.649	4.809	2.156	4.661	1045.13
Rented housing	7.435	7.264	3.820	6.491	3.212	4.098	1,272.15

Housing Tenure Type	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)
	All Households			Recent In-Movers[e]		
Traditional owned housing	484.81	18,422	40.75	637.80	23,233	51.31
Manufactured owned housing	355.20	15,835	34.17	406.64	18,535	37.18
Rented housing	518.88	16,785	56.41	536.38	19,112	57.94

[a] *Low-income households have incomes below the 80 percent of the median for a particular year and area.*

[b] *Housing rank and neighborhood rank are measured using an ordinal scale from 1 to 10, with 10 being the best.*

[c] *A ranking of 1, 2, or 3 was deemed poor.*

[d] *Interviewers ranked structures as adequate, moderately inadequate, or severely inadequate.*

[e] *Any household that moved into its dwelling unit in the last 2 years before the interview was deemed as a recent in-mover.*

Exhibit 1c

2001 Quality, Size, and Cost of Housing by Tenure Type for Low-Income Households[a]

Housing Tenure Type	Mean Housing Rank[b]	Mean Neighborhood Rank[b]	Opinion of House Poor[c] (%)	Opinion of Neighborhood Poor[c] (%)	Structures Moderately or Severely Inadequate[d] (%)	Mean Number of Rooms	Mean Square Feet in Unit
Traditional owned housing	8.431	8.167	0.891	2.268	1.731	5.888	1,848.01
Manufactured owned housing	7.900	7.871	3.231	4.060	2.651	4.841	1,107.81
Rented housing	7.501	7.433	3.825	5.027	3.605	4.134	1,025.71

Housing Tenure Type	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)
	All Households			Recent In-Movers[e]		
Traditional owned housing	621.66	20,560	44.48	792.59	26,111	54.84
Manufactured owned housing	407.96	17,537	38.11	461.21	19,919	44.48
Rented housing	612.62	18,177	56.67	634.53	21,832	58.94

[a] *Low-income households have incomes below 80 percent of the median for a particular year and area.*

[b] *Housing rank and neighborhood rank are measured using an ordinal scale from 1 to 10, with 10 being the best.*

[c] *A ranking of 1, 2, or 3 was deemed poor.*

[d] *Interviewers ranked structures as adequate, moderately inadequate, or severely inadequate.*

[e] *Any household that moved into its dwelling unit in the last 2 years before the interview was deemed as a recent in-mover.*

neighborhoods and structures higher than the households in rented housing did. In addition, only a very small percentage of the households living in manufactured owned housing (2.2 to 3.6 percent) ranked their structures as poor (that is, a quality ranking of 1, 2, or 3). Although traditional owned housing fared better, rented housing did worse across all three time periods. It is noteworthy that these relative rankings hold for both housing quality and neighborhood quality.

Initially, we might expect that owners of traditional or manufactured housing would have a higher level of satisfaction than renters would, for two reasons. First, because the adjustment costs of changing units are much greater for owners than for renters, owners typically search more extensively to ensure that they have found the most desirable unit possible. Second, because most households that rent aspire to homeownership, they may have purposely selected less desirable and less costly units in order to accumulate the downpayment required for homeownership. It is important to note, however, that exhibit 1 does not represent average-income households but rather low-income households. As is well appreciated, these households face a more limited set of housing choices and, in this context, the results noted previously are particularly encouraging.

The validity of these household perceptions is substantiated by structural adequacy rankings constructed from objective information gathered by the enumerators conducting the survey. In exhibit 1, we see that, for low-income households living in manufactured owned housing, only 1.8 to 2.6 percent of their dwelling units were deemed to be moderately or severely inadequate over the time period.[12] These rates are actually lower than those for rented housing (2.8 to 3.6 percent) over the period.

This quality information becomes even more interesting when the average cost of the various housing tenure types is considered. When one examines the average cost of units in exhibit 1, one is immediately struck by fact that manufactured owned housing is much lower in cost than either of the other alternatives. This observation is true for all households and for households that have recently occupied the dwelling (recent in-movers in exhibit 1). For low-income households, mean monthly housing cost for manufactured owned housing compared with that for rented housing falls slightly when recent movers are compared with all households. Specifically, in exhibit 1a for recent movers, monthly housing cost for owned manufactured housing is approximately 71 percent of that for rental units ($339.25 and $478.07, respectively). Alternatively, for all households, this ratio drops to 66 percent ($305.13 and $461.04, respectively). These figures are consistent with the increases in rents for low-income households noted in HUD (2001). For the different housing categories, all of which are relatively comparable in size, if one factors in the annual cost of maintenance and repairs, owners of manufactured housing have the lowest total out-of-pocket housing cost.[13]

[12] A unit is considered moderately or severely inadequate if it has specific problems relating to plumbing, heating, upkeep, and/or electrical issues. For a detailed list of the problems and the specifics of how the adequacy categorizations are done, see the respective codebooks for the AHS database (Hadden and Leger, 1990; ICF Consulting, 2004).

[13] One element of maintenance cost is not captured by the AHS and, therefore, total maintenance cost is underestimated. Specifically, the AHS does not measure the value of an occupant's contribution of labor for the maintenance of his or her unit. Typically, renters engage in very little, if any, maintenance of their own units; consequently, most maintenance cost should be capitalized in the rent that they pay. For owned units, whether traditional or manufactured, the owner-occupant often contributes a substantial amount of labor, although manufactured owned housing (particularly if it is relatively new) might be expected to require less maintenance than traditional owned housing. Although total maintenance cost for owners may be understated relative to that for renters, one should keep in mind that, for low-income households, this opportunity cost may be minimal. The same cannot be said for out-of-pocket expenditures.

Exhibit 1 also provides information on the issue of affordability. Although lower income households have a much greater likelihood of falling into the greather-than-30-percent ratio of housing cost to income category for all housing types, manufactured housing owners do (financially) better than any of the other tenure types.[14] Perhaps the most striking result is that, among lower income renters, more than 56 percent spend more than 30 percent of their income on housing as compared with 30 to 38 percent for owners of manufactured housing. When the lower average out-of-pocket housing costs for manufactured owned housing is also taken into account, low-income households certainly appear to reduce their housing expenditures with manufactured owned housing. In summary, the information presented in exhibit 1 on quality and cost suggests that manufactured owned housing provides a good value when compared with the more traditional housing alternatives (traditional owned housing and rented housing).

It is important, however, to examine how legitimate the previous comparisons of manufactured owned, traditional owned, and rented housing are if the manufactured units might be expected to have a very different geographic distribution than the other two tenure categories; that is, with more manufactured units likely to be located in nonmetropolitan areas of the South and West. Actually all tenure types were relatively evenly distributed regionally; however, quite a disparity was evident in the percentage of each tenure type located in metropolitan versus nonmetropolitan areas.[15] Although, some variation occurs across sampling years, approximately 55 percent of manufactured owned units, 75 percent of traditional owned units, and 85 percent of rented units were in metropolitan areas. Consequently, as an experiment, exhibits 1a, 1b, and 1c were recalculated, stratified by metropolitan and nonmetropolitan area. These exhibits are presented in the appendix (A-1a, A-1b, A-1c, A-2a, A-2b, and A-2c).

Several general conclusions can be drawn from this experiment. First, regardless of which area one considers, manufactured owned housing continues to seem a good value; that is, it is low cost given the quality ranking and, in general, neighborhood and structural rankings are better for manufactured owned housing than for rented housing. Another general tendency apparent across these sets of exhibits (that is, all years) is that many of the differences across tenure type are more pronounced for metropolitan areas than for their nonmetropolitan counterparts. For example, consider mean monthly housing cost for recent in-movers in 1993 (exhibits A-1a and A-2a). In the metropolitan areas, mean monthly housing costs range from $370 for manufactured owned units to $604 for traditional owned housing; the latter figure represents a 63-percent increase relative to the manufactured unit cost. In nonmetropolitan areas, the same range is $282 to $365; the latter figure represents a 29-percent difference. Similarly, in 1993, 3.355 percent of the households in traditional owned housing in metropolitan areas had a poor opinion of their neighborhood and 9.166 percent of households in rented housing had a poor opinion, indicating a spread of 5.811 points. For nonmetropolitan areas, the range is 1.887 to 4.672, a spread of 2.785 points. In general, this comparison between metropolitan and nonmetropolitan areas suggests that

[14] As noted previously, a 30-percent ratio of housing cost to income was selected here consistent with discussions in the literature on housing affordability. This rule of thumb is, of course, not an absolute rule. For example, HUD data from the Section 8 Housing Choice Voucher Program, which enables tenants to choose units that meet HUD standards, shows that many low-income families choose units requiring more than 30 percent of their income.

[15] The AHS defines areas as metropolitan or nonmetropolitan according to whether a housing unit is within a standard metropolitan statistical area; both types of areas can have rural and urban subareas.

manufactured owned housing is a more attractive option, relative to rented housing, in metropolitan areas than in nonmetropolitan areas.

The Determinants of Structural Quality and Neighborhood Quality: Model and Estimation

Given the differences in structure satisfaction and neighborhood satisfaction addressed in exhibit 1, it would be beneficial to policymakers to understand more about the relative importance of various individual structural attributes in determining households' perceptions of overall dwelling and neighborhood quality. Most of the research considering the relative importance of individual structural and other (for example, neighborhood, public service, location) housing characteristics on household preferences has been implemented by estimating hedonic price models. In this approach, sales price or contract rent is regressed on a set of variables that describe the structure and its environment. Unfortunately, the hedonic approach has often been criticized because it assumes that consumer preferences are identical. In reality, however, consumer preferences may not be identical. For example, some individuals may not mind cracks in walls or peeling paint while others find them quite objectionable. On the margin, if the household that ends up occupying a given dwelling is indifferent to these structural defects, then the defects will be uncorrelated with rent or value even though most people would consider them to be bothersome.

In lieu of the hedonic approach, we employ the estimating technique discussed in Boehm and Ihlanfeldt (1991), which revealed the importance of individual neighborhood characteristics on the overall quality of the neighborhood. In this analysis, the AHS 10-point scale is interpreted to be an ordinal utility index. There are two primary advantages to this approach. First, for each household group, estimates will represent the group average rather than the preferences of the marginal purchaser of housing services. Second, by focusing on perceptions rather than the relationship between some objective characteristics and dwelling rent or price, we can identify more clearly the factors that influence the way people feel about their living environment.

The Model

Assuming that utility functions are strongly separable, the jth household's utility from its dwelling (U_j^{NG}) can be expressed as a function of individual structural attributes (X_i $i = 1, \ldots, k$),

$$U_j^{NG} = u_j\,(X_1, \ldots, X_k)\ (j = 1, \ldots, s), \tag{1}$$

where G represents a group identification variable. We hypothesize homogenous preference functions for households within a particular group but permit these functions to differ among groups. The utility function for households within the same group then can be defined over the set of structural attributes and, assuming it is linear in its parameters, can be expressed as:

$$U_j^{NG} = u_j^{G}(\mathbf{X}) = \Sigma\, \beta_i X_{ij} + \varepsilon_j, \tag{2}$$

with the stochastic term ε_j accounting for the influence of unobserved attributes of the neighborhood and random deviations in preferences from the average of the subgroup. It is assumed that the ε_j are distributed normally ($N(0, \sigma^2 I)$).

In principle, the ordinary least squares (OLS) regression model could be employed to estimate the relationship between utility and observed structural attributes. This model assumes an interval-level dependent variable, however, which would require a cardinal measure of utility. As is well known, such a measure is not available; however, our data do provide an ordinal version of U_j^N for which the OLS model is satisfied. Households were asked to rank the overall quality of their dwelling on a 10-point scale, with a "1" indicating worst and a "10" indicating best. We assume that greater utility levels from either the structure or the neighborhood are concomitant with higher rankings. This quality ranking, therefore, provides a utility measure of ordinal strength, namely I.

An estimating equation using I_j in lieu of U_j^N as the dependent variable can be derived by first noting that, in the general case, if there are Z distinct structure/neighborhood rankings (R_m, m = 1,. . ., Z), there must be Z + 1 hypothetical category boundaries (α_m, m = 0,. . ., Z) such that the j_{it} household ranks its dwelling or neighborhood as a "1" (R_1) if $\alpha_0 < U_j^N < \alpha_1$, as a "2" ($R_2$) if $\alpha_1 < U_j^N < \alpha_2$, and so on. In other words, we observe the mth ranking if the true (but nonobservable) value of cardinal utility falls within that category's boundaries (α_{m-1}, α_m). Because it has been assumed that U_j^N is normally distributed, the probability of observing the mth rank by the jth household can be expressed as:

$$P(R_{mj}) = F[(U_j^N - \alpha_{m-1})/\sigma] - F[(U_j^N - \alpha_m)/\sigma] \quad (3)$$

where F is the cumulative standard normal density function. Following the convention of setting $\alpha_0 = -\infty$, $\alpha_1 = 0$, and $\sigma^2 = 1$ and substituting from (2), then (3) can be rewritten as:

$$P(R_{mj}) = F[\Sigma \beta_i X_{ij} - \alpha_{m-1}] - F[\Sigma \beta_i X_{ij} - \alpha_m] \quad (4)$$

Equation (4) estimates the conditional probability of observing a particular structure or neighborhood ranking. McKelvey and Zavoina (1975) have provided a model (namely N-chotomous multivariate probit) that simultaneously provides estimates of the β and α vectors of (4) that are minimum variance and are consistent. Furthermore, because the parameter estimates are obtained by maximum likelihood techniques, they are known to be asymptotically normally distributed, allowing for standard statistical tests.[16]

Data, Samples, and Variables

The primary AHS data, time periods of analysis, types of housing choice, and low-income sample are as defined in exhibit 1 and discussed previously. The first sample period from which observations are drawn is 1993. Although our analysis reported in the following text includes the 1997 AHS as representative of the middle of the study period and the 2001 survey as the latest sample period, we include units from the 1997 and 2001 samples that are not present in 1993 to maximize the number of observations (particularly for manufactured housing). The number of observations in the equations for each time period by housing type ranges from 1,200 to more than 12,000.

[16] In surveys such as the AHS, household responses are preferences as expressed by an ordinal ranking. In this regard, there is no significance to the unit distance between the set of observed values (as contrasted with traditional statistical analyses of metric data). Thus, the estimation procedure uses an additional set of variables (breakpoints) that merely preserve the ranking criterion. These variables are shown in the exhibits in the following text (starting with exhibit 4) as a numbered set of parameters denoted as "Mu's." These parameters are included in the exhibits for purposes of completeness but have no economic or public policy interpretation themselves.

A great deal of structural information is provided for each unit included in the AHS, including structure age; unit size (used to construct a measure of crowding); availability and age of major appliances; type and condition of heating, air conditioning, plumbing, and electrical systems; and structural problems with the roof, internal and external walls, windows, and foundation. In addition, a detailed set of neighborhood factors is included in the questions that relate to issues such as crime, noise, litter, abandoned buildings, and general deterioration. Exhibit 2 contains variable names and definitions for all of the variables included in the analysis. Related information is shown in exhibit 3, which contains means for each variable by tenure type for both housing quality and neighborhood quality. The next section considers the effect of these structural characteristics on households' perceived housing quality and neighborhood quality.[17]

Exhibit 2

Variable Names and Definitions: Housing Quality and Neighborhood Quality (1 of 2)

Variable Name	Variable Definition
Structural	
how_h	Housing structural quality ranking: 0 = worst, 8 = best*
age_s	Age of the structure in years
n_porch	1 = housing unit has a porch; 0 = otherwise
n_garage	1 = housing unit has a garage or carport; 0 = otherwise
equipment	Number of the following items the housing unit has at least one of: refrigerator, garbage disposal, stove/oven, dishwasher, washer/dryer
bathroom	1 = unit has a private toilet; 0 = otherwise
water	1 = unit has hot and cold piped water; 0 = otherwise
sewage	1 = unit is connected to a public sewer or septic system; 0 = otherwise
cntrl_air	1 = unit has central air conditioning; 0 = otherwise
struc_prob	Number of structural problems observed by the enumerator: sagging roof, missing roof materials, holes in roof, missing wall material or siding, sloping exterior walls, broken windows, bars on windows, crumbling foundation
ext_leak	1 = exterior leak in last 12 months; 0 = otherwise
int_leak	1 = interior leak in last 12 months; 0 = otherwise
bad_int	1 = cracks or holes in walls or ceiling, holes in floor, or broken plaster or peeling paint more than 1 square foot; 0 = otherwise
wtr_prob	Number of water source breakdowns in last 90 days
tlt_prob	Number of toilet breakdowns in the last 90 days
sew_prob	Number of public sewer breakdowns in the last 90 days
wrg_prob	1 = inadequate electrical wiring; 0 = otherwise
fus_blow	Number of times fuses blew or breakers tripped in the last 90 days
heat_brk	Number of heat breakdowns last winter lasting 6 hours or more
heating1	1 = steam, electric, heat pump, or central warm air furnace; 0 = otherwise
heating2	1 = other built-in electric floor, wall, or heaters; 0 = otherwise
heating3	1 = space heaters, stoves, fireplaces or no heat; 0 = otherwise
vermin	1 = presence of rats or mice in building the last 90 days; 0 = otherwise

[17] As is well appreciated, often, when one incorporates many structural variables in the estimation of an equation, multicollinearity can be a potential problem. Fortunately, this potential problem does not appear to be a significant issue in our low-income household samples.

Exhibit 2

Variable Names and Definitions: Housing Quality and Neighborhood Quality (2 of 2)

Variable Name	Variable Definition
Neighborhood	
how_n	Housing neighborhood quality ranking; 0 = worst, 8 = best *
e_low	1 = enumerator observed single-family or other lowrise buildings within 300 feet of unit; 0 = otherwise
e_mid	1 = enumerator observed midrise residential buildings within 300 feet of unit; 0 = otherwise
e_high	1 = enumerator observed highrise residential buildings within 300 feet of unit; 0 = otherwise
e_mobil	1 = enumerator observed mobile homes within 300 feet of unit; 0 = otherwise
e_com	1 = enumerator observed commercial/institutional/industrial buildings within 300 feet of unit; 0 = otherwise
e_prkg	1 = enumerator observed residential parking lots within 300 feet of unit; 0 = otherwise
e_water	1 = enumerator observed a body of water within 300 feet of the unit; 0 = otherwise
e_green	1 = open space/park/woods/farm/ranch within 300 feet of the unit; 0 = otherwise
old_buildings	1 = buildings in the area are predominantly older than the unit; 0 = otherwise
new_buildings	1 = buildings in the area are predominantly younger than the unit; 0 = otherwise
aban	1 = abandoned buildings within 300 feet of the unit; 0 = otherwise
bars	1 = bars on windows of buildings within 300 feet of the unit; 0 = otherwise
road_prob	1 = roads within 300 feet of the unit in need of repairs; 0 = otherwise
junk	1 = trash litter or junk accumulated in the neighborhood; 0 = otherwise
nucrim_p	1 = crime in the neighborhood is bothersome; 0 = otherwise
noise_p	1 = noise in the neighborhood is bothersome; 0 = otherwise
litter_p	1 = litter or housing deterioration in the neighborhood is bothersome; 0 = otherwise
badsrv_p	1 = poor city/county services in the neighborhood are bothersome; 0 = otherwise
badprp_p	1 = undesirable nonresidential uses in the neighborhood are bothersome; 0 = otherwise
odor_p**	1 = odor in the neighborhood is bothersome; 0 = otherwise
badper	1 = people in the neighborhood are bothersome; 0 = otherwise
othnhd_p	1 = some other feature in the neighborhood is bothersome; 0 = otherwise
schm_p	1 = schools in the area are inadequate; 0 = otherwise
shp_p	1 = shopping in the area is inadequate; 0 = otherwise
good_trn	1 = public transportation in the area is adequate; 0 = otherwise
mh_in_grp***	Number of mobile homes in group

**In the American Housing Survey, these variables range between 1 and 10. Because of the lack of observations on the lower end of distribution options, 1 and 2 were collapsed to a single category. For LIMDEP to do the statistical analysis, these nine remaining rankings had to be coded 0–8.*

***Available only for 1997 and beyond.*

****Available only for manufactured housing.*

Exhibit 3a

Variable Means—Housing Structural Quality Ranking

Variable Name	Manufactured Owned Housing			Traditional Owned Housing			Rented Housing		
	1993	1997	2001	1993	1997	2001	1993	1997	2001
how_h	6.1230	5.8570	5.9094	6.5959	6.4103	6.4367	5.6166	5.4516	5.5173
age_s	17.3918	21.2506	22.5402	41.8054	43.9577	44.7467	40.2837	42.6526	44.6962
n_porch	0.7813	0.7812	0.8701	0.8134	0.8133	0.8823	0.5793	0.5622	0.6478
n_garage	0.3538	0.3187	0.3120	0.7138	0.6948	0.7274	0.2552	0.2642	0.2748
equipment	3.3311	3.2860	3.4410	3.7121	3.7116	3.8433	3.0211	3.0022	3.1285
bathroom	0.9879	0.9991	0.9966	0.9842	0.9977	0.9982	0.9865	0.9966	0.9960
water	0.9977	0.9922	0.9932	0.9975	0.9962	0.9971	0.9985	0.9965	0.9964
sewage	0.5103	0.5202	0.4675	0.2360	0.2629	0.2456	0.0585	0.0512	0.0438
cntrl_air	0.4184	0.4780	0.5333	0.3956	0.4695	0.5511	0.2889	0.3440	0.3930
struc_prob	0.0425	0.2438	0.2821	0.0344	0.2391	0.2589	0.0988	0.3421	0.3582
ext_leak	0.1860	0.1645	0.1350	0.2001	0.1312	0.1196	0.1417	0.1043	0.1006
int_leak	0.1238	0.1068	0.1162	0.0823	0.0687	0.0618	0.1614	0.1294	0.1341
bad_int	0.1116	0.0706	0.0821	0.0943	0.0640	0.0586	0.1787	0.1258	0.1125
wtr_prob	0.0532	0.0715	0.0658	0.0204	0.0265	0.0214	0.0553	0.0520	0.0462
tlt_prob	0.0524	0.0258	0.0085	0.0420	0.0175	0.0136	0.0860	0.0502	0.0455
sew_prob	0.0243	0.0112	0.0111	0.0196	0.0105	0.0117	0.0272	0.0078	0.0217
wrg_prob	0.0304	0.0284	0.0145	0.0339	0.0247	0.0150	0.0548	0.0367	0.0221
fus_blow	0.2422	0.1817	0.1504	0.1930	0.1347	0.1310	0.2635	0.1727	0.1781
heat_brk	0.0243	0.0258	0.0513	0.0217	0.0212	0.0243	0.0652	0.0532	0.0515
heating1	0.8201	0.8846	0.9052	0.7984	0.8379	0.8553	0.6996	0.7575	0.7640
heating2	0.0516	0.0465	0.0333	0.1023	0.0962	0.0884	0.2208	0.1857	0.1902
heating3	0.1283	0.0689	0.0615	0.0993	0.0659	0.0563	0.0796	0.0568	0.0458
vermin	0.0273	0.2317	0.2453	0.0222	0.1802	0.1740	0.0550	0.1455	0.1434
Number of observations	1,317	1,161	1,170	12,347	9,141	9,391	11,782	8,550	8,291

Exhibit 3b

Variable Means—Housing Neighborhood Quality Ranking

Variable Name	Manufactured Owned Housing			Traditional Owned Housing			Rented Housing		
	1993	1997	2001	1993	1997	2001	1993	1997	2001
how_n	6.1519	5.9423	5.8872	6.2712	6.1778	6.1745	5.3398	5.2892	2.0542
e_low	NA	NA	NA	0.1009	0.1916	0.2006	0.5816	0.6194	0.4822
e_mid	NA	NA	NA	0.0144	0.0249	0.0260	0.1224	0.1483	0.3443
e_high	NA	NA	NA	0.0079	0.0127	0.0125	0.0540	0.0753	0.2549
e_mobil	0.3569	0.8174	0.8316	0.0166	0.0904	0.1039	0.0143	0.0467	0.2242
e_com	0.0615	0.1697	0.1744	0.0536	0.2082	0.2088	0.2609	0.5094	0.5000
e_prkg	0.0167	0.1068	0.1385	0.0245	0.1373	0.1329	0.2204	0.4949	0.4998
e_water	0.0175	0.2102	0.2051	0.0141	0.1454	0.1436	0.0257	0.1216	0.3141
e_green	0.1883	0.5349	0.4769	0.0880	0.3560	0.3323	0.1642	0.3244	0.4544
old_bldings	0.0357	0.1525	0.1940	0.0144	0.1145	0.1215	0.0512	0.1249	0.3628
new_bldings	0.0235	0.1972	0.1940	0.0172	0.0756	0.0762	0.0250	0.0786	0.2656
aban	0.0205	0.0439	0.0581	0.0186	0.0494	0.0479	0.0598	0.0874	0.2711
bars	0.0053	0.0215	0.0214	0.0471	0.0880	0.0735	0.1450	0.1620	0.3300
road_prob	0.1936	0.4384	0.4504	0.1016	0.3224	0.3399	0.2386	0.3929	0.4903
junk	0.1503	0.0879	0.0991	0.0932	0.0839	0.0788	0.2971	0.1662	0.3645
nucrim_p	0.0296	0.0792	0.0752	0.0553	0.0906	0.0786	0.1395	0.1551	0.3504
noise_p	0.0630	0.1240	0.1282	0.0707	0.1330	0.1219	0.1275	0.1839	0.3741
litter_p	0.0304	0.0138	0.0120	0.0524	0.0213	0.0211	0.0424	0.0204	0.1481
badsrv_p	0.0106	0.0043	0.0077	0.0133	0.0093	0.0100	0.0137	0.0077	0.1048
badprp_p	0.0114	0.0095	0.0026	0.0151	0.0079	0.0073	0.0149	0.0088	0.0855
odor_p	NA	0.0500	0.0487	NA	0.0427	0.0396	NA	0.0598	0.2326
badper_p	0.1488	0.0474	0.0342	0.1212	0.0439	0.0385	0.1698	0.0614	0.2232
othnhd_p	0.1147	0.0672	0.0684	0.0881	0.0668	0.0730	0.0775	0.0671	0.2629
schm_p	0.0251	0.0112	0.0188	0.0214	0.0094	0.0128	0.0314	0.0187	0.1350
shp_p	0.2688	0.3144	0.2974	0.1706	0.2022	0.1972	0.1040	0.1123	0.3177
good_trn	0.1048	0.1025	0.2248	0.2695	0.2472	0.3988	0.4793	0.4749	0.4829
mh_in_grp	0.5642	0.4746	0.4983	NA	NA	NA	NA	NA	NA
Number of observations	1,317	1,161	1,170	12,347	9,141	9,391	11,782	8,550	8,291

NA = data not available.

Empirical Results

Exhibit 4 contains the N-chotomous probit coefficients for each tenure type over each time period shown, relating structural characteristics to perceived housing quality.[18] In an analogous manner, exhibit 5 focuses on the determinants of neighborhood quality rankings. Due to the number of individual equations reported in these exhibits, we present general findings of relevance to the topic at hand rather than discussing the individual equations.

Structural Quality

The results presented in exhibit 4 demonstrate not only that most of the variables describing the structural characteristics of the dwelling are significant, but also that a great deal of consistency occurs in their relative importance across *both* tenure types *and* time periods.[19] Specifically, factors such as structure age (age_s), the presence of new appliances (equipment), the presence of structural problems (struc_prob), the presence of leaks (ext_leak and int_leak), major deterioration of the interior of the dwelling (bad_ int), the presence of central air conditioning (centr_air), and neighborhood quality (how_n) are generally significant with the expected sign across not only all three tenure types but also across all time periods. Very few "peculiar" results are shown in exhibit 4.[20]

The fundamental implication from exhibit 4 for manufactured owned housing is deceptively simple, namely that household satisfaction with manufactured owned housing is determined by exactly the same type of structural factors that are associated with other housing options. For example, interior and exterior leaks and structural problems are particularly important factors in affecting perceived structural quality. This assertion is robust in that it holds across all three time periods. Thus, communities do not need to devise special guidelines for manufactured owned housing as a special type that diverges from rented housing, stick-built owned housing, and so on. Households both act and react to structural characteristics in manufactured owned housing just as community residents in other types of housing act and react to structural characteristics in their respective environments.

[18] As in Boehm (1995), we conducted basic pooling tests to determine if a single aggregate relationship was appropriate. This hypothesis was rejected. Based on the housing literature, this result is hardly surprising. Thus, our estimates are presented by tenure type. A similar comment applies to neighborhood quality rankings.

[19] As noted previously (in footnote 13), the series of variables shown in exhibit 4 (and subsequent exhibits) as a set of Mu's are breakpoints required in the estimation procedure due to the ordinal ranking of the survey. They do not have any policy interpretation per se.

[20] For example, in the 1997 sample the presence of a garage or carport reduces the desirability of rental units. Somewhat unexpectedly, the presence of a porch appears to be an important feature for households residing in traditional owned housing and rented housing but not for households in manufactured owned housing.

Exhibit 4

N-Chotomous Probit Results by Housing Type and Time Period—Housing Quality Dependent Variable = how_h, Coefficient Estimates (1 of 2)

Variable Name	Manufactured Owned Housing			Traditional Owned Housing			Rented Housing		
	1993	1997	2001	1993	1997	2001	1993	1997	2001
age_s	– 0.0127**	– 0.0089**	– 0.0058**	– 0.0016**	– 0.0009*	– 0.0015**	– 0.0016**	– 0.0010**	– 0.0006
n_porch	0.0324	– 0.0966	0.0297	0.0874**	0.0422*	0.0971**	0.0515**	0.0521**	0.0414*
n_garage	0.2836**	0.1650**	0.1067*	0.1322**	0.0648**	0.0200	– 0.0263	– 0.0549**	0.0112
equipment	0.1037**	0.0439	0.0665**	0.0689**	0.0632**	0.0357**	0.0318**	0.0318**	0.0292**
bathroom	– 0.1892	1.6418**	0.7596**	– 0.0027	0.7364**	0.1831	0.1296**	0.6863**	0.3241**
water	1.5249**	– 0.4035*	0.1544	1.3493**	0.2058	0.7459**	1.2844**	0.4131**	0.5101**
sewage	– 0.0936*	– 0.0740	0.0309	– 0.0688**	0.0019**	0.0038	– 0.1214**	– 0.1163**	– 0.0609
cntrl_air	0.1252**	0.1636**	0.2796**	0.0505**	0.0391**	0.0983**	0.0747**	– 0.0194	0.0360
struc_prob	– 0.1011	– 0.1868**	– 0.1475**	– 0.1370**	– 0.1119**	– 0.1135**	– 0.1133**	– 0.1163**	– 0.0977**
ext_leak	– 0.4405**	– 0.2570**	– 0.1916**	– 0.2551**	– 0.1855**	– 0.1060**	– 0.2933**	– 0.1723**	– 0.2157**
int_leak	– 0.0116	– 0.1231	– 0.1921**	0.0187	– 0.1157**	– 0.1400**	0.0846**	– 0.1539**	– 0.2317**
bad_int	– 0.3007**	– 0.3865**	– 0.2482**	– 0.3842**	– 0.3268**	– 0.3224**	– 0.4318**	– 0.4366**	– 0.4122**
wtr_prob	– 0.0040	– 0.0652	– 0.0737	– 0.0551	– 0.0056	0.0812*	– 0.0584**	– 0.0595**	– 0.0760**
tlt_prob	0.0102	0.1404	– 0.1254	– 0.0376	0.0305	– 0.0285	– 0.1343**	– 0.0764**	– 0.0687**
sew_prob	– 0.0521	0.2282	– 0.0387	– 0.0779**	0.1241	– 0.0674	– 0.0696**	– 0.0263	– 0.0821**
wrg_prob	– 0.0944	– 0.1025	– 0.3079	– 0.3171**	– 0.2644**	– 0.1495**	– 0.2404**	– 0.2544**	– 0.2396**
fus_blow	– 0.0889**	– 0.0275	– 0.0484	– 0.0544**	– 0.0455**	– 0.0477**	– 0.0710**	– 0.0491**	– 0.0322**
heat_brk	– 0.3258*	0.0342	0.0057	– 0.1260**	0.0011	– 0.0933**	– 0.1133**	– 0.0461**	– 0.0319
heating2	0.0972	– 0.0377	– 0.1004	– 0.0547**	– 0.0779**	0.0437	– 0.0379*	– 0.0586**	– 0.0499*
heating3	– 0.1765**	0.0904	– 0.0956	– 0.1733**	– 0.0699*	– 0.0183	– 0.1728**	– 0.1992**	– 0.0565
vermin	0.0892	– 0.1544**	– 0.1221	– 0.1576**	– 0.0556**	– 0.0391*	– 0.3213**	– 0.0680**	– 0.1187**
Mu(1)	0.3970**	0.3589**	0.3870**	0.2807**	0.3251**	0.3312**	0.2799**	0.3738**	0.3387**
Mu(2)	0.6008**	0.6478**	0.7182**	0.5067**	0.6413**	0.6322**	0.5682**	0.7230**	0.6386**
Mu(3)	1.5428**	1.3980**	1.4560**	1.3674**	1.5159**	1.5296**	1.3362**	1.5864**	1.4385**
Mu(4)	1.7827**	1.6480**	1.7380**	1.6682**	1.8819**	1.8736**	1.6747**	1.9897**	1.8284**

Exhibit 4

N-Chotomous Probit Results by Housing Type and Time Period—Housing Quality Dependent Variable = how_h, Coefficient Estimates (2 of 2)

Variable Name	Manufactured Owned Housing			Traditional Owned Housing			Rented Housing		
	1993	1997	2001	1993	1997	2001	1993	1997	2001
Mu(5)	2.2462**	2.1372**	2.2436**	2.1411**	2.4442**	2.4844**	2.1900**	2.6047**	2.5004**
Mu(6)	3.0079**	2.8758**	2.9616**	2.9143**	3.3296**	3.4327**	2.9090**	3.4648**	3.3817**
Mu(7)	3.3169**	3.1890**	3.3752**	3.3339**	3.7732**	3.8992**	3.3084**	3.8632**	3.8243**
Log likelihood function	– 2,043.69	– 1,924.01	– 1,932.03	– 17,637.29	– 13,219.70	– 13,297.02	– 20,517.22	– 14,322.13	– 13,729.36
Restricted log likelihood	– 2,265.32	– 2,127.37	– 2,157.86	– 19,281.68	– 14,983.13	– 15,210.61	– 22,538.36	– 16,434.32	– 15,831.94
Chi-squared	443.27	406.73	451.65	3,288.78	3,526.87	3,827.19	4,042.28	4,224.38	4,205.15

**Statistically significant at the 10-percent level (one-tailed test).*

***Statistically significant at the 5-percent level (one-tailed test).*

Neighborhood Quality

As shown in exhibit 5, variables that significantly affect the perceived quality of neighborhoods tend to be similar across *both* tenure types *and* time periods. In this regard, the results for neighborhood quality tend to reinforce the similar results for perceived structural quality. Specifically, factors such as open spaces and parks (e_green), neighborhood noise (noise_p), trash and litter (junk), the perception of bothersome crime (nucrim_p), and undesirable nonresidential property uses (badprp_p) generally are significant with the expected sign across not only all three tenure types but also for all time periods. As with structural quality, very few peculiar results occur.[21]

Once again, the fundamental implication from exhibit 5 for manufactured owned housing is deceptively simple, namely that owner households in manufactured owned housing view the determinants of neighborhood quality as resulting from the same neighborhood factors that are associated with traditional owned housing and rented housing. This observation is true across all three time periods. For example, resident owners of manufactured housing appreciate parks and open space and disapprove of criminal activity in their neighborhoods, just as other owners do. Thus, communities planning for future growth need only to focus on traditional determinants of resident satisfaction, irrespective of housing type. This idea is particularly important to communities facing growth in relatively low-wage service industries, where the potential need for planned neighborhoods is most acute. The key lesson from exhibit 5 is the need for proper planning to maximize the perceived quality of neighborhoods.

Changes in Structural Quality and Neighborhood Quality Over Time

To more fully explore changes in the perceptions of structural and neighborhood quality, in this section we extend the previous analysis to consider changes over time and across tenure types. This process enables us to investigate the factors driving the changes in quality rankings over time.

Data, Samples, and Variables

As is well known, changes in a household's structural and neighborhood rankings can only be observed for those who stay in the unit until the next interview period, because the American Housing Survey follows housing units rather than households. Our basic time period of analysis covers changes over the 2-year waves of the AHS from 1993 to 2001. Thus, we do separate analyses for changes over time for four intervals, namely 1993 to 1995, 1995 to 1997, 1997 to 1999, and 1999 to 2001. It could be insightful, however, to observe changes in structural and neighborhood rankings over a longer interval than 2 years, even though the sample size would be expected to decline somewhat and out-movers in the initial 2 years might be expected to have experienced the most dramatic changes during that period. Consequently, we also include the 4-year intervals of 1993 to 1997 and 1997 to 2001. Because six time intervals with regressions for two independent variables are cumbersome to examine, and because the results do not differ substantially across the

[21] As shown in exhibit 5, enumerators' observations about surrounding properties (e_low, e_mid, e_high, and so on) follow no particular pattern. Also note that bars on windows on nearby properties (bars) always have the anticipated sign but tend to skip statistical significance across time period and housing type.

Exhibit 5

N-Chotomous Probit Results by Housing Type and Time Period—Neighborhood Quality Dependent Variable = how_n, Coefficient Estimates (1 of 2)

Variable Name	Manufactured Owned Housing			Traditional Owned Housing			Rented Housing		
	1993	1997	2001	1993	1997	2001	1993	1997	2001
e_low	0.1819	NA	NA	– 0.1379**	– 0.1287**	– 0.0905**	0.0594**	– 0.0457**	– 0.0205
e_mid	0.3135	NA	NA	– 0.0771	– 0.1368*	– 0.1041	0.0169	– 0.0817**	– 0.0435
e_high	0.8745	NA	NA	– 0.2302*	– 0.0060	0.2389**	– 0.0290	0.0719*	0.0857**
e_mobil	1.1074	0.1311*	– 0.0129	– 0.0068	0.0102	– 0.1047**	0.1010	0.1263**	0.1096**
e_com	1.5094*	– 0.0030	0.0588	0.0143	– 0.0582**	– 0.0381	– 0.0037	– 0.0253	0.0298
e_prkg	2.2091	0.0004	– 0.1388	– 0.0157	0.0107	0.0240	– 0.0509**	0.0238	0.0230
e_water	2.5974	0.0880	0.2306**	0.2296**	0.0395	0.0695**	– 0.0229	0.0716**	0.0582*
e_green	**	0.3305**	0.2321**	0.2085**	0.1963**	0.1722**	0.1476**	0.1532**	0.1124**
old_buildings	– 2,010.43	0.2849**	0.2342**	0.0608	0.0900**	0.0940**	– 0.0587*	0.2232**	0.2184**
new_buildings	**	– 0.0578	– 0.1167*	0.2775**	– 0.1551**	– 0.0605*	0.2779**	– 0.0953**	– 0.0213
aban	– 2,300.56	– 0.0828	– 0.1397	– 0.1325**	– 0.2493**	– 0.2650**	– 0.2229**	– 0.1719**	– 0.1130**
bars	580.25	0.2072	– 0.3789*	– 0.0139	– 0.1890**	– 0.0749**	– 0.1154**	– 0.0414	– 0.0083
road_prob	– 0.1395*	– 0.0852	– 0.0940*	0.1112**	– 0.1136**	– 0.1239**	0.0635**	– 0.0368*	– 0.0784**
junk	– 0.0506	– 0.2704**	– 0.2844**	– 0.1051**	– 0.3495**	– 0.4474**	– 0.0561**	– 0.1648**	– 0.2525**
nucrim_p	– 0.8724**	– 0.7722**	– 0.3226**	– 0.9362**	– 0.5636**	– 0.5613**	– 0.8838**	– 0.6422**	– 0.6390**
noise_p	– 0.4060**	– 0.2551**	– 0.4181**	– 0.3592**	– 0.3893**	– 0.3321**	– 0.3326**	– 0.2457**	– 0.2717**
litter_p	– 1.0118**	– 0.1193	– 0.3686*	– 0.8402**	– 0.6104**	– 0.3412**	– 0.3538**	– 0.1922**	– 0.1586**
badsrv_p	0.0731	0.4456	0.1176	– 0.2615**	0.2246**	– 0.1218*	– 0.1837**	– 0.0929**	– 0.1438*
badprp_p	– 0.5262**	0.5917*	– 0.0270	– 0.4497**	– 0.2200**	– 0.1347**	– 0.2041**	– 0.0261**	– 0.0415
odor_p	NA	– 0.4343**	– 0.3517**	NA	– 0.1987**	– 0.1509	NA	– 0.0631**	– 0.0448
badper	– 0.8321**	– 0.8311**	– 0.3979**	– 0.8053**	– 0.5907**	– 0.5175**	– 0.6380**	– 0.3750**	– 0.3606**
othnhd_p	– 0.5661**	– 0.2841**	– 0.0153	– 0.5138**	– 0.3142**	– 0.3102**	– 0.3076**	– 0.1470**	– 0.1666**
schm_p	– 0.2691*	– 1.1862**	– 0.5164**	– 0.1108**	– 0.2894**	– 0.2521**	– 0.0542	– 0.1415**	– 0.1584**
shp_p	0.1283**	0.0966*	0.1882**	0.0098	0.0549**	– 0.0003	0.0288	0.0485*	0.0315
good_trn	0.0979	0.1008	0.2789**	– 0.0515**	0.0119	– 0.0102	0.0641**	0.0605**	0.0550**
mh_in_grp	– 0.0857	– 0.1683**	– 0.2719**	NA	NA		NA	NA	NA

Exhibit 5

N-Chotomous Probit Results by Housing Type and Time Period—Neighborhood Quality Dependent Variable = how_n, Coefficient Estimates (2 of 2)

Variable Name	Manufactured Owned Housing			Traditional Owned Housing			Rented Housing		
	1993	1997	2001	1993	1997	2001	1993	1997	2001
Mu(1)	0.1819**	0.1769**	0.2120**	0.1472**	0.1662**	0.2146**	0.1878**	0.2401**	0.2296**
Mu(2)	0.3135**	0.3264**	0.3970**	0.3338**	0.3941**	0.4821**	0.4007**	0.4970**	0.4933**
Mu(3)	0.8745**	0.9142**	0.9986**	0.9395**	1.0861**	1.1751**	0.9903**	1.1891**	1.2000**
Mu(4)	1.1074**	1.1496**	1.2852**	1.2189**	1.4467**	1.5124**	1.2709**	1.5559**	1.5643**
Mu(5)	1.5094**	1.6381**	1.7945**	1.6683**	2.0023**	2.0984**	1.7180**	2.1439**	2.1909**
Mu(6)	2.2091**	2.4058**	2.5240**	2.4467**	2.9249**	3.0882**	2.3975**	2.9789**	3.0545**
Mu(7)	2.5974**	2.8083**	2.9280**	2.8809**	3.4546**	3.6207**	2.7997**	3.4769**	3.5658**
Log likelihood function	– 2,010.43	– 1,873.34	– 1,940.351	– 18,478.11	– 13,532.43	– 13,781.72	– 20,710.02	– 14,638.85	– 13,859.85
Restricted log likelihood	– 2,300.56	– 2,115.94	– 2,167.232	– 21,174.63	– 16,009.04	– 16,372.68	– 23,546.52	– 17,060.88	– 16,218.08
Chi-squared	580.25	485.20	453.763	5,393.05	4,953.22	5,181.91	5,673.00	4,844.07	4,716.46

NA = data not available.

**Statistically significant at the 10-percent level (one-tailed test).*

***Statistically significant at the 5-percent level (one-tailed test).*

period, results for the two longer intervals are presented in the text, while those for the four shorter intervals are provided for the interested reader in the appendix (exhibits A-3a, A-3b, A-4a, A-4b, A-5a, A-5b, A-6a, and A-6b).

The change in the structural and neighborhood rankings generally depends on the detailed structural and neighborhood characteristics included in the preceding estimation. Despite that observation, several variants in this analysis are important to note. First, very large changes in quality rankings rarely occur in the AHS due, in part, to the ordinal nature of the rankings. Thus, for estimation purposes, to have sufficient observations at the extreme ends of the scale, the few large positive changes (of more than plus four) were grouped together in the ordinal category "plus four." In a similar manner, the few large negative changes (of less than minus four) were included in the ordinal category "minus four." Thus, our ordinal change categories include nine categories, namely -4 or less, -3, -2, -1, 0, 1, 2, 3, and 4 or more, a progression from worst to best.[22] Second, we also control for both crowding (ratio of persons to rooms) and housing cost to income. Third, the basic level of structural quality and neighborhood quality (how_h or how_n) is included in the appropriate changes equation as recognition of the fact that if a housing unit starts out as either very high or very low, it can really only change in the other direction.[23] Finally, a few variables such as age of structure and exterior leaks had to be included as a level (not a change) due to data issues. In this respect, a couple of variables are excluded, particularly for the smallest sample (manufactured owned housing), due to a lack of variance in the variable.

Exhibit 6 contains variable names and definitions for all of the variables included in the analysis of the change in structural quality. Exhibit 7 shows similar information for the change in neighborhood quality.

Empirical Results

The basic empirical findings are shown in a set of four exhibits, namely exhibits 8 through exhibit 11.[24] Exhibit 8 presents the N-chotomous probit coefficients for each tenure type over the first set of time periods (1993 to 1997), relating changes in perceived structural quality to the factors discussed previously. In a similar manner, exhibit 9 focuses on the determinants of changes in neighborhood quality rankings. The next two exhibits (exhibit 10 and exhibit 11) are analogous to the first two exhibits but are based on the later time period (1997 to 2001). Due to the large number of individual equations reported in these exhibits, including those for the shorter subintervals reported in the appendix, we present general findings of relevance to the topic at hand rather than discussing the individual equations.

[22] For simplicity of interpretation, the categories were recoded in the ordinal probit estimation as 0, 1, 2, 3, 4, 5, 6, 7, and 8.

[23] The level of structural quality and level of neighborhood quality are determined, of course, by many of the same variables included in the analysis of changes in these measures. Thus, in this section we might expect less significance in the individual factors, although the analysis does provide additional insights to that presented previously.

[24] Not included as separate exhibits are the extensive mean values of all variables across housing type and time periods. Note that the changes in quality rankings between households in manufactured owned housing and traditional owned housing are statistically the same. For example, (traditional owned housing, manufactured owned housing) of (3.99, 3.93), (3.77, 3.80), and so on. In simple average terms, quality perceptions change in a similar manner.

The basic determinants of changes in either structural quality or neighborhood quality, where significant, tend to reinforce results reported previously. In general, not having an amenity (such as a garage) or gaining a negative feature (such as developing wiring problems) tends to increase the change in perceived structural quality in the anticipated direction. For changes in neighborhood quality, a similar observation can be made.

For changes in structural quality, a number of factors relatively consistently influence structural quality. In particular, interior and exterior leaks have a significant effect on the change in housing quality for each tenure type, as do interior and exterior structural problems. Also, concerns about crowding and structure age consistently affect the change in household ranking of the structural quality.

For changes in neighborhood quality, it is clear that the most consistent single influence on the level of change is the perception that crime has become a problem over the period.

Clearly, feedback occurs on the size of quality changes between changes in structural quality and changes in neighborhood quality. Owners of any housing type are willing to forgive some structural problems in neighborhoods that are perceived as becoming better (and vice versa).

The perceptions of owners of manufactured housing are similar to those of owners of traditional housing in terms of public policy issues such as changes in crime, noise, and litter and trash.

Communities do not appear to have to consider any special factors that affect manufactured owned housing relative to traditional owned housing.

Exhibit 6

Variable Names and Definitions—Change in Housing Quality (1 of 2)

Variable Name	Variable Definition
d_howh	Change in housing quality ranking over the period (range +4 to -4)*
how_h	Level of housing quality at the start of the period
age_s	Age of the housing the structure in years at the start of the period
crowding	Ratio of persons per room
zsmhc	Monthly housing costs (as defined by the AHS) at the beginning of the period
zinc2	Annual household income in dollars at the start of the period
hc2inc	Ratio of monthly housing costs to household income at the beginning of the period
get_porch	1 = porch added to the unit during the period; 0 = otherwise
lose_porch	1 = porch removed from the unit during the period; 0 = otherwise
get_garage	1 = garage added to the unit during the period; 0 = otherwise
lose_garage	1 = garage removed from the unit during the period; 0 = otherwise
d_equip	Change in the number of the following items during the period: refrigerator, garbage disposal, stove/oven, dishwasher, washer/dryer
get_bathroom	1 = bathroom added to the unit during the period; 0 = otherwise
lose_bathroom	1 = bathroom removed from the unit during the period; 0 = otherwise
get_water	1 = hot and cold piped water added to the unit during the period; 0 = otherwise
lose_water	1 = hot and cold piped water removed from the unit during the period; 0 = otherwise

Exhibit 6

Variable Names and Definitions—Change in Housing Quality (2 of 2)

Variable Name	Variable Definition
ext_leak	1 = exterior leak in the last 12 months; 0 = otherwise
get_sewage	1 = unit connected to public sewer or septic system during the period; 0 = otherwise
lose_sewage	1 = unit disconnected from public sewer or septic system during the period; 0 = otherwise
get_cntrl_air	1 = central air conditioning added to the unit during the period; 0 = otherwise
lose_cntrl_air	1 = central air conditioning removed from the unit during the period; 0 = otherwise
d_struc_prob	Change in the number of the following structural problems during the period: sagging roof, missing roof materials, holes in roof, missing wall materials or siding, slopping exterior walls, broken windows, bars on windows, and/or crumbling foundation
get_int_leak	1 = interior leak developed during the period; 0 = otherwise
lose_int_leak	1 = interior leak eliminated during the period; 0 = otherwise
get_bad_int	1 = the following interior problems developed during the period: cracks or holes in walls or ceilings, holes in floor, broken plaster, and/or peeling paint more than 1 square foot; 0 = otherwise
lose_bad_int	1 = the following interior problems corrected during the period: cracks or holes in walls or ceilings, holes in floor, broken plaster, and/or peeling paint over one square foot; 0 = otherwise
d_wtr_prob	Change in the reported number of water source breakdowns from the beginning to the end of the period
d_tlt_prob	Change in the reported number of toilet breakdowns from the beginning to the end of the period
d_sew_prob	Change in the reported number of sewer breakdowns from the beginning to the end of the period
d_wrg_prob	Change in the reported number of wiring problems from the beginning to the end of the period
d_fus_blow	Change in the reported number of times fuses blew from the beginning to the end of the period
d_heat_brk	Change in the reported number of heating breakdowns last winter from the beginning to the end of the period
d_2goodheat	1 = changed to steam, electric, heat pump, or central warm air furnace from some other less desirable way of heating during the period; 0 = otherwise
get_vermin	1 = rats or mice infested the unit during the period; 0 = otherwise
lose_vermin	1 = rat or mouse infestation eliminated from the unit during the period; 0 = otherwise
mh_in_grp**	1 = two or more mobile homes in group; 0 = otherwise
ownlot**	1 = resident of manufactured housing owns the land on which the unit is located; 0 = otherwise

AHS = American Housing Survey.

**A change of +4 or -4 represents a change of 4 or more in either direction.*

***Available only for manufactured housing.*

Exhibit 7

Variable Names and Definitions—Change in Neighborhood Quality (1 of 3)

Variable Name	Variable Definition
d_hown	Change in neighborhood quality ranking over the period (range +4 to -4)*
how_n	Level of neighborhood quality at the start of the period
age_s	Age of the housing the structure in years at the start of the period
crowding	Ratio of persons per room
zsmhc	Monthly housing costs (as defined by the AHS) at the beginning of the period
zinc2	Annual household income in dollars at the start of the period
hc2inc	Ratio of monthly housing costs to household income at the beginning of the period
get_e_low	1 = single-family or other lowrise buildings built within 300 feet of unit during the period; 0 = otherwise
lose_e_low	1 = single-family or other lowrise buildings removed from within 300 feet of unit during the period; 0 = otherwise
get_e_mid	1 = midrise residential buildings built within 300 feet of unit during the period; 0 = otherwise
lose_e_mid	1 = midrise residential buildings removed from within 300 feet of unit during the period; 0 = otherwise
get_e_high	1 = highrise residential buildings built within 300 feet of unit during the period; 0 = otherwise
lose_e_high	1 = highrise residential buildings removed from within 300 feet of unit during the period; 0 = otherwise
get_e_mobil	1 = mobile homes located within 300 feet of the unit during the period; 0 = otherwise
lose_e_mobil	1 = mobile homes removed from within 300 feet of the unit during the period; 0 = otherwise
get_e_com	1 = commercial/institutional/industrial building built within 300 feet of the unit during the period; 0 = otherwise
lose_e_com	1 = commercial/institutional/industrial building removed from within 300 feet of the unit during the period; 0 = otherwise
get_e_prkg	1 = residential parking lots built within 300 feet of the unit during the period; 0 = otherwise
lose_e_prkg	1 = residential parking lots removed from within 300 feet of the unit during the period; 0 = otherwise
get_e_water	1 = body of water established within 300 feet of the unit during the period; 0 = otherwise
lose_e_water	1 = body of water removed from within 300 feet of the unit during the period; 0 = otherwise
get_e_green	1 = green space/park/woods/farm/ranch established within 300 feet of the unit; 0 = otherwise
lose_e_green	1 = green space/park/woods/farm/ranch removed from within 300 feet of the unit; 0 = otherwise
get_aban	1 = housing units become abandoned within 300 feet of the unit during the period; 0 = otherwise
lose_aban	1 = abandoned housing units become occupied within 300 feet of the unit during the period; 0 = otherwise

Exhibit 7

Variable Names and Definitions—Change in Neighborhood Quality (2 of 3)

Variable Name	Variable Definition
get_bars	1 = bars are placed on windows within 300 feet of the unit during the period; 0 = otherwise
lose_bars	1 = bars are removed from windows within 300 feet of the unit during the period; 0 = otherwise
get_rd_prob	1 = road problems develop within 300 feet of the unit during the period; 0 = otherwise
lose_rd_prob	1 = road problems are eliminated within 300 feet of the unit during the period; 0 = otherwise
get_junk	1 = trash, litter, or junk has become a problem in the neighborhood during the period; 0 = otherwise
lose_junk	1 = a trash, litter, or junk problem in the neighborhood has been eliminated during the period; 0 = otherwise
get_nucrim_p	1 = during the period residents have become concerned with crime as a problem; 0 = otherwise
lose_nucrim_p	1 = during the period crime has been eliminated as a concern for the household; 0 = otherwise
get_noise_p	1 = during the period noise has become bothersome in the neighborhood; 0 = otherwise
lose_noise_p	1 = during the period noise has been eliminated as bothersome in the neighborhood; 0 = otherwise
get_litter_p	1 = during the period litter or housing deterioration has become a concern in the neighborhood; 0 = otherwise
lose_litter_p	1 = during the period litter or housing deterioration has been eliminated as a concern in the neighborhood; 0 = otherwise
get_badsrv_p	1 = during the period poor city or county services in the neighborhood has become a concern; 0 = otherwise
lose_badsrv_p	1 = during the period poor city or county services in the neighborhood has been eliminated as a concern; 0 = otherwise
get_badprp_p	1 = during the period undesirable residential uses have become a problem in the neighborhood; 0 = otherwise
lose_badprp_p	1 = during the period undesirable residential uses have been eliminated as a problem in the neighborhood; 0 = otherwise
get_badper	1 = during the period undesirable people in the neighborhood have become a problem; 0 = otherwise;
lose_badper	1 = undesirable people in the neighborhood are no longer a problem at the end of the period; 0 = otherwise
get_othnhd_p	1 = during the period some other feature has become a problem; 0 = otherwise
lose_othnhd_p	1 = during the period some other feature has been eliminated as a problem; 0 = otherwise
get_schm_p	1 = during the period schools in the area have come to be viewed as inadequate; 0 = otherwise
lose_schm_p	1 = during the period schools in the area have come to be viewed as adequate; 0 = otherwise
get_shp_p	1 = during the period shopping in the area has come to be viewed as inadequate; 0 = otherwise

Exhibit 7

Variable Names and Definitions—Change in Neighborhood Quality (3 of 3)

Variable Name	Variable Definition
lose_shp_p	1 = during the period shopping in the area has come to be viewed as adequate; 0 = otherwise
get_good_trn	1 = during the period public transportation in the area has come to be viewed as inadequate; 0 = otherwise
lose_good_trn	1 = during the period public transportation in the area has come to be viewed as adequate; 0 = otherwise
mh_in_grp**	1 = two or more mobile homes in group; 0 = otherwise
ownlot**	1 = resident of manufactured housing owns the land on which the unit is located; 0 = otherwise

AHS = American Housing Survey.

**A change of +4 or -4 represents a change of 4 or more in either direction.*

***Available only for manufactured housing.*

Exhibit 8

N-Chotomous Probit Results—Change in Housing Quality, 1993–1997 (1 of 2)

Variable Name	1993–1997					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	5.342	47.924	4.490	12.420	4.241	28.128
how_h	– 0.434	– 43.185	– 0.378	– 12.008	– 0.339	– 24.766
age_s	– 0.003	– 6.023	– 0.001	– 0.126	– 0.003	– 2.884
crowding	– 0.167	– 3.055	– 0.305	– 1.729	– 0.296	– 4.360
hc2inc	0.000	– 0.010	– 0.001	– 1.052	0.000	– 1.121
get_porch	0.036	0.739	– 0.149	– 0.894	0.023	0.288
lose_porch	– 0.041	– 0.893	0.006	0.043	– 0.115	– 1.581
get_garage	– 0.030	– 0.448	0.587	2.608	0.093	0.998
lose_garage	0.017	0.315	– 0.475	– 2.618	0.032	0.292
d_equip	0.026	1.159	0.133	1.995	0.108	2.988
get_bathroom	– 0.012	– 0.118	– 0.131	– 0.131	0.173	0.751
lose_bathroom	0.250	0.340	NA	NA	NA	NA
get_water	0.046	0.133	NA	NA	8.259	1.000
lose_water	– 0.194	– 0.771	1.545	0.711	– 0.338	0.496
ext_leak	– 0.084	– 2.591	– 0.119	– 1.038	– 0.184	0.003
get_sewage	0.109	0.908	0.329	1.509	0.039	0.880
lose_sewage	0.036	0.407	0.021	0.122	0.201	0.184
get_cntrl_air	0.083	1.412	0.330	1.790	– 0.007	0.952
lose_cntrl_air	– 0.108	– 1.276	0.358	1.315	0.080	0.525
d_struc_prob	– 0.140	– 7.729	– 0.207	– 3.002	– 0.136	0.000
get_int_leak	– 0.024	– 0.402	– 0.092	– 0.529	– 0.167	0.027
lose_int_leak	– 0.110	– 1.797	0.340	1.484	– 0.335	0.000
get_bad_int	– 0.288	– 5.179	– 0.473	– 2.278	– 0.446	0.000
lose_bad_int	– 0.037	– 0.647	– 0.258	– 1.154	0.250	0.001
d_wtr_prob	0.013	0.267	– 0.212	– 1.494	– 0.130	0.003
d_tlt_prob	0.015	0.426	0.141	0.774	– 0.083	0.047
d_sew_prob	0.040	0.768	0.054	0.222	0.032	0.699

Exhibit 8

N-Chotomous Probit Results—Change in Housing Quality, 1993–1997 (2 of 2)

Variable Name	1993–1997					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
d_wrg_prob	– 0.111	– 2.023	– 0.024	– 0.113	0.160	0.048
d_fus_blow	– 0.008	– 0.519	– 0.028	– 0.588	– 0.012	0.625
d_heat_brk	– 0.004	– 0.100	– 0.186	– 0.837	– 0.055	0.133
d_2goodheat	0.094	1.914	0.045	0.315	0.040	0.613
get_vermin	– 0.119	– 3.597	– 0.106	– 0.999	– 0.077	0.172
lose_vermin	– 0.041	– 0.354	0.076	0.007	0.125	0.339
mh_in_grp	NA	NA	– 0.048	– 0.397	NA	NA
ownlot	NA	NA	0.108	0.890	NA	NA
Mu(1)	0.468	0.468	0.591	6.413	0.471	12.340
Mu(2)	1.174	1.174	1.191	11.125	1.017	21.991
Mu(3)	1.735	1.735	1.639	14.749	1.570	31.845
Mu(4)	3.122	3.122	2.741	20.863	2.658	45.694
Mu(5)	3.754	3.754	3.373	23.538	3.239	50.226
Mu(6)	4.502	4.502	4.051	21.975	3.829	49.192
Mu(7)	5.096	5.096	4.543	22.485	4.383	48.391
Number of observations	6,344		602		2,196	
Log likelihood function	– 9,794.004		– 1,014.336		– 3,749.38	
Restricted log likelihood	– 11,372.28		– 1,190.434		– 4,324.191	
Chi-squared	3,156.542		352.1962		1,149.621	
Degrees of freedom	33		33		32	

NA = not applicable.

Exhibit 9

N-Chotomous Probit Results—Change in Neighborhood Quality, 1993–1997 (1 of 2)

Variable Name	1993–1997					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	5.166	56.546	4.734	12.566	4.118	29.842
how_n	– 0.439	– 52.153	– 0.410	– 12.550	– 0.348	– 28.521
hc2inc	0.000	– 0.327	– 0.004	– 4.877	0.000	0.215
get_e_low	– 0.066	– 1.662	0.009	0.028	0.007	0.124
lose_e_low	– 0.165	– 2.160	– 0.648	– 1.057	0.084	1.146
get_e_mid	– 0.197	– 1.776	1.005	1.246	– 0.070	– 0.857
lose_e_mid	0.418	2.482	– 7.939	0.000	– 0.045	– 0.438
get_e_high	0.084	0.471	– 0.435	– 0.574	– 0.187	– 1.822
lose_e_high	– 0.006	– 0.017	NA	NA	– 0.018	– 0.139
get_e_mobil	– 0.078	– 1.729	0.043	0.404	0.063	0.515
lose_e_mobil	0.081	0.465	0.463	1.757	– 0.189	– 0.679
get_e_com	– 0.039	– 1.046	0.078	0.500	– 0.082	– 1.584
lose_e_com	– 0.153	– 1.414	– 0.246	– 0.724	0.057	0.571
get_e_prkg	– 0.022	– 0.521	– 0.104	– 0.554	0.007	0.131
lose_e_prkg	– 0.049	– 0.293	– 0.444	– 0.730	– 0.088	– 0.810
get_e_water	0.036	0.892	0.196	1.623	0.091	0.996

Exhibit 9

N-Chotomous Probit Results—Change in Neighborhood Quality, 1993–1997 (2 of 2)

Variable Name	1993–1997					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
lose_e_water	– 0.053	– 0.135	– 0.070	– 0.025	0.326	1.328
get_e_green	0.084	2.712	0.022	0.211	0.141	2.315
lose_e_green	– 0.044	– 0.589	– 0.037	– 0.127	0.039	0.424
get_aban	– 0.227	– 4.027	– 0.632	– 2.719	– 0.249	– 3.060
lose_aban	0.051	0.378	– 0.178	– 0.405	– 0.125	– 1.105
get_bars	– 0.157	– 3.261	– 0.080	– 0.226	0.004	0.050
lose_bars	– 0.351	– 3.198	– 0.132	0.000	– 0.050	– 0.605
get_rd_prob	– 0.117	– 3.927	– 0.217	– 2.055	– 0.093	– 1.752
lose_rd_prob	0.041	0.650	0.062	0.331	– 0.009	– 0.118
get_junk	– 0.363	– 7.837	– 0.265	– 1.231	– 0.093	– 1.109
lose_junk	– 0.087	– 1.461	– 0.033	– 0.175	– 0.069	– 1.079
get_nucrim_p	– 0.534	– 11.917	– 0.960	– 5.748	– 0.757	– 10.988
lose_nucrim_p	0.249	3.084	0.066	0.142	0.069	0.859
get_noise_p	– 0.359	– 9.368	– 0.550	– 3.248	– 0.475	– 7.400
lose_noise_p	– 0.102	– 1.635	– 0.609	– 2.602	0.021	0.260
get_litter_p	– 0.772	– 9.328	– 0.649	– 1.056	0.066	0.384
lose_litter_p	– 0.001	– 0.020	0.137	0.547	– 0.364	– 3.299
get_badsrv_p	– 0.281	– 2.287	– 0.434	– 0.539	0.178	0.477
lose_badsrv_p	0.302	2.216	– 0.106	– 0.158	0.229	1.311
get_badprp_p	– 0.163	– 1.135	– 0.412	– 0.548	– 0.502	– 1.883
lose_badprp_p	0.014	0.136	0.046	0.071	– 0.168	– 0.840
get_badper	– 0.712	– 10.838	– 0.916	– 3.076	– 0.680	– 6.694
lose_badper	0.000	– 0.005	0.167	0.984	– 0.017	– 0.261
get_othnhd_p	– 0.376	– 6.851	– 0.073	– 0.337	– 0.280	– 2.920
lose_othnhd_p	0.005	0.105	0.149	0.913	0.023	0.257
get_schm_p	– 0.404	– 3.143	– 1.798	– 4.118	– 0.402	– 2.537
lose_schm_p	– 0.226	– 2.677	0.439	1.335	– 0.004	– 0.030
get_shp_p	– 0.001	– 0.029	0.004	0.028	– 0.128	– 1.426
lose_shp_p	– 0.041	– 0.929	0.031	0.213	0.174	2.024
get_good_trn	0.021	0.479	– 0.127	– 0.623	0.025	0.366
lose_good_trn	0.028	0.605	0.045	0.201	0.031	0.414
mh_in_grp	NA	NA	– 0.007	– 0.053	NA	NA
ownlot	NA	NA	0.224	1.844	NA	NA
Mu(1)	0.501	18.352	0.387	4.915	0.474	12.000
Mu(2)	1.201	36.771	1.086	10.697	1.016	21.005
Mu(3)	1.800	53.044	1.615	15.002	1.545	29.837
Mu(4)	3.142	81.279	2.932	22.905	2.710	43.640
Mu(5)	3.838	89.388	3.531	24.684	3.238	47.494
Mu(6)	4.581	88.220	4.311	24.586	3.856	48.640
Mu(7)	5.180	83.568	4.933	21.376	4.346	48.981
Number of observations	6,344		602		2,196	
Log likelihood function	– 9,771.438		– 942.4089		– 3,649.236	
Restricted log likelihood	– 11,825.6		– 1,146.982		– 4,385.621	
Chi-squared	4,108.316		409.1458		1,472.769	
Degrees of freedom	47		48		47	

NA = not applicable.

Exhibit 10

N-Chotomous Probit Results—Change in Housing Quality, 1997–2001 (1 of 2)

Variable Name	1997–2001					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	5.4113	48.175	5.0519	13.305	4.1973	25.897
how_h	– 0.4419	– 43.577	– 0.4141	– 12.651	– 0.3350	– 23.106
age_s	– 0.0036	– 5.584	– 0.0058	– 1.264	– 0.0045	– 3.991
crowding	– 0.1669	– 2.935	– 0.2723	– 1.404	– 0.2191	– 2.852
hc2inc	0.0000	– 0.539	– 0.0004	– 0.563	0.0000	0.159
get_porch	0.0412	0.937	– 0.0351	– 0.249	0.0945	1.309
lose_porch	– 0.0322	– 0.443	0.4407	1.911	– 0.0674	– 0.518
get_garage	0.0108	0.211	0.3101	2.033	– 0.0111	– 0.108
lose_garage	0.0534	0.777	0.2510	1.089	0.0622	0.571
d_equip	0.0300	1.098	0.1934	2.183	0.0611	1.493
get_bathroom	– 0.6440	– 1.509	NA	NA	NA	NA
lose_bathroom	1.6150	0.000	– 0.0897	– 0.136	NA	NA
get_water	0.3017	0.891	0.9689	0.688	0.6371	0.774
lose_water	– 1.6969	0.000	– 0.8997	– 1.360	0.0575	0.069
ext_leak	– 0.1553	– 4.004	– 0.1987	– 1.746	– 0.0870	– 1.123
get_sewage	– 0.2751	– 1.979	– 0.4363	– 1.530	0.1041	0.385
lose_sewage	0.0582	0.782	– 0.2116	– 1.291	0.5345	2.431
get_cntrl_air	0.0492	0.906	0.0424	0.269	0.0920	0.840
lose_cntrl_air	– 0.1304	– 1.333	0.1070	0.546	0.1723	1.134
d_struc_prob	– 0.0905	– 6.259	– 0.1219	– 2.194	– 0.1059	– 5.131
get_int_leak	– 0.1721	– 3.065	– 0.4061	– 2.457	– 0.4651	– 5.391
lose_int_leak	– 0.1913	– 3.299	0.0333	0.174	– 0.2065	– 2.839
get_bad_int	– 0.1971	– 3.340	– 0.7624	– 3.873	– 0.3025	– 3.349
lose_bad_int	– 0.0920	– 1.482	– 0.4247	– 2.000	– 0.0750	– 0.843
d_wtr_prob	0.0245	0.597	– 0.0031	– 0.035	0.0153	0.372
d_tlt_prob	– 0.0664	– 0.887	0.0924	0.354	– 0.1127	– 2.140
d_sew_prob	0.0168	0.282	– 0.3877	– 0.815	0.0447	0.330
d_wrg_prob	0.0192	0.254	– 0.0413	– 0.168	0.0797	0.947
d_fus_blow	– 0.0554	– 2.900	– 0.0357	– 0.538	– 0.0245	– 0.938
d_heat_brk	– 0.0513	– 1.547	– 0.0093	– 0.091	– 0.0771	– 2.154
d_2goodheat	0.0120	0.148	– 0.2818	– 1.113	0.0810	0.584
get_vermin	– 0.0223	– 0.523	– 0.1588	– 1.203	– 0.2310	– 3.005
lose_vermin	– 0.0288	– 0.697	0.1508	1.114	– 0.0376	– 0.428
mh_in_grp	NA	NA	– 0.1059	– 0.848	NA	NA
ownlot	NA	NA	– 0.1952	– 1.611	NA	NA
Mu(1)	0.5529	15.850	0.4151	5.661	0.4926	10.837
Mu(2)	1.2278	30.390	1.0337	10.648	1.1534	20.856
Mu(3)	1.8053	43.389	1.5101	14.737	1.7376	30.038
Mu(4)	3.1711	69.221	2.7729	21.326	2.8563	44.652
Mu(5)	3.9047	79.185	3.3636	23.429	3.4304	50.288
Mu(6)	4.7650	81.306	4.0745	23.052	4.1794	50.947
Mu(7)	5.3897	77.945	4.7194	21.625	4.7045	49.855
Number of observations	5,994		614		2,004	
Log likelihood function	– 9,112.10		– 992.6159		– 3,311.410	

Exhibit 10

N-Chotomous Probit Results—Change in Housing Quality, 1997–2001 (2 of 2)

Variable Name	1997–2001					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Restricted log likelihood	– 10,817.53		– 1,202.662		– 3,930.412	
Chi-squared	3,410.86		420.0928		1,238.005	
Degrees of freedom	33		34		31	

NA = not applicable.

Exhibit 11

N-Chotomous Probit Results—Change in Neighborhood Quality, 1997–2001 (1 of 2)

Variable Name	1997–2001					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	4.5975	49.572	4.5991	14.941	4.2095	28.363
how_n	– 0.3810	– 45.027	– 0.3878	– 12.991	– 0.3620	– 26.142
hc2inc	0.0000	– 0.123	– 0.0004	– 0.895	0.0000	– 0.484
get_e_low	0.0063	0.122	– 0.1185	– 0.556	0.0126	0.169
lose_e_low	0.1338	2.455	0.1317	0.602	0.0250	0.372
get_e_mid	– 0.3045	– 2.539	– 0.2043	0.000	– 0.0003	– 0.003
lose_e_mid	0.1213	0.823	– 7.7943	0.000	– 0.0415	– 0.474
get_e_high	0.2284	0.649	NA	NA	0.0339	0.233
lose_e_high	0.4473	2.348	NA	NA	– 0.2696	– 2.171
get_e_mobil	– 0.0795	– 1.438	0.1758	0.930	0.2243	1.584
lose_e_mobil	– 0.0782	– 1.240	0.2964	1.401	– 0.0481	– 0.279
get_e_com	– 0.0927	– 2.050	– 0.2266	– 1.246	– 0.0465	– 0.639
lose_e_com	– 0.0109	– 0.210	– 0.0427	– 0.245	0.0654	0.951
get_e_prkg	0.0542	0.993	– 0.0377	– 0.212	0.0477	0.584
lose_e_prkg	– 0.0899	– 1.509	– 0.0171	– 0.073	0.0001	0.002
get_e_water	0.0601	0.995	– 0.0185	– 0.128	0.0357	0.304
lose_e_water	0.0065	0.108	– 0.0337	– 0.204	0.0427	0.398
get_e_green	– 0.0494	– 1.208	0.0089	0.064	0.0111	0.154
lose_e_green	0.0327	0.833	0.0438	0.361	– 0.0364	– 0.554
get_aban	– 0.3306	– 5.234	– 0.3346	– 1.618	– 0.3426	– 3.416
lose_aban	– 0.2179	– 3.345	0.2879	0.987	– 0.1198	– 1.304
get_bars	0.0821	1.313	– 0.2888	– 0.730	– 0.0504	– 0.541
lose_bars	– 0.0993	– 1.784	– 0.3373	– 0.967	– 0.0214	– 0.285
get_rd_prob	– 0.1011	– 2.856	– 0.1281	– 1.015	– 0.1230	– 2.005
lose_rd_prob	0.0144	0.392	– 0.0176	– 0.133	– 0.1002	– 1.673
get_junk	– 0.5984	– 12.083	– 0.7349	– 3.877	– 0.3599	– 4.485
lose_junk	– 0.0875	– 1.748	– 0.0532	– 0.209	– 0.1512	– 2.131
get_nucrim_p	– 0.5507	– 10.110	– 0.2184	– 0.993	– 0.5783	– 7.230
lose_nucrim_p	0.0914	1.748	0.1120	0.485	0.0347	0.435
get_noise_p	– 0.2350	– 4.995	– 0.1079	– 0.608	– 0.3071	– 4.065
lose_noise_p	– 0.0037	– 0.075	– 0.0346	– 0.205	0.0480	0.649

Exhibit 11

N-Chotomous Probit Results—Change in Neighborhood Quality, 1997–2001 (2 of 2)

Variable Name	1997–2001					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
get_litter_p	– 0.4315	– 5.255	– 0.2433	– 0.499	– 0.1497	– 0.968
lose_litter_p	– 0.0255	– 0.259	0.1081	0.103	– 0.1280	– 0.641
get_badsrv_p	– 0.7115	– 6.338	– 0.0276	– 0.054	– 0.2948	– 1.038
lose_badsrv_p	– 0.1328	– 0.876	7.0334	0.000	– 0.1291	– 0.419
get_badprp_p	– 0.2464	– 1.900	0.7044	0.000	– 0.1727	– 0.677
lose_badprp_p	0.0429	0.325	0.0116	0.007	0.1072	0.478
get_badper	– 0.5272	– 8.560	– 0.8275	– 2.672	– 0.4186	– 3.757
lose_badper	– 0.0476	– 0.757	– 0.1051	– 0.449	0.0944	0.974
get_othnhd_p	– 0.3551	– 6.649	0.1360	0.612	– 0.2242	– 2.520
lose_othnhd_p	– 0.1468	– 2.729	– 0.1704	– 0.850	– 0.0145	– 0.134
get_schm_p	– 0.6356	– 5.483	0.1668	0.430	– 0.1723	– 0.671
lose_schm_p	– 0.1973	– 1.404	0.2511	0.567	– 0.2345	– 1.278
get_shp_p	– 0.0196	– 0.454	– 0.4373	– 2.653	– 0.0700	– 0.807
lose_shp_p	0.0420	0.980	0.0938	0.689	0.0121	0.126
get_good_trn	0.0079	0.221	0.2690	1.928	0.0007	0.011
lose_good_trn	0.0093	0.156	0.0487	0.164	– 0.1327	– 1.445
mh_in_grp	NA	NA	– 0.0569	– 0.476	NA	NA
ownlot	NA	NA	0.0884	0.778	NA	NA
Mu(1)	0.5373	17.155	0.4281	4.754	0.4725	10.075
Mu(2)	1.1680	31.783	1.1233	10.008	1.0800	18.945
Mu(3)	1.7743	46.576	1.6571	14.135	1.6667	27.615
Mu(4)	3.0561	73.282	2.9473	21.486	2.7501	40.689
Mu(5)	3.7865	84.436	3.6292	24.240	3.4178	46.953
Mu(6)	4.5467	84.951	4.4129	24.654	4.1361	49.221
Mu(7)	5.1490	82.494	4.8387	23.565	4.7238	48.894
Number of observations	5,994		614		2,004	
Log likelihood function	– 9,365.427		– 963.6032		– 3,292.085	
Restricted log likelihood	– 11094.61		– 1,169.484		– 4,014.898	
Chi-squared	3,458.358		411.7607		1,445.626	
Degrees of freedom	47		47		47	

NA = not applicable.

Household Mobility and Manufactured Owned Housing: Implications for Neighborhood Stability

The results presented previously indicate that households in manufactured owned housing and traditional owned housing are quite similar in their assessments of both the structural aspects of housing and neighborhood quality. Indeed, housing policy for low-income households is considerably simplified by the simple yet powerful observation that quality is invariant across low-income housing options.

Despite these observations, the questionnaire studies cited in the first section reveal a general belief that manufactured housing is somehow associated with less community stability. The purpose of the analysis in this section is to explore this conjecture.

In this section, we explore stability in terms of whether households that reside in manufactured owned housing tend to move more than households in traditional owned housing and rented housing do. Specifically, even if we adjust for the structural characteristics of housing options and characteristics of the neighborhood, is there a tendency to observe additional mobility due solely to an effect associated with manufactured owned housing? Is there a negative effect on community stability that is peculiar to the manufactured owned housing option for low-income households? In other words, does manufactured owned housing lead to movement of low-income households from one housing alternative to the next at a more rapid rate than that of low-income households in traditional owned housing and rented housing?

The Model

In much of the mobility literature, the traditional estimation approach to the likelihood of moving generally involves a regression format (as a logit or probit specification) with the likelihood of "moving-staying" subsequently evaluated at the mean values of the sample. This likelihood is an average value over the sample period. In contrast, our model specification provides the opportunity to calculate a cumulative probability that varies over time and across different household types. To obtain the likelihood of household mobility reported here, we use the duration modeling approach of the continuous time model (CTM) as extensively developed by James Heckman in such works as Heckman and Walker (1990, 1986) and recently used by Boehm and Schlottmann (2004). Continuous time duration models, and the CTM approach in particular, provide superior insights into the intertemporal dynamics of economic relationships. To estimate the hazard function, these models make use of all the information available in a panel data set on the timing of change from one economic state of existence to another, as well as the timing and magnitude of changes in the values of the independent variable hypothesized to influence the transition from one state of existence to another.[25] The critical feature of the CTM model for the issue of manufactured owned housing and neighborhood stability is that it allows for estimation of a so-called duration term (parameter) that represents the separate effect of time in residence in a specific type of housing on the likelihood of moving. This effect on mobility is independent of other factors included in the

[25] Heckman and Flinn (1982) present a good discussion of the practical advantages of using continuous time duration models to analyze a problem as opposed to regression approaches and discrete time probability models.

analysis, such as household structure and neighborhood characteristics, and represents a unique push or pull factor associated with the specific housing type.[26]

Data, Samples, and Variables

The time period for the analysis of mobility among low-income households is the entire sample period; that is, 1991 to 2001. Over this period, mobility is estimated for households that reside in the three types of housing of interest (manufactured owned housing, traditional owned housing, and rented housing). Exhibit 12 shows the names and definitions of all the variables included in the analysis of household mobility. As shown in exhibit 12, mobility is hypothesized to be a function of three factors: (1) disequilibrium in housing consumption (for example, overcrowding measured by a high persons-per-room ratio, or high housing costs relative to household income), (2) factors affecting the cost of moving (for example, older individuals find it more difficult to move than younger ones do), and (3) the quality of the structure and neighborhood in which the household resides at a specific point in time.

Exhibit 13 shows the relative number of movers and stayers by housing option over the sample period. Not surprisingly, residents of traditional owned housing have the lowest (average) likelihood of moving over the period while residents of rented housing, not manufactured owned housing, have the highest probability of moving. Mobility rates among households that reside in manufactured owned housing fall in between these two extremes but, in percentage terms, are closer to traditional owned housing than to rented housing. These observations are, of course, based on average rates of mobility and do not necessarily reflect variation in causal factors. Exhibit 14 contains means for each included variable by tenure type. Most of the values shown appear to be consistent with prior work. For example, movers tend to be younger, with lower marital rates and higher incomes.

Empirical Results

Exhibit 15 contains the estimated coefficients in the CTM model for each tenure type. In general, the estimates are broadly consistent with expected results; for example, the age selectivity of mobility is shown across housing type (older households move less) and increased household size impedes mobility, where significant households with minority heads or single heads have lower mobility.[27] Based on the previous discussions on structural quality and neighborhood quality, we would expect higher values for either of these factors to decrease household mobility. This scenario is indeed the case in exhibit 15, where both variables are consistently negative across all housing options (if not statistically significant).

[26] More formally, the technical literature refers to this effect as duration dependence. Positive duration dependence implies that a household is more likely to leave its current situation over time and negative duration dependence implies that the household is less likely to leave its current situation over time. In the current instance, negative duration dependence, given other factors included in the analysis, implies greater neighborhood stability; that is, less moving in and out by neighborhood residents.

[27] The education selectivity of migration (household heads with more education are more likely to move) is only partially seen in the results. This trend is due to the inclusion of income (which is generally significant), a factor obviously directly related to education.

A major point of interest in exhibit 15 is the results for duration dependence for the individual housing types; that is, what effect (if any) does time in residence have on mobility independent of traditional issues such as structural quality and neighborhood quality? As shown in exhibit 15, *both* manufactured owned housing and traditional owned housing exhibit statistically significant negative duration dependence. That is to say, controlling for the effects of all the independent variables included in the mobility equation, the likelihood of moving decreases over time for households residing in these housing options. In simple terms, no empirical evidence of neighborhood instability is associated with manufactured owned housing. Residents of manufactured owned housing tend toward stability of location in a manner quite similar to that of residents of traditional owned housing. To the best of our knowledge, this is the first time such an observation has been validated in the literature on either low-income housing or manufactured housing. In direct contrast, rented housing exhibits positive duration dependence; that is, a tendency for a household to move the longer it resides in a rented housing unit. This trend could, of course, reflect households purchasing homes, but, whatever the reason, it represents an attempt to leave an environment that has become less desirable over time. The main point, however, is that manufactured owned housing does not inherently generate movement over time by the low-income households residing in this type of housing unit.

Exhibit 12

Variable Names and Definitions—Mobility Regression (1 of 2)

Variable Name	Variable Definition
how_h	Ranking of the overall quality of the structure by the household: 10 (best) to 1 (worst)
how_n	Ranking of the overall quality of the neighborhood by the household: 10 (best) to 1 (worst)
northeast	1 = current residence located in the northeastern United States; 0 = otherwise
midwest	1 = current residence located in the midwestern United States; 0 = otherwise
south	1 = current residence located in the southern United States; 0 = otherwise
rural	1 = current residence located in a rural area; 0 = otherwise
married	1 = household headed by husband and wife or partners; 0 = otherwise
s_male	1 = household headed by a single male; 0 = otherwise
s_female	1 = household headed by single female; 0 = otherwise
white	1 = race of household head is White; 0 = otherwise
black	1 = race of household head is Black; 0 = otherwise
hispanic	1 = race of household head is Hispanic; 0 = otherwise
other	1 = race of household head is other than White, Black, or Hispanic; 0 = otherwise
no_hs	1 = household head did not graduate from high school; 0 = otherwise
hs_grad	1 = household head is high school graduate without additional education; 0 = otherwise
post_hs	1 = household head has additional education beyond high school, but is not a graduate of a 4-year college or university; 0 = otherwise
c_grad_p	1 = household head has a degree from a 4-year college or university, or more; 0 = otherwise

Exhibit 12

Variable Names and Definitions—Mobility Regression (2 of 2)

Variable Name	Variable Definition
yrs_in_res91	Number of years the household head resided in current residence before 1991, the start of the observation period.
age	Age of the household head in years.
fsize	Number of people in the household
income	Annual income of the household measured in $10,000 units
hc2inc	Monthly housing cost/monthly household income
per2rms	Persons per room for a given household
mf_ownlot	1 = if in manufactured owned housing and own lot; 0 = otherwise

Exhibit 13

Mobility Transition Matrix, 1991–2001

Housing Type	Stayed Entire Time	Moved During Period
Traditional Owned Housing		
Count	3,169	2,043
Percent of total	60.80%	39.20%
Mean duration in years	10	3.68
Manufactured Owned Housing		
Count	260	323
Percent of total	44.60%	55.40%
Mean duration in years	10	2.57
Rented Housing		
Count	761	5,248
Percent of total	12.66%	87.34%
Mean duration in years	10	1.98

Exhibit 14a

Variable Means—Owners Traditional Housing, 1991–2001 (1 of 2)

Variable Name	Movers 1991	Movers Year Moved	Stayers 1991	Stayers 1999
age	56.911	58.500	60.779	66.739
how_n	8.131	8.110	8.347	8.269
how_h	8.550	8.464	8.643	8.505
s_female	0.339	0.405	0.310	0.411
s_male	0.164	0.201	0.084	0.123
mar	0.496	0.394	0.606	0.466
fsize	2.267	2.137	2.382	2.087
income	2.905	2.589	2.590	3.114
zsmhc	469.415	488.357	371.287	448.369
black	0.063	0.062	0.113	0.115
white	0.879	0.876	0.824	0.816
hispanic	0.044	0.047	0.051	0.054

Exhibit 14a

Variable Means—Owners Traditional Housing, 1991–2001 (2 of 2)

Variable Name	Movers 1991	Movers Year Moved	Stayers 1991	Stayers 1999
other	0.015	0.015	0.012	0.014
yrs_in_res91	16.767	16.767	22.165	22.175
per2rms	0.398	0.378	0.413	0.366
northeast	0.174	0.174	0.208	0.208
midwest	0.322	0.322	0.296	0.296
south	0.321	0.321	0.345	0.345
west	0.183	0.183	0.151	0.151
msa_ccity	0.302	0.302	0.273	0.273
msa_suburban	0.352	0.352	0.326	0.326
msa_rural	0.113	0.113	0.141	0.141
non_rural	0.135	0.135	0.168	0.168
non_urban	0.098	0.098	0.092	0.092
no_hs	0.265	0.263	0.323	0.317
hs_grad	0.390	0.378	0.420	0.360
post_hs	0.175	0.194	0.145	0.210
c_grad_p	0.170	0.164	0.111	0.113
mf_ownlot	NA	NA	NA	NA
Number of observations		2,043		3,169

NA = not applicable.

Exhibit 14b

Variable Means—Manufactured Owned Housing, 1991–2001 (1 of 2)

Variable Name	Movers 1991	Movers Year Moved	Stayers 1991	Stayers 1999
age	49.576	50.573	58.185	64.892
how_n	7.960	7.833	8.435	8.419
how_h	8.149	7.947	8.250	8.169
s_female	0.356	0.372	0.331	0.415
s_male	0.183	0.186	0.146	0.173
mar	0.461	0.443	0.523	0.412
fsize	2.288	2.285	2.238	1.919
income	2.077	2.067	1.843	2.253
zsmhc	316.291	333.988	257.331	324.077
black	0.040	0.040	0.065	0.065
white	0.901	0.898	0.892	0.904
hispanic	0.040	0.040	0.031	0.027
other	0.019	0.022	0.012	0.004
yrs_in_res91	6.731	6.731	11.415	11.415
per2rms	0.504	0.503	0.463	0.402
northeast	0.115	0.115	0.150	0.150
midwest	0.248	0.248	0.192	0.192
south	0.372	0.372	0.427	0.427
west	0.266	0.266	0.231	0.231
msa_ccity	0.090	0.090	0.069	0.069
msa_suburban	0.269	0.269	0.200	0.200
msa_rural	0.313	0.313	0.281	0.281

Exhibit 14b

Variable Means—Manufactured Owned Housing, 1991–2001 (2 of 2)

Variable Name	Movers 1991	Movers Year Moved	Stayers 1991	Stayers 1999
non_rural	0.276	0.276	0.362	0.362
non_urban	0.053	0.053	0.088	0.088
no_hs	0.322	0.322	0.415	0.423
hs_grad	0.464	0.449	0.419	0.358
post_hs	0.161	0.170	0.127	0.181
c_grad_p	0.053	0.059	0.038	0.038
mf_ownlot	0.260	0.248	0.438	0.454
Number of observations		323		260

Exhibit 14c

Variable Mobility Means—Rented Housing Units, 1991–2001

Variable Name	Movers 1991	Movers Year Moved	Stayers 1991	Stayers 1999
age	40.133	40.910	54.368	61.319
how_n	7.318	7.254	7.691	7.737
how_h	7.513	7.427	8.058	7.883
s_female	0.453	0.460	0.531	0.568
s_male	0.250	0.254	0.201	0.201
mar	0.296	0.287	0.268	0.231
fsize	2.381	2.365	2.205	2.068
income	2.108	2.098	1.847	2.471
zsmhc	451.636	463.885	401.523	504.689
black	0.175	0.176	0.209	0.217
white	0.645	0.642	0.614	0.602
hispanic	0.137	0.137	0.142	0.148
other	0.044	0.045	0.035	0.033
yrs_in_res91	3.865	3.865	9.811	9.811
per2rms	0.580	0.577	0.517	0.485
northeast	0.200	0.200	0.382	0.382
midwest	0.237	0.237	0.210	0.210
south	0.310	0.310	0.226	0.226
west	0.253	0.253	0.181	0.181
msa_ccity	0.500	0.500	0.510	0.510
msa_suburban	0.324	0.324	0.302	0.302
msa_rural	0.046	0.046	0.038	0.038
non_rural	0.045	0.045	0.078	0.078
non_urban	0.086	0.086	0.072	0.072
no_hs	0.255	0.256	0.389	0.381
hs_grad	0.366	0.359	0.352	0.305
post_hs	0.208	0.215	0.138	0.197
c_grad_p	0.171	0.171	0.121	0.117
mf_ownlot	NA	NA	NA	NA
Number of observations		5,248		761

NA = not applicable.

Exhibit 15

Mobility Coefficients and t-Statistics

Variable Name	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
intercept	0.8383	2.1827	1.8351	3.4629	3.3703	24.6842
duration	– 0.1856	– 6.0759	– 0.2463	– 3.0306	0.0670	3.2644
how_h	– 0.0272	– 0.3140	– 0.0184	– 0.5123	– 0.0365	– 4.5516
how_n	– 0.1282	– 2.1771	– 0.0115	– 0.3804	– 0.0470	– 1.6543
howh_sq	0.0016	0.2696	NA	NA	NA	NA
hown_sq	0.0071	1.6370	NA	NA	0.0040	1.8088
midwest	0.1544	2.3601	0.1146	0.5412	0.2768	7.7210
south	0.0810	1.2200	0.1339	0.6643	0.3264	9.5870
west	0.1582	2.1198	0.2759	1.2965	0.2929	8.1970
rural	– 0.1712	– 2.5681	– 0.1895	– 1.4523	– 0.3256	– 5.9115
s_female	0.4571	7.8776	0.1468	1.0087	– 0.0628	– 1.7810
s_male	0.7557	11.4036	– 0.0557	– 0.3106	– 0.0619	– 1.5298
black	– 0.6814	– 7.4451	– 0.3304	– 1.0757	– 0.1527	– 4.3637
hispanic	– 0.2281	– 2.1434	– 0.1969	– 0.6122	– 0.2568	– 6.2913
other	– 0.1561	– 0.8947	0.8249	1.7163	– 0.0542	– 0.8039
hs_grad	– 0.0622	– 1.0583	– 0.0455	– 0.3320	0.0072	0.2141
post_hs	– 0.0653	– 0.9297	– 0.2796	– 1.5803	– 0.0508	– 1.2914
c_grad_p	0.1696	2.2487	– 0.0444	– 0.1822	0.0365	0.8446
mf_ownlot	NA	NA	– 0.4005	– 2.9170	NA	NA
yrs_in_res91	– 0.0184	– 10.1395	– 0.0626	– 6.0176	– 0.0817	– 29.3149
age	– 0.0112	– 6.5826	– 0.0221	– 5.1270	– 0.0229	– 24.8623
fsize	– 0.0838	– 2.2938	– 0.2122	– 1.7572	– 0.0905	– 5.8619
income	0.0122	1.0654	0.0705	1.8318	0.0250	2.5290
hc2inc	0.4536	4.5113	0.4467	1.5578	0.2766	4.0225
per2rms	0.2638	1.4034	0.8169	1.4340	0.2440	3.8671
Number of observations	5,212		583		6,009	

NA = not applicable.

Note: All equations statistically significant at 5 percent or better based on log likelihood test statistics.

Notes on Housing Appreciation: The Case for Manufactured Owned Housing

As is well documented in Retsinas and Belsky (2002b), low-income homeownership can, by its very nature, be a potentially risky investment.[28] In this section, we present the evidence on price appreciation for manufactured owned housing and traditional owned housing based on the American Housing Survey for the period 1993 to 2001. We also distinguish between two types of manufactured owned housing, specifically, whether the household owns the lot or does not own the lot. Consistent with the time periods used in this article, we have computed this information for the 2-year intervals (1993 to 1995, 1995 to 1997, 1997 to 1999, and 1999 to 2001) and the 4-year intervals (1993 to1997 and 1997 to 2001).

[28] See the introduction to Part 3 (DeGiovanni, 2002) and associated papers (Belsky and Duda, 2002a, 2002b; Case and Marynchenko, 2002; and Goetzmann and Spiegel, 2002).

Exhibit 16 presents information on housing values (prices) and percent appreciation over the period.[29] As is well known, the distribution of housing values does not necessarily follow a normal (symmetric) distribution. Thus, exhibit 16 presents results computed for both average housing values (mean) and mid-range values (median). In our opinion, four basic observations can be made:

1. Traditional owned housing appears to be a reasonable investment, particularly when one considers that exhibit 16 focuses on low-income housing.

2. As a general rule, manufactured owned housing in which the lot is owned may offer an opportunity for appreciation, but such appreciation is highly variable and occurs on a much smaller base (value) than traditional owned housing.[30]

3. In cases in which the land is owned, manufactured owned housing can yield (total) appreciation amounts that are not dissimilar from those of traditional owned housing. This trend can be seen by applying mean percentage changes to mean starting values in exhibit 16. In four of the six time periods shown, manufactured owned housing does well relative to traditional low-income housing. It must be noted, however, that significant variation occurs in rates of appreciation across manufactured owned housing units, which may indicate these homes are riskier investments. This result might also be partially attributable to the smaller number of observations for these homes in the data.

4. Manufactured owned housing in which the household does not own the lot is not an investment in any sense. It should be thought of as a type of consumer durable.

Regarding the last observation in the preceding text, it is important to note that the cost of manufactured owned housing over the time period 1993 to 2001 in the AHS is considerably lower than average rents (see exhibit 1). As pointed out by Belsky and Duda (2002b), one justification for efforts to support low-income homeownership is "its potential to insulate households from rent inflation." In particular, it might be possible for low-income households to use manufactured owned housing as a means to save for traditional owned housing, the most preferred alternative from a purely investment perspective.

[29] We experimented with running a regression to try to explain pricing differentials, but, given the information available to us, the results, particularly for manufactured owned housing units, did not merit presentation or comparison with traditional owned housing units.

[30] The reported values in the AHS represent owners' estimates of value. Perhaps this is one reason for the variability shown in the computations for manufactured owned housing. In addition, as shown for manufactured owned housing where the lot is also owned, the percentage changes (although applied to a low base) are high.

Exhibit 16

Value and Appreciation Comparison

Number of Observations	Period	Mean Percentage Change in Value (%)	Mean Value Beginning of Period ($)	Median Percentage Change in Value (%)	Median Value Beginning of Period ($)
		Traditional Owned Housing			
6,425	1993–1995	11.48	82,524	4.88	69,000
6,154	1995–1997	12.25	87,448	4.35	75,000
5,381	1993–1997	19.74	81,898	10.00	70,000
6,115	1997–1999	13.97	88,347	6.67	78,000
6,057	1999–2001	14.87	96,049	7.14	85,000
5,109	1997–2001	27.65	87,761	15.79	79,000
		Manufactured Owned Housing—Lot Is Owned			
302	1993–1995	77.10	17,192	13.81	12,000
258	1995–1997	27.43	20,147	– 1.39	16,000
225	1993–1997	106.52	17,151	7.14	12,000
334	1997–1999	30.81	24,166	0.00	15,000
335	1999–2001	150.28	20,970	2.56	15,000
267	1997–2001	155.48	23,382	30.00	17,000
		Manufactured Owned Housing—Lot Is Not Owned			
351	1993–1995	16.56	16,368	0.00	14,000
320	1995–1997	10.03	16,475	0.00	14,000
253	1993–1997	20.16	16,937	– 1.69	14,000
344	1997–1999	0.68	16,866	0.00	11,500
303	1999–2001	57.10	16,563	0.00	12,000
241	1997–2001	62.13	18,685	0.00	12,000

Appendix. Supplementary Exhibits

Exhibit A-1a

1993 Quality, Size, and Cost of Housing by Tenure Type for Low-Income Households[a] in Metropolitan Areas

Housing Tenure Type	Mean Housing Rank[b]	Mean Neighborhood Rank[b]	Opinion of House Poor[c] (%)	Opinion of Neighborhood Poor[c] (%)	Structures Moderately or Severely Inadequate[d] (%)	Mean Number of Rooms	Mean Square Feet in Unit
Traditional owned housing	8.631	8.181	0.785	3.355	1.887	5.932	1,773.18
Manufactured owned housing	8.105	7.982	2.243	5.431	1.653	4.808	1,014.45
Rented housing	7.563	7.183	4.085	9.166	2.918	4.137	980.72

Housing Tenure Type	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)
	All Households			Recent In-Movers[e]		
Traditional owned housing	458.39	19,439	36.12	603.86	23,153	46.76
Manufactured owned housing	333.63	17,047	32.74	370.06	18,045	34.57
Rented housing	481.76	16,302	57.00	499.98	17,751	57.76

[a] *Low-income households have incomes below 80 percent of the median for a particular year and area.*

[b] *Housing rank and neighborhood rank are measured using an ordinal scale from 1 to 10, with 10 being the best.*

[c] *A ranking of 1, 2, or 3 was deemed poor.*

[d] *Structures were ranked by interviewers as adequate, moderately inadequate, or severely inadequate.*

[e] *Any household that moved into its dwelling unit in the last 2 years before the interview was deemed as a recent in-mover.*

Exhibit A-1b

1997 Quality, Size, and Cost of Housing by Tenure Type for Low-Income Households[a] in Metropolitan Areas

Housing Tenure Type	Mean Housing Rank[b]	Mean Neighborhood Rank[b]	Opinion of House Poor[c] (%)	Opinion of Neighborhood Poor[c] (%)	Structures Moderately or Severely Inadequate[d] (%)	Mean Number of Rooms	Mean Square Feet in Unit
Traditional owned housing	8.417	8.081	0.899	2.726	1.293	5.997	1,838.33
Manufactured owned housing	7.802	7.693	3.582	5.671	1.791	4.616	1,079.01
Rented housing	7.402	7.172	3.861	6.895	3.389	4.078	1,267.96

Housing Tenure Type	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)
	All Households			Recent In-Movers[e]		
Traditional owned housing	533.94	19,912	42.96	687.40	24,833	52.19
Manufactured owned housing	406.01	17,448	36.10	461.94	21,290	34.59
Rented housing	541.82	17,471	56.61	561.57	19,977	57.84

[a] *Low-income households have incomes below 80 percent of the median for a particular year and area.*

[b] *Housing rank and neighborhood rank are measured using an ordinal scale from 1 to 10, with 10 being the best.*

[c] *A ranking of 1, 2, or 3 was deemed poor.*

[d] *Structures were ranked by interviewers as adequate, moderately inadequate, or severely inadequate.*

[e] *Any household that moved into its dwelling unit in the last 2 years before the interview was deemed as a recent in-mover.*

Exhibit A-1c

2001 Quality, Size, and Cost of Housing by Tenure Type for Low-Income Households[a] in Metropolitan Areas

Housing Tenure Type	Mean Housing Rank[b]	Mean Neighborhood Rank[b]	Opinion of House Poor[c] (%)	Opinion of Neighborhood Poor[c] (%)	Structures Moderately or Severely Inadequate[d] (%)	Mean Number of Rooms	Mean Square Feet in Unit
Traditional owned housing	8.430	8.102	0.876	2.469	1.619	5.925	1,871.60
Manufactured owned housing	7.872	7.708	2.748	3.359	2.748	4.846	1,101.14
Rented housing	7.469	7.356	3.898	5.355	3.655	4.112	1,012.02

Housing Tenure Type	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)
	All Households			Recent In-Movers[e]		
Traditional owned housing	681.51	22,041	46.37	852.39	27,553	56.49
Manufactured owned housing	457.55	19,276	41.63	501.26	20,921	49.38
Rented housing	641.37	18,849	57.20	666.14	22,733	59.61

[a] *Low-income households have incomes below 80 percent of the median for a particular year and area.*

[b] *Housing rank and neighborhood rank are measured using an ordinal scale from 1 to 10, with 10 being the best.*

[c] *A ranking of 1, 2, or 3 was deemed poor.*

[d] *Structures were ranked by interviewers as adequate, moderately inadequate, or severely inadequate.*

[e] *Any household that moved into its dwelling unit in the last 2 years before the interview was deemed as a recent in-mover.*

Exhibit A-2a

1993 Quality, Size, and Cost of Housing by Tenure Type for Low-Income Households[a] in Nonmetropolitan Areas

Housing Tenure Type	Mean Housing Rank[b]	Mean Neighborhood Rank[b]	Opinion of House Poor[c] (%)	Opinion of Neighborhood Poor[c] (%)	Structures Moderately or Severely Inadequate[d] (%)	Mean Number of Rooms	Mean Square Feet in Unit
Traditional owned housing	8.437	8.531	1.139	1.887	3.026	5.758	1,679.70
Manufactured owned housing	8.118	8.394	2.157	3.333	2.157	4.782	985.16
Rented housing	7.846	8.062	3.093	4.672	1.957	4.326	1,039.28

Housing Tenure Type	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)
	All Households			Recent In-Movers[e]		
Traditional owned housing	293.49	14,463	29.35	365.22	16,569	38.20
Manufactured owned housing	257.85	13,684	25.58	281.88	14,533	30.69
Rented housing	324.36	12,128	49.87	341.66	12,966	51.39

[a] *Low-income households have incomes below 80 percent of the median for a particular year and area.*

[b] *Housing rank and neighborhood rank are measured using an ordinal scale from 1 to 10, with 10 being the best.*

[c] *A ranking of 1, 2, or 3 was deemed poor.*

[d] *Structures were ranked by interviewers as adequate, moderately inadequate, or severely inadequate.*

[e] *Any household that moved into its dwelling unit in the last 2 years before the interview was deemed as a recent in-mover.*

Exhibit A-2b

1997 Quality, Size, and Cost of Housing by Tenure Type for Low-Income Households[a] in Nonmetropolitan Areas

Housing Tenure Type	Mean Housing Rank[b]	Mean Neighborhood Rank[b]	Opinion of House Poor[c] (%)	Opinion of Neighborhood Poor[c] (%)	Structures Moderately or Severely Inadequate[d] (%)	Mean Number of Rooms	Mean Square Feet in Unit
Traditional owned housing	8.370	8.418	1.092	1.294	2.305	5.740	1,727.26
Manufactured owned housing	7.869	8.210	3.731	3.731	2.612	4.716	1,002.45
Rented housing	7.636	7.816	3.571	4.048	2.143	4.221	1,286.45

Housing Tenure Type	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)
	All Households			Recent In-Movers[e]		
Traditional owned housing	343.56	14,133	34.31	461.33	17,541	48.17
Manufactured owned housing	291.67	13,818	31.80	349.17	15,671	39.87
Rented housing	380.30	12,639	55.24	392.67	14,178	58.48

[a] *Low-income households have incomes below 80 percent of the median for a particular year and area.*

[b] *Housing rank and neighborhood rank are measured using an ordinal scale from 1 to 10, with 10 being the best.*

[c] *A ranking of 1, 2, or 3 was deemed poor.*

[d] *Structures were ranked by interviewers as adequate, moderately inadequate, or severely inadequate.*

[e] *Any household that moved into its dwelling unit in the last 2 years before the interview was deemed as a recent in-mover.*

Exhibit A-2c

2001 Quality, Size, and Cost of Housing by Tenure Type for Low-Income Households[a] in Nonmetropolitan Areas

Housing Tenure Type	Mean Housing Rank[b]	Mean Neighborhood Rank[b]	Opinion of House Poor[c] (%)	Opinion of Neighborhood Poor[c] (%)	Structures Moderately or Severely Inadequate[d] (%)	Mean Number of Rooms	Mean Square Feet in Unit
Traditional owned housing	8.435	8.359	0.934	1.665	2.071	5.775	1,779.01
Manufactured owned housing	7.931	8.066	3.804	4.891	2.536	4.835	1,115.91
Rented housing	7.694	7.892	3.387	3.065	3.306	4.265	1,102.04

Housing Tenure Type	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)	Mean Monthly Housing Cost ($)	Average Annual Household Income ($)	Spend > 30% of Income on Housing (%)
	All Households			Recent In-Movers[e]		
Traditional owned housing	441.58	16,101	38.78	577.08	20,916	48.92
Manufactured owned housing	349.12	15,474	33.86	404.00	18,487	37.50
Rented housing	440.85	14,163	53.52	461.51	16,904	55.28

[a] *Low-income households have incomes below 80 percent of the median for a particular year and area.*

[b] *Housing rank and neighborhood rank are measured using an ordinal scale from 1 to 10, with 10 being the best.*

[c] *A ranking of 1, 2, or 3 was deemed poor.*

[d] *Structures were ranked by interviewers as adequate, moderately inadequate, or severely inadequate.*

[e] *Any household that moved into its dwelling unit in the last 2 years before the interview was deemed as a recent in-mover.*

Exhibit A-3a

N-Chotomous Probit Results—Change in Housing Quality, 1993–1995

Variable Name	1993–1995					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	5.253	53.835	4.027	13.349	4.073	33.827
how_h	– 0.406	– 46.736	– 0.321	– 12.707	– 0.309	– 29.302
age_s	– 0.004	– 7.371	– 0.007	– 1.449	– 0.003	– 3.807
crowding	– 0.263	– 4.913	– 0.420	– 2.802	– 0.219	– 4.024
hc2inc	0.000	0.992	– 0.001	– 1.125	0.000	1.142
get_porch	0.062	1.267	– 0.023	– 0.169	0.054	0.821
lose_porch	– 0.093	– 2.038	– 0.149	– 1.220	– 0.102	– 1.574
get_garage	– 0.029	– 0.463	0.245	1.419	0.019	0.227
lose_garage	– 0.169	– 2.958	– 0.060	– 0.421	– 0.129	– 1.422
d_equip	0.023	0.791	0.165	2.082	0.107	3.082
get_bathroom	0.002	0.018	– 0.194	– 0.339	0.351	1.839
lose_bathroom	– 0.013	– 0.123	0.399	0.719	0.015	0.070
get_water	– 0.749	– 0.926	– 1.105	– 1.944	– 0.210	– 0.642
lose_water	– 1.578	– 2.357	NA	NA	– 0.798	– 1.304
ext_leak	– 0.061	– 1.976	– 0.105	– 1.092	– 0.163	– 3.416
get_sewage	– 0.253	– 2.310	– 0.144	– 0.676	– 0.104	– 0.662
lose_sewage	– 0.067	– 0.696	– 0.115	– 0.669	0.190	1.075
get_cntrl_air	0.279	4.039	0.148	0.863	0.158	1.404
lose_cntrl_air	– 0.258	– 2.729	0.127	0.591	0.116	0.989
d_struc_prob	– 0.077	– 2.914	– 0.139	– 1.590	– 0.052	– 1.652
get_int_leak	0.049	0.805	0.029	0.106	0.083	1.115
lose_int_leak	– 0.044	– 0.668	0.290	1.268	– 0.117	– 1.553
get_bad_int	– 0.414	– 7.232	– 0.275	– 1.051	– 0.438	– 6.128
lose_bad_int	– 0.009	– 0.145	– 0.133	– 0.520	0.005	0.062
d_wtr_prob	– 0.036	– 1.169	– 0.029	– 0.352	0.002	0.067
d_tlt_prob	0.001	0.050	0.005	0.035	– 0.085	– 3.332
d_sew_prob	0.092	2.949	– 0.001	– 0.007	– 0.061	– 1.593
d_wrg_prob	– 0.153	– 3.200	– 0.161	– 1.012	– 0.195	– 3.639
d_fus_blow	– 0.024	– 1.997	– 0.025	– 0.574	– 0.028	– 1.834
d_heat_brk	– 0.118	– 3.603	0.150	0.953	– 0.074	– 3.315
d_2goodheat	– 0.062	– 1.052	0.196	1.295	– 0.076	– 0.983
get_vermin	– 0.273	– 3.517	0.226	1.079	– 0.462	– 5.257
lose_vermin	0.079	1.115	0.190	0.898	– 0.026	– 0.304
mh_in_grp	NA	NA	0.158	1.605	NA	NA
ownlot	NA	NA	0.007	0.067	NA	NA
Mu(1)	0.027	14.235	0.441	6.383	0.441	13.494
Mu(2)	0.034	29.743	0.821	10.261	0.958	24.144
Mu(3)	0.035	44.297	1.332	15.595	1.535	36.017
Mu(4)	0.040	77.782	2.680	25.541	2.630	54.716
Mu(5)	0.043	87.644	3.240	27.563	3.236	61.145
Mu(6)	0.053	85.700	3.794	27.383	3.902	61.386
Mu(7)	0.064	80.213	4.315	27.787	4.438	59.610
Number of observations	7,061		813		3,396	
Log likelihood function	– 10,347.82		– 1,322.02		– 5,759.376	
Restricted log likelihood	– 11,926.45		– 1,499.238		– 6,526.888	
Chi-squared	3,157.26		354.4366		1,535.024	
Degrees of freedom	33		34		33	

NA = not applicable.

Exhibit A-3b

N-Chotomous Probit Results—Change in Housing Quality, 1995–1997

Variable Name	1995–1997					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	5.202	51.255	4.098	14.680	3.712	29.678
how_h	– 0.417	– 45.327	– 0.314	– 13.062	– 0.295	– 26.289
age_s	– 0.003	– 5.991	0.000	– 0.066	– 0.001	– 1.809
crowding	– 0.280	– 5.402	– 0.386	– 2.480	– 0.260	– 4.728
hc2inc	0.000	– 1.086	0.000	0.099	0.000	0.320
get_porch	0.018	0.378	– 0.178	– 1.166	0.019	0.293
lose_porch	– 0.054	– 1.202	– 0.038	– 0.269	– 0.030	– 0.452
get_garage	– 0.013	– 0.213	0.115	0.632	0.079	0.972
lose_garage	0.035	0.687	– 0.064	– 0.358	– 0.011	– 0.121
d_equip	0.060	2.761	0.056	0.823	0.068	2.170
get_bathroom	0.123	1.210	– 0.503	– 1.538	– 0.409	– 2.290
lose_bathroom	2.145	0.353	NA	NA	0.456	0.036
get_water	0.069	0.168	NA	NA	1.783	0.000
lose_water	– 0.568	– 2.943	– 0.001	– 0.003	0.612	0.092
ext_leak	– 0.087	– 2.784	– 0.109	– 1.148	– 0.104	– 1.989
get_sewage	0.066	0.585	0.317	1.522	0.248	1.393
lose_sewage	0.111	1.252	0.223	1.253	0.064	0.412
get_cntrl_air	0.108	1.718	0.308	1.667	0.002	0.021
lose_cntrl_air	0.033	0.382	0.180	0.753	0.021	0.174
d_struc_prob	– 0.125	– 8.021	– 0.223	– 4.274	– 0.119	– 5.977
get_int_leak	– 0.021	– 0.392	0.089	0.567	– 0.182	– 2.835
lose_int_leak	– 0.101	– 1.703	– 0.264	– 1.575	– 0.230	– 3.015
get_bad_int	– 0.303	– 6.005	– 0.367	– 2.190	– 0.443	– 7.481
lose_bad_int	0.072	1.258	0.139	0.831	0.083	1.193
d_wtr_prob	0.011	0.289	– 0.111	– 1.050	– 0.129	– 4.127
d_tlt_prob	– 0.038	– 1.126	0.114	0.970	– 0.056	– 1.997
d_sew_prob	0.066	1.249	– 0.113	– 0.367	– 0.061	– 0.762
d_wrg_prob	– 0.183	– 3.399	– 0.159	– 1.020	0.020	0.313
d_fus_blow	– 0.016	– 1.107	– 0.019	– 0.532	– 0.007	– 0.434
d_heat_brk	– 0.022	– 0.754	– 0.034	– 0.265	– 0.022	– 0.818
d_2goodheat	0.004	0.088	– 0.056	– 0.428	– 0.018	– 0.288
get_vermin	– 0.105	– 3.381	– 0.062	– 0.707	– 0.073	– 1.495
lose_vermin	0.133	1.242	0.390	1.169	0.231	2.064
mh_in_grp	NA	NA	– 0.098	– 0.982	NA	NA
ownlot	NA	NA	0.017	0.172	NA	NA
Mu(1)	0.495	18.777	0.385	5.940	0.436	13.505
Mu(2)	1.152	36.603	0.950	11.419	0.989	24.759
Mu(3)	1.758	53.702	1.432	16.057	1.565	36.463
Mu(4)	3.156	83.879	2.621	25.080	2.654	53.752
Mu(5)	3.815	91.011	3.103	27.661	3.264	59.813
Mu(6)	4.539	86.787	3.684	27.896	3.869	58.072
Mu(7)	5.126	81.424	4.221	27.760	4.363	56.710
Number of observations	7,203		762		3,143	
Log likelihood function	– 11,057.66		– 1,301.995		– 5,337.673	
Restricted log likelihood	– 1,2802.7		– 1,447.644		– 6,072.802	
Chi-squared	3,490.088		291.2984		1,470.256	
Degrees of freedom	33		33		33	

NA = not applicable.

Exhibit A-4a

N-Chotomous Probit Results—Change in Neighborhood Quality, 1993–1995 (1 of 2)

Variable Name	1993–1995					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	4.354	55.248	3.973	16.339	3.455	33.483
how_n	– 0.353	– 50.405	– 0.307	– 14.600	– 0.278	– 29.583
hc2inc	0.000	0.575	0.001	1.046	0.000	– 0.038
get_e_low	0.101	1.350	– 0.731	– 1.105	– 0.076	– 1.352
lose_e_low	– 0.003	– 0.045	– 0.153	– 0.106	– 0.040	– 0.690
get_e_mid	– 0.132	– 0.837	0.133	0.000	– 0.004	– 0.048
lose_e_mid	0.006	0.030	NA	NA	0.006	0.078
get_e_high	– 1.046	– 2.950	1.852	0.000	– 0.057	– 0.571
lose_e_high	0.201	0.585	NA	NA	0.129	1.167
get_e_mobil	– 0.020	– 0.216	0.030	0.244	0.224	0.877
lose_e_mobil	0.025	0.227	0.025	0.195	– 0.139	– 0.989
get_e_com	– 0.103	– 1.461	0.259	0.765	– 0.016	– 0.260
lose_e_com	– 0.103	– 1.479	– 0.128	– 0.517	– 0.030	– 0.532
get_e_prkg	0.007	0.073	0.339	0.310	– 0.097	– 1.528
lose_e_prkg	0.130	0.903	– 0.960	– 2.183	– 0.091	– 1.573
get_e_water	– 0.157	– 1.149	0.563	1.748	0.274	1.445
lose_e_water	– 0.278	– 1.708	– 0.469	– 0.941	0.238	1.622
get_e_green	0.223	3.648	0.065	0.506	0.118	1.704
lose_e_green	0.001	0.027	0.017	0.118	0.042	0.680
get_aban	– 0.294	– 2.916	0.456	1.695	– 0.019	– 0.229
lose_aban	– 0.007	– 0.063	– 0.098	– 0.315	– 0.283	– 3.520
get_bars	0.027	0.325	0.184	0.092	– 0.157	– 1.948
lose_bars	– 0.094	– 1.032	0.098	0.000	0.129	1.941
get_rd_prob	– 0.008	– 0.151	– 0.200	– 1.226	0.036	0.639
lose_rd_prob	– 0.126	– 2.264	0.091	0.554	0.111	1.954
get_junk	– 0.210	– 3.585	0.045	0.289	– 0.160	– 2.836
lose_junk	– 0.065	– 1.084	– 0.212	– 1.197	– 0.153	– 2.729
get_nucrim_p	– 0.943	– 17.079	– 1.238	– 5.454	– 0.918	– 14.733
lose_nucrim_p	0.066	1.102	– 0.358	– 1.212	0.255	3.806
get_noise_p	– 0.498	– 9.208	– 0.499	– 3.008	– 0.424	– 6.950
lose_noise_p	– 0.186	– 3.604	0.261	1.238	0.012	0.206
get_litter_p	– 0.661	– 11.263	– 0.509	– 2.360	– 0.462	– 5.346
lose_litter_p	0.040	0.672	0.780	2.833	0.103	1.047
get_badsrv_p	– 0.431	– 2.928	– 0.887	– 1.306	– 0.534	– 3.023
lose_badsrv_p	0.060	0.553	0.003	0.002	0.099	0.741
get_badprp_p	– 0.477	– 5.009	– 0.924	– 1.068	– 0.232	– 1.307
lose_badprp_p	– 0.055	– 0.570	0.480	1.097	0.209	1.499
get_badper	– 0.687	– 16.356	– 0.968	– 7.023	– 0.564	– 9.572
lose_badper	0.160	3.688	0.556	3.993	0.026	0.466
get_othnhd_p	– 0.389	– 9.205	– 0.252	– 1.766	– 0.249	– 3.538
lose_othnhd_p	– 0.006	– 0.138	0.094	0.719	– 0.118	– 1.753
get_schm_p	– 0.021	– 0.190	0.158	0.405	– 0.392	– 3.256
lose_schm_p	– 0.253	– 2.859	– 0.125	– 0.339	– 0.219	– 2.151
get_shp_p	0.017	0.398	– 0.113	– 1.078	– 0.095	– 1.287

Exhibit A-4a

N-Chotomous Probit Results—Change in Neighborhood Quality, 1993–1995 (2 of 2)

Variable Name	1993–1995					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
lose_shp_p	– 0.033	– 0.794	0.004	0.032	– 0.026	– 0.399
get_good_trn	0.010	0.221	0.151	0.786	0.061	1.117
lose_good_trn	0.007	0.160	– 0.070	– 0.327	0.065	1.200
mh_in_grp	NA	NA	– 0.194	– 1.885	NA	NA
ownlot	NA	NA	0.064	0.664	NA	NA
Mu(1)	0.375	15.561	0.439	6.148	0.402	13.596
Mu(2)	0.950	31.261	0.965	10.892	0.956	25.733
Mu(3)	1.520	47.169	1.463	15.566	1.449	36.503
Mu(4)	2.969	81.305	2.921	27.092	2.573	55.932
Mu(5)	3.630	91.650	3.558	29.730	3.115	62.147
Mu(6)	4.334	90.744	4.202	29.786	3.691	63.062
Mu(7)	4.840	85.782	4.907	27.222	4.132	62.902
Number of observations	7,061		813		3,396	
Log likelihood function	– 10,696.2		– 1,248.47		– 5,760.979	
Restricted log likelihood	– 12,520.53		– 1,493.735		– 6,699.628	
Chi-squared	3,648.65		490.5308		1,877.297	
Degrees of freedom	47		47		47	

NA = not applicable.

Exhibit A-4b

N-Chotomous Probit Results—Change in Neighborhood Quality, 1995–1997 (1 of 2)

Variable Name	1995–1997					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	4.818	57.428	4.264	16.707	3.840	33.090
how_n	– 0.400	– 52.291	– 0.341	– 14.921	– 0.321	– 31.631
hc2inc	0.000	– 0.393	0.000	0.343	0.000	0.425
get_e_low	– 0.106	– 2.905	– 0.281	– 1.256	0.029	0.587
lose_e_low	– 0.176	– 2.325	0.835	0.545	0.041	0.721
get_e_mid	– 0.212	– 2.301	– 0.099	– 0.161	– 0.132	– 1.935
lose_e_mid	0.143	0.581	NA	NA	0.031	0.336
get_e_high	0.399	2.017	– 0.652	– 0.373	0.031	0.334
lose_e_high	0.153	0.401	0.445	0.000	– 0.067	– 0.553
get_e_mobil	– 0.065	– 1.523	0.092	0.978	– 0.055	– 0.568
lose_e_mobil	– 0.148	– 1.024	0.311	1.335	– 0.001	– 0.003
get_e_com	0.013	0.370	0.067	0.531	– 0.061	– 1.479
lose_e_com	– 0.046	– 0.431	0.028	0.064	0.125	1.439
get_e_prkg	– 0.083	– 2.084	– 0.043	– 0.259	0.052	1.210
lose_e_prkg	0.054	0.369	0.327	0.664	– 0.016	– 0.172
get_e_water	0.019	0.526	0.067	0.621	0.047	0.725
lose_e_water	0.118	0.483	0.446	0.691	0.317	1.214
get_e_green	0.059	2.011	– 0.061	– 0.690	0.012	0.256
lose_e_green	– 0.056	– 0.826	0.015	0.086	– 0.062	– 0.781
get_aban	– 0.348	– 6.545	– 0.154	– 0.771	– 0.277	– 3.942
lose_aban	– 0.320	– 2.678	– 0.293	– 0.970	– 0.011	– 0.110
get_bars	– 0.171	– 3.763	– 0.089	– 0.291	0.007	0.099
lose_bars	– 0.252	– 2.724	0.122	0.154	– 0.203	– 2.754
get_rd_prob	– 0.132	– 4.747	– 0.031	– 0.330	– 0.196	– 4.466
lose_rd_prob	– 0.055	– 0.912	0.132	0.755	0.049	0.793
get_junk	– 0.343	– 7.886	– 0.403	– 2.423	– 0.187	– 2.808
lose_junk	– 0.009	– 0.174	– 0.096	– 0.710	– 0.069	– 1.385
get_nucrim_p	– 0.570	– 13.446	– 0.814	– 5.517	– 0.573	– 10.251
lose_nucrim_p	0.120	1.863	0.160	0.562	0.100	1.447
get_noise_p	– 0.432	– 11.894	– 0.317	– 2.339	– 0.350	– 6.567
lose_noise_p	0.016	0.243	0.135	0.646	0.092	1.289
get_litter_p	– 0.558	– 6.232	– 0.173	– 0.499	– 0.516	– 3.597
lose_litter_p	– 0.026	– 0.453	– 0.164	– 0.714	0.053	0.610
get_badsrv_p	– 0.156	– 1.262	– 1.275	– 0.816	– 0.055	– 0.303
lose_badsrv_p	– 0.226	– 2.007	– 0.089	– 0.206	0.053	0.289
get_badprp_p	– 0.396	– 3.702	0.446	0.895	– 0.378	– 2.061
lose_badprp_p	– 0.309	– 3.395	– 0.578	– 1.235	– 0.286	– 1.897
get_badper	– 0.608	– 9.162	– 0.301	– 1.154	– 0.309	– 3.557
lose_badper	– 0.047	– 1.196	0.337	2.110	– 0.070	– 1.292
get_othnhd_p	– 0.290	– 5.842	– 0.250	– 1.509	– 0.231	– 2.987
lose_othnhd_p	0.070	1.613	– 0.075	– 0.517	– 0.074	– 0.994
get_schm_p	– 0.152	– 1.251	– 2.109	– 3.877	– 0.568	– 4.161
lose_schm_p	– 0.161	– 1.520	– 0.674	– 2.456	0.034	0.282
get_shp_p	– 0.091	– 2.359	– 0.037	– 0.314	– 0.041	– 0.573
lose_shp_p	0.033	0.781	– 0.105	– 0.846	– 0.019	– 0.250
get_good_trn	0.033	0.781	0.355	1.693	0.033	0.604
lose_good_trn	– 0.004	– 0.092	0.174	0.771	0.105	1.662
mh_in_grp	NA	NA	– 0.254	– 2.408	NA	NA
ownlot	NA	NA	0.122	1.133	NA	NA
Mu(1)	0.514	19.674	0.356	5.270	0.527	14.601

Exhibit A-4b

N-Chotomous Probit Results—Change in Neighborhood Quality, 1995–1997 (2 of 2)

Variable Name	1995–1997					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Mu(2)	1.176	38.053	1.003	11.253	1.122	25.930
Mu(3)	1.796	55.832	1.549	16.104	1.695	36.687
Mu(4)	3.147	85.798	2.794	24.573	2.762	52.221
Mu(5)	3.808	94.067	3.384	26.702	3.378	58.154
Mu(6)	4.549	92.973	3.878	26.731	3.989	58.692
Mu(7)	5.133	88.506	4.547	25.433	4.500	58.171
Number of observations	7,203		762		3,143	
Log likelihood function	– 11,148.78		– 1,239.578		– 5,272.048	
Restricted log likelihood	– 13,195.51		– 1,448.692		– 6,277.065	
Chi-squared	4,093.451		418.2289		2,010.034	
Degrees of freedom	47		48		47	

NA = not applicable.

Exhibit A-5a

N-Chotomous Probit Results—Change in Housing Quality, 1997–1999 (1 of 2)

Variable Name	1997–1999					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	5.087	50.129	4.8001	16.580	4.0510	31.225
how_h	– 0.403	– 46.016	– 0.3899	– 15.476	– 0.3282	– 28.894
age_s	– 0.003	– 5.508	– 0.0061	– 1.625	– 0.0031	– 3.578
crowding	– 0.336	– 6.729	– 0.0012	– 0.009	– 0.2526	– 4.444
hc2inc	0.000	0.715	– 0.0002	– 0.828	0.0000	– 0.543
get_porch	– 0.110	– 2.416	– 0.0322	– 0.242	– 0.0062	– 0.108
lose_porch	– 0.180	– 2.536	– 0.3101	– 1.254	0.1720	1.509
get_garage	0.023	0.445	0.1385	0.816	0.0049	0.058
lose_garage	– 0.008	– 0.146	0.3121	1.747	– 0.0925	– 0.986
d_equip	0.048	1.641	0.1509	1.396	0.0285	0.685
get_bathroom	– 1.113	– 1.943	NA	NA	– 0.8724	– 0.792
lose_bathroom	– 0.349	– 0.905	NA	NA	– 1.8499	0.000
get_water	0.704	1.845	– 0.2654	– 0.317	1.2563	1.150
lose_water	– 0.213	– 0.538	0.7705	0.285	1.6109	0.000
ext_leak	– 0.128	– 3.442	– 0.2579	– 2.532	– 0.0531	– 0.957
get_sewage	– 0.054	– 0.479	0.1225	0.460	0.3551	1.543
lose_sewage	0.005	0.054	– 0.2479	– 1.036	0.0923	0.636
get_cntrl_air	0.076	1.285	0.2391	1.542	0.1836	1.680
lose_cntrl_air	0.138	1.142	– 0.2336	– 1.168	– 0.0425	– 0.327
d_struc_prob	– 0.038	– 2.639	– 0.0478	– 0.993	– 0.0864	– 5.144
get_int_leak	– 0.129	– 2.344	– 0.1281	– 0.837	– 0.2326	– 3.783
lose_int_leak	– 0.213	– 3.803	– 0.2851	– 2.100	– 0.1487	– 2.451
get_bad_int	– 0.355	– 6.855	– 0.4695	– 2.468	– 0.6613	– 10.629
lose_bad_int	– 0.037	– 0.635	– 0.1312	– 0.644	– 0.1458	– 1.949
d_wtr_prob	– 0.008	– 0.188	0.0558	0.875	– 0.0191	– 0.521
d_tlt_prob	– 0.031	– 0.575	0.2356	1.412	– 0.0667	– 1.831
d_sew_prob	– 0.009	– 0.213	– 0.4664	– 3.182	– 0.0605	– 0.852
d_wrg_prob	– 0.082	– 1.305	– 0.1490	– 0.731	0.0691	0.957
d_fus_blow	– 0.036	– 2.174	– 0.0011	– 0.024	– 0.0030	– 0.148
d_heat_brk	– 0.050	– 1.241	0.0247	0.159	– 0.0280	– 0.943
d_2goodheat	– 0.080	– 1.036	0.5787	2.587	0.1173	1.055
get_vermin	– 0.158	– 3.959	– 0.3893	– 3.244	– 0.1852	– 2.938
lose_vermin	– 0.045	– 1.116	– 0.0854	– 0.740	– 0.0090	– 0.129
mh_in_grp	NA	NA	– 0.0926	– 0.970	NA	NA
ownlot	NA	NA	0.0095	0.100	NA	NA
Mu(1)	0.446	14.699	0.4173	6.353	0.4602	12.994
Mu(2)	1.168	31.542	0.9910	12.264	1.0187	23.724
Mu(3)	1.777	46.481	1.5345	18.150	1.5700	34.368
Mu(4)	3.199	76.170	2.6969	26.709	2.7018	52.271
Mu(5)	3.934	87.263	3.2805	30.110	3.3159	59.493
Mu(6)	4.773	88.334	4.0689	30.009	4.0301	60.410
Mu(7)	5.344	83.729	4.5472	29.529	4.5041	60.115

Exhibit A-5a

N-Chotomous Probit Results—Change in Housing Quality, 1997–1999 (2 of 2)

Variable Name	1997–1999					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Number of observations	7,117		809		3,136	
Log likelihood function	– 10,574.02		– 1,338.067		– 5,219.503	
Restricted log likelihood	– 12,476.99		– 1,566.364		– 6,101.015	
Chi-squared	3,805.929		456.5944		1,763.023	
Degrees of freedom	33		33		33	

NA = not applicable.

Exhibit A-5b

N-Chotomous Probit Results—Change in Housing Quality, 1999–2001 (1 of 2)

Variable Name	1999–2001					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	5.1145	50.203	4.2721	13.683	4.0469	31.185
how_h	– 0.4181	– 45.502	– 0.3278	– 12.569	– 0.3155	– 27.711
age_s	– 0.0038	– 6.564	– 0.0049	– 1.394	– 0.0042	– 4.991
crowding	– 0.1761	– 3.198	– 0.3219	– 2.051	– 0.2640	– 4.478
hc2inc	0.0000	– 0.996	– 0.0003	– 0.329	0.0000	– 0.095
get_porch	– 0.0041	– 0.067	– 0.0002	– 0.001	– 0.0478	– 0.666
lose_porch	0.0141	0.194	0.4463	1.993	0.0065	0.059
get_garage	– 0.1230	– 2.430	– 0.1871	– 1.336	0.1888	2.111
lose_garage	– 0.0104	– 0.189	0.1904	0.715	0.2130	2.395
d_equip	0.0043	0.130	0.2121	1.984	0.0496	1.284
get_bathroom	– 1.7303	0.000	– 0.6840	0.000	0.3118	0.482
lose_bathroom	– 0.0707	– 0.068	– 0.2010	– 0.115	0.0206	0.040
get_water	1.4820	0.000	– 0.6394	0.000	0.1593	0.263
lose_water	0.2395	0.246	NA	NA	0.5147	0.716
ext_leak	– 0.1644	– 4.510	– 0.2960	– 2.606	– 0.2194	– 3.769
get_sewage	0.1057	0.953	0.4338	1.192	– 0.0605	– 0.338
lose_sewage	0.0929	1.299	0.1550	0.84	– 0.3205	– 1.892
get_cntrl_air	0.0800	1.166	0.0957	0.51	– 0.0123	– 0.119
lose_cntrl_air	– 0.0144	– 0.157	– 0.1308	– 0.484	0.1151	0.958
d_struc_prob	– 0.0697	– 4.805	– 0.0758	– 1.673	– 0.0686	– 4.121
get_int_leak	– 0.1719	– 3.258	– 0.2212	– 1.598	– 0.2562	– 3.960
lose_int_leak	– 0.1164	– 2.302	0.2476	1.689	– 0.2033	– 3.175
get_bad_int	– 0.1998	– 3.453	– 0.4802	– 2.655	– 0.4319	– 7.435
lose_bad_int	– 0.1217	– 2.102	– 0.2537	– 1.39	– 0.1049	– 1.420
d_wtr_prob	0.0670	1.970	0.0704	0.769	– 0.0985	– 2.336
d_tlt_prob	0.0264	0.440	– 0.6238	– 1.132	– 0.0739	– 1.600
d_sew_prob	– 0.0572	– 1.580	– 0.1898	– 0.462	– 0.1171	– 2.434
d_wrg_prob	– 0.0626	– 0.755	– 0.6788	– 3.374	– 0.0448	– 0.575
d_fus_blow	– 0.0301	– 1.890	– 0.0075	– 0.15	0.0010	0.051
d_heat_brk	– 0.1165	– 2.950	0.0189	0.11	– 0.0762	– 2.573
d_2goodheat	0.0522	0.441	– 0.1498	– 0.467	0.4836	2.861
get_vermin	– 0.0094	– 0.231	– 0.0536	– 0.493	– 0.0932	– 1.544
lose_vermin	– 0.0349	– 0.875	0.1160	0.967	– 0.0305	– 0.448
mh_in_grp	NA	NA	0.0808	0.825	NA	NA
ownlot	NA	NA	0.0703	0.751	NA	NA
Mu(1)	0.423	14.833	0.5931	6.104	0.4879	12.795
Mu(2)	1.130	32.150	1.2033	10.843	1.1177	23.994
Mu(3)	1.741	47.671	1.7205	14.899	1.6918	34.333
Mu(4)	3.182	77.895	2.8376	21.745	2.8074	51.504
Mu(5)	3.898	88.944	3.3425	24.293	3.4337	58.367
Mu(6)	4.814	88.560	4.0569	25.320	4.1870	60.079
Mu(7)	5.392	81.314	4.5539	24.248	4.7315	55.708

Exhibit A-5b

N-Chotomous Probit Results—Change in Housing Quality, 1999–2001 (2 of 2)

Variable Name	1999–2001					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Number of observations	7,132		761		3,077	
Log likelihood function	– 10,542.48		– 1,289.091		5090.007	
Restricted log likelihood	– 12,462.53		– 1,464.814		– 5,936.899	
Chi-squared	3,840.094		351.4468		1,693.784	
Degrees of freedom	33		34		33	

NA = not applicable.

Exhibit A-6a

N-Chotomous Probit Results—Change in Housing Quality, 1997–1999 (1 of 2)

Variable Name	1997–1999					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	4.3353	50.846	4.9963	16.571	4.0383	35.395
how_n	– 0.3679	– 47.861	– 0.3895	– 13.780	– 0.3283	– 30.927
hc2inc	0.0000	0.851	0.0002	0.539	0.0000	– 0.017
get_e_low	– 0.0101	– 0.215	– 0.2077	– 0.791	– 0.0676	– 1.252
lose_e_low	0.0508	1.027	– 0.1749	– 0.817	– 0.1446	– 2.749
get_e_mid	– 0.1945	– 2.029	– 0.5925	– 0.903	0.0233	0.264
lose_e_mid	0.0173	0.159	0.5872	0.961	0.0269	0.350
get_e_high	– 0.0375	– 0.179	– 0.2309	0.001	0.0065	0.060
lose_e_high	0.1685	0.910	0.8681	0.000	– 0.0565	– 0.515
get_e_mobil	0.0287	0.481	– 0.0571	– 0.397	– 0.1066	– 0.831
lose_e_mobil	– 0.0523	– 0.834	0.0519	0.304	0.0884	0.635
get_e_com	– 0.0748	– 1.706	– 0.0350	– 0.264	– 0.0084	– 0.149
lose_e_com	– 0.0110	– 0.238	0.1401	0.802	0.0229	0.413
get_e_prkg	– 0.0721	– 1.393	0.3387	1.892	– 0.0485	– 0.820
lose_e_prkg	– 0.0346	– 0.721	– 0.2248	– 1.262	– 0.0560	– 0.993
get_e_water	0.0298	0.560	0.0663	0.419	0.0031	0.035
lose_e_water	– 0.0275	– 0.524	0.1685	1.245	– 0.0125	– 0.132
get_e_green	0.0546	1.409	0.0122	0.108	– 0.0458	– 0.853
lose_e_green	0.0228	0.595	0.0546	0.503	0.0082	0.149
get_aban	– 0.2858	– 4.927	0.0837	0.360	– 0.1941	– 2.619
lose_aban	– 0.0693	– 1.072	0.3962	1.699	– 0.2064	– 2.687
get_bars	– 0.0341	– 0.606	0.2196	0.513	– 0.0404	– 0.569
lose_bars	– 0.0360	– 0.702	– 1.4088	– 3.440	0.0002	0.004
get_rd_prob	– 0.1054	– 3.068	– 0.1773	– 1.561	– 0.1008	– 2.022
lose_rd_prob	0.0239	0.694	– 0.1965	– 1.852	– 0.0419	– 0.849
get_junk	– 0.3362	– 7.334	– 0.7872	– 3.908	– 0.2482	– 3.957
lose_junk	– 0.0142	– 0.290	0.1091	0.620	– 0.0790	– 1.301
get_nucrim_p	– 0.4765	– 8.589	– 0.4174	– 2.123	– 0.3584	– 5.207
lose_nucrim_p	0.1140	2.282	0.0160	0.071	0.1717	2.667
get_noise_p	– 0.2671	– 5.948	– 0.3789	– 2.314	– 0.4280	– 7.262
lose_noise_p	0.0618	1.418	– 0.0405	– 0.249	– 0.0764	– 1.319
get_litter_p	– 0.3813	– 4.922	– 0.1857	– 0.537	– 0.3188	– 2.744
lose_litter_p	– 0.0725	– 0.921	0.0818	0.204	– 0.2638	– 1.765
get_badsrv_p	– 0.2720	– 2.353	– 1.2489	– 2.148	– 0.0866	– 0.488
lose_badsrv_p	– 0.1141	– 0.959	0.6059	0.860	0.0133	0.067
get_badprp_p	– 0.4056	– 3.289	– 2.9020	– 2.270	0.0415	0.196
lose_badprp_p	– 0.1683	– 1.250	– 0.2362	– 0.466	0.1797	1.054
get_badper	– 0.3229	– 5.714	– 0.7322	– 4.065	– 0.4724	– 6.103
lose_badper	– 0.0680	– 1.111	– 0.2001	– 0.983	0.0090	0.104
get_othnhd_p	– 0.1989	– 4.133	– 0.6027	– 3.485	– 0.3599	– 5.068
lose_othnhd_p	– 0.0171	– 0.338	– 0.2916	– 1.758	– 0.1627	– 1.943
get_schm_p	– 0.1941	– 1.446	– 0.4153	– 1.507	– 0.4309	– 3.112
lose_schm_p	0.0508	0.313	– 0.9231	– 2.226	– 0.0622	– 0.461
get_shp_p	– 0.0704	– 1.711	– 0.1755	– 1.386	– 0.1577	– 2.216
lose_shp_p	0.0380	0.900	0.0934	0.737	– 0.0907	– 1.300

Exhibit A-6a

N-Chotomous Probit Results—Change in Housing Quality, 1997–1999 (2 of 2)

Variable Name	1997–1999					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
get_good_trn	– 0.0785	– 1.841	– 0.1304	– 0.856	– 0.0100	– 0.168
lose_good_trn	– 0.1046	– 2.643	– 0.1291	– 0.729	– 0.0346	– 0.627
mh_in_grp	NA	NA	– 0.0744	– 0.713	NA	NA
ownlot	NA	NA	– 0.0378	– 0.379	NA	NA
Mu(1)	0.4527	16.553	0.3698	4.804	0.4733	12.323
Mu(2)	1.0836	32.877	1.0024	10.038	1.0922	23.368
Mu(3)	1.7336	50.395	1.5632	14.616	1.6684	33.879
Mu(4)	3.0264	79.894	2.8655	22.825	2.7291	50.424
Mu(5)	3.7782	91.854	3.4987	25.631	3.3747	57.979
Mu(6)	4.5221	93.940	4.3409	25.595	4.0432	60.750
Mu(7)	5.1504	89.118	4.8038	26.137	4.5768	61.361
Number of observations	7,117		809		3,136	
Log likelihood function	– 11,004.04		– 1,264.497		– 5,233.982	
Restricted log likelihood	– 12,999.61		– 1,504.027		– 6,208.414	
Chi-squared	3,991.153		479.0597		1,948.864	
Degrees of freedom	47		49		47	

NA = not applicable.

Exhibit A-6b

N-Chotomous Probit Results—Change in Housing Quality, 1999–2001 (1 of 2)

Variable Name	1999–2001					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	4.3400	49.909	4.1806	15.055	3.6959	30.377
how_n	– 0.3666	– 46.260	– 0.3367	– 12.675	– 0.3106	– 28.429
hc2inc	0.0000	1.168	0.0009	0.993	0.0000	0.333
get_e_low	– 0.0731	– 1.587	0.2061	1.126	0.1263	2.174
lose_e_low	0.0608	1.169	0.0223	0.091	0.0696	1.220
get_e_mid	– 0.1068	– 0.943	0.2337	0.302	0.0772	1.057
lose_e_mid	– 0.0348	– 0.230	0.4599	0.785	0.1630	1.975
get_e_high	– 0.1233	– 0.553	NA	NA	– 0.0300	– 0.349
lose_e_high	– 0.2278	– 1.112	– 1.4563	0.000	– 0.0836	– 0.816
get_e_mobil	– 0.0634	– 1.180	0.0339	0.238	0.1178	1.045
lose_e_mobil	– 0.0301	– 0.485	– 0.0340	– 0.170	– 0.0335	– 0.216
get_e_com	– 0.0408	– 0.974	0.0253	0.156	– 0.0632	– 1.149
lose_e_com	0.0001	0.002	0.1004	0.669	0.0031	0.058
get_e_prkg	0.0198	0.382	– 0.1667	– 0.985	0.1363	2.191
lose_e_prkg	– 0.0301	– 0.567	– 0.2591	– 1.070	– 0.0055	– 0.101
get_e_water	0.0289	0.562	0.0704	0.493	– 0.0777	– 0.905
lose_e_water	0.0228	0.438	0.0677	0.454	– 0.0196	– 0.237
get_e_green	0.0450	1.154	0.1060	0.814	0.0092	0.155
lose_e_green	0.0135	0.359	0.1020	0.900	0.0660	1.165
get_aban	– 0.3343	– 5.614	– 0.6210	– 3.793	– 0.2078	– 2.853
lose_aban	– 0.3124	– 5.012	– 0.1101	– 0.509	– 0.0831	– 1.122
get_bars	– 0.1023	– 1.688	0.0196	0.064	– 0.1268	– 1.832
lose_bars	– 0.0990	– 1.767	0.1559	0.348	– 0.0425	– 0.667
get_rd_prob	– 0.1310	– 3.982	0.0587	0.526	– 0.0157	– 0.326
lose_rd_prob	0.0459	1.323	0.0792	0.684	0.1356	2.522
get_junk	– 0.4490	– 9.566	– 0.3462	– 2.405	– 0.2760	– 4.524
lose_junk	– 0.0348	– 0.693	– 0.0116	– 0.054	– 0.1187	– 1.807
get_nucrim_p	– 0.5877	– 11.530	– 0.1566	– 0.991	– 0.6406	– 11.171
lose_nucrim_p	– 0.0142	– 0.247	– 0.2614	– 1.179	0.0177	0.256
get_noise_p	– 0.3363	– 8.012	– 0.3523	– 2.394	– 0.4409	– 7.183
lose_noise_p	0.0045	0.099	0.0399	0.248	– 0.0552	– 0.906
get_litter_p	– 0.3846	– 4.659	– 0.5101	– 1.874	– 0.3245	– 2.853
lose_litter_p	– 0.0821	– 0.965	– 0.1573	– 0.376	– 0.1933	– 1.595
get_badsrv_p	– 0.4241	– 3.588	– 0.2009	– 0.464	– 0.2821	– 1.753
lose_badsrv_p	– 0.0734	– 0.502	– 0.0445	– 0.090	0.1411	0.662
get_badprp_p	– 0.2997	– 2.342	0.7741	0.000	– 0.1258	– 0.654
lose_badprp_p	– 0.3816	– 3.032	– 0.3430	– 0.581	0.3238	1.563
get_badper	– 0.4927	– 8.197	– 0.8318	– 3.723	– 0.5683	– 6.983
lose_badper	– 0.0636	– 1.053	– 0.0503	– 0.272	– 0.0798	– 0.957
get_othnhd_p	– 0.2756	– 5.655	– 0.0076	– 0.039	– 0.2071	– 2.859
lose_othnhd_p	– 0.0116	– 0.239	– 0.1366	– 0.709	– 0.0492	– 0.591
get_schm_p	– 0.5855	– 4.125	– 0.2650	– 0.845	– 0.1708	– 1.040
lose_schm_p	– 0.1174	– 0.933	– 0.3765	– 1.141	0.1268	0.937
get_shp_p	0.0085	0.218	– 0.1519	– 1.266	– 0.0872	– 1.124
lose_shp_p	0.0013	0.032	– 0.0227	– 0.190	0.0590	0.875

Exhibit A-6b

N-Chotomous Probit Results—Change in Housing Quality, 1999–2001 (2 of 2)

Variable Name	1999–2001					
	Traditional Owned Housing		Manufactured Owned Housing		Rented Housing	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
get_good_trn	0.0315	0.993	0.1383	1.171	– 0.0084	– 0.181
lose_good_trn	– 0.0609	– 1.117	– 0.2718	– 1.158	– 0.0350	– 0.454
mh_in_grp	NA	NA	– 0.2906	– 2.912	NA	NA
ownlot	NA	NA	0.0211	0.228	NA	NA
Mu(1)	0.4504	16.697	0.418	5.913	0.4587	12.662
Mu(2)	1.1130	33.757	1.148	12.632	1.1169	24.824
Mu(3)	1.7477	50.790	1.712	18.103	1.6984	36.037
Mu(4)	3.0519	80.421	2.765	26.641	2.7665	52.524
Mu(5)	3.7719	92.592	3.338	28.849	3.4342	60.662
Mu(6)	4.6044	91.636	4.121	27.593	4.1415	62.121
Mu(7)	5.2086	84.774	4.607	24.689	4.6170	58.733
Number of observations	7,132		761		3,077	
Log likelihood function	– 10,990.79		– 1,282.765		– 5,116.507	
Restricted log likelihood	– 12,936.77		– 1,456.395		– 6,035.134	
Chi-squared	3,891.961		347.260		1,837.253	
Degrees of freedom	47		48		47	

NA = not applicable.

Acknowledgments

The authors thank Chris Herbert for helpful suggestions in developing the research concept of this article. They also acknowledge the suggestions of anonymous reviewers from the U.S. Department of Housing and Urban Development whose insights substantially improved the quality of the research.

Authors

Thomas P. Boehm is a professor of finance and Regions Bank Scholar at The University of Tennessee.

Alan Schlottmann is a professor of economics at the University of Nevada, Las Vegas and a senior research fellow at Claremont Graduate University.

References

Apgar, William, Allegra Calder, Michael Collins, and Mark Duda. 2002. *An Examination of Manufactured Housing as a Community and Asset Building Strategy.* Report to the Ford Foundation by Neighborhood Reinvestment Corporation in collaboration with the Joint Center for Housing Studies of Harvard University. Report Number W02-11. Cambridge, MA: Joint Center for Housing Studies.

Beamish, Julia O., Rosemary C. Goss, Jorge H. Attiles, and Younggioo Kim. 2001. "Not a Trailer Anymore: Perceptions of Manufactured Housing," *Housing Policy Debate* (12) 2: 373–392.

Belsky, Eric S., and Mark Duda. 2002a. "Anatomy of the Low-Income Homeownership Boom in the 1990s." In *Low Income Homeownership,* edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: The Brookings Institution and Joint Center for Housing Studies of Harvard University: 15–63.

Belsky, Eric S., and Mark Duda. 2002b. "Asset Appreciation, Timing of Purchases and Sales, and Returns to Low-Income Homeownership." In *Low Income Homeownership,* edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: The Brookings Institution and Joint Center for Housing Studies of Harvard University: 208–238.

Boehm, Thomas P. 1995. "A Comparison of the Determinants of Structural Quality Between Manufactured Housing and Conventional Tenure Choices: Evidence From the American Housing Survey," *Journal of Housing Economics* (4) 4: 373–391.

Boehm, Thomas P., and Keith R. Ihlanfeldt. 1991. "The Revelation of Neighborhood Preferences: An N-Chotomous Multivariate Probit Approach," *Journal of Housing Economics* (1) 1: 33–59.

Boehm, Thomas P., and Alan M. Schlottmann. 2004. "The Dynamics of Race, Income and Homeownership," *Journal of Urban Economics* (55) 1: 113–130.

Case, Karl, and Maryna Marynchenko. 2002. "Home Price Appreciation in Low- and Moderate-Income Markets." In *Low Income Homeownership,* edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: The Brookings Institution and Joint Center for Housing Studies of Harvard University: 239–256.

DeGiovanni, Frank. 2002. "Introduction to Part 3: Returns to Home Ownership." In *Low Income Homeownership,* edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: The Brookings Institution and Joint Center for Housing Studies of Harvard University: 201–207.

Genz, Richard. "Why Advocates Need to Rethink Manufactured Housing," *Housing Policy Debate* (12) 2: 393–414.

Goetz, William, and Matthew Spiegel. 2002. "Policy Implications of Portfolio Choice in Underserved Markets." In *Low Income Homeownership,* edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: The Brookings Institution and Joint Center for Housing Studies of Harvard University: 257–274.

Hadden, Louise, and Mirielle Leger. 1990. *Codebook for the American Housing Survey: 1973–1993*. Cambridge, MA: prepared by Abt and Associates and revised by HUD and the Census Bureau.

Heckman, James, and Christopher Flinn. 1982. "Models for the Analysis of Labor Force Dynamics," *Advances in Econometrics* (1) 35–95.

Heckman, James, and James Walker. 1990. "The Relationship Between Wages and Income and the Timing and Spacing of Births: Evidence from Swedish Longitudinal Data," *Econometrica* 58: 1411–1441.

———. 1986. Using Goodness of Fit and Other Criteria to Choose Among Competing Duration Models: A Case Study of Hutterite Data. Unpublished paper. University of Chicago. (A shorter, published version appears in *Sociological Methodology 87.)*

ICF Consulting. 2004. *Codebook for the American Housing Survey, Public Use File: 1997 and Later.* Version 1.77. Fairfax, VA: ICF Consulting.

Joint Center for Housing Studies (JCHS) of Harvard University. 2003. *The State of the Nation's Housing.* Cambridge, MA: Harvard University, John F. Kennedy School of Government.

Mansur, Erin, John M. Quigley, Steven Raphael, and Eugene Smolensky. 2000. Examining Policies to Reduce Homelessness in California Using a General Equilibrium Model of the Housing Market. Working paper. University of California, Berkeley.

Manufactured Housing Institute. 2003. *Consumer Statistics* and *Quarterly Economic Report*. Arlington, VA: Manufactured Housing Institute

McKelvey, Richard, and William Zavoina. 1975. "A Statistical Model for the Analysis of Ordinal Level Dependent Variables," *Journal of Mathematical Sociology* 4: 103–120.

Quigley, John, Steven Raphael, and Eugene Smolensky. 2001. "Homeless in America, Homeless in California," *Review of Economics and Statistics,* 83: 37–51.

Reed, Deborah, Melissa Glenn-Haber, and Laura Mameesh. 1996. *The Distribution of Income in California.* San Francisco: Public Policy Institute of California.

Retsinas, Nicolas P., and Eric S. Belsky, eds. 2002. *Low Income Homeownership.* Washington, DC: The Brookings Institution and Joint Center for Housing Studies of Harvard University.

U.S. Department of Housing and Urban Development (HUD). 2004. "Manufactured Housing: Past, Present, and Future," *Recent Research Works* (1): 2–7.

———. 2001. *A Community Guide to Factory-Built Housing.* Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Wealth Accumulation and Homeownership: Evidence for Low-Income Households

Thomas P. Boehm
The University of Tennessee

Alan Schlottmann
University of Nevada, Las Vegas

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.

---

[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.*

Acknowledgments

The authors thank Eric Belsky, William Goetzmann, and Chris Herbert for helpful suggestions in developing the research concept of this article. They also acknowledge the suggestions of anonymous reviewers from the U.S. Department of Housing and Urban Development whose insights substantially improved the quality of the research.

Authors

Thomas P. Boehm is a professor of finance and Regions Bank Scholar at The University of Tennessee.

Alan Schlottmann is a professor of economics at the University of Nevada, Las Vegas and a senior research fellow at Claremont Graduate University.

References

Belsky, Eric S., and Mark Duda. 2002. "Asset Appreciation, Timing of Purchases and Sales, and Returns to Low-Income Homeownership." In *Low-Income Homeownership: Examining the Unexamined Goal,* edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: The Brookings Institution: 208–238.

Boehm, Thomas P. 1993. "Income, Wealth Accumulation, and First Time Homeownership: An Intertemporal Analysis," *Journal of Housing Economics* 8: 217–232.

Boehm, Thomas P., and Alan M. Schlottmann. 2004. "The Dynamics of Race, Income, and Homeownership," *Journal of Urban Economics* 55: 113–130.

———. 2002. "Housing and Wealth Accumulation: Intergenerational Impacts." In *Low-Income Homeownership: Examining the Unexamined Goal,* edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: The Brookings Institution: 407–426.

Case, Karl E., and Maryna Marynchenko. 2002. "Home Price Appreciation in Low- and Moderate-Income Markets." In *Low-Income Homeownership: Examining the Unexamined Goal,* edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: The Brookings Institution: 239–256.

Di, Zhu Xiao, Yi Yang, and Xiaodong Liu. 2004. The Importance of Housing to the Accumulation of Household Net Worth. Working paper. Harvard University, Joint Center for Housing Studies.

Goetzmann, William N., and Matthew Spiegel. 2002. "The Policy Implications of Portfolio Choice in Underserved Mortgage Markets." In *Low-Income Homeownership: Examining the Unexamined Goal,* edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: The Brookings Institution: 257–272.

Gyourko, Joseph, Peter Linneman, and Susan Wachter. 1999. "Analyzing the Relationships among Race, Wealth, and Home Ownership in America," *Journal of Housing Economics* 8: 63–89.

Heckman, James J., and James R. Walker. 1986. Using Goodness of Fit and Other Criteria to Choose Among Competing Duration Models: A Case Study of Hutterite Data. Working paper. University of Chicago, National Opinion Research Center.

Ihlanfeldt, Keith. 1980. "An Intertemporal Empirical Analysis of the Renter's Decision to Purchase a Home," *Journal of the American Real Estate Urban Economics Association* 8: 180–197.

Joint Center for Housing Studies (JCHS). 2003. *The State of the Nation's Housing.* Cambridge, MA: Harvard University.

———. 2000. *The State of the Nation's Housing.* Cambridge, MA: Harvard University.

Mayer, Christopher J. 1999. "Commentary," *Federal Reserve Bank of New York Economic Policy Review* (September): 79–83.

McCarthy, George, Shannon Van Zandt, and William M. Rohe. 2001. The Economic Costs and Benefits of Homeownership: A Critical Assessment of the Research. Working paper. Research Institute for Housing America.

Orr, James A., and Richard W. Peach. 1999. "Housing Outcomes: An Assessment of Long-Term Trends," *Federal Reserve Bank of New York Economic Policy Review* (September): 51–61.

Retsinas, Nicolas P., and Eric S. Belsky. 2002a. "Examining the Unexamined Goal." In *Low-Income Homeownership: Examining the Unexamined Goal,* edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: The Brookings Institution: 1–12.

———, editors. 2002b. *Low-Income Homeownership: Examining the Unexamined Goal.* Washington, DC: The Brookings Institution.

Scanlon, Edward. 1999. The Impact of Homeownership on the Life Satisfaction of African Americans. Working paper. Washington University, Center for Social Development.

Income Diversity Within Neighborhoods and Very Low-Income Families

George C. Galster
Jason C. Booza
Jackie M. Cutsinger
Wayne State University

This research was supported by a grant from the U.S. Department of Housing and Urban Development, Office of Policy Development and Research. The opinions expressed in this article are those of the authors and do not necessarily reflect those of the Department.

Abstract

The past decades have witnessed increasing concern over the family ills engendered by neighborhoods inhabited overwhelmingly by families with limited resources. This study focuses on a different sort of residential context—neighborhoods with substantial income mixing—and the extent to which very low-income (VLI) families—those earning less than 50 percent of the area median income (AMI)—live in them. The study's primary units of analysis are the 100 largest metropolitan areas in the United States, according to the 2000 Census, and the secondary units of analysis are census tracts. The study specifies six mutually exclusive income groups based on the ratios relative to AMI, as defined by the U.S. Department of Housing and Urban Development. It also specifies four groups of neighborhoods according to their diversity of the six income groups, as measured by an entropy index. The descriptive results show that in 2000 (1) most neighborhoods had high diversity, although a decline is apparent in the overall income diversity of neighborhoods and in the share comprising high-diversity neighborhoods; (2) no neighborhoods with median incomes of less than 50 percent of AMI had high diversity; (3) 19 percent of all high-diversity neighborhoods (on average) consist of VLI families and 65 percent of all VLI families live in high-diversity neighborhoods, although both percentages have declined since 1970; (4) 5 percent of VLI families live in neighborhoods with median incomes of less than 50 percent of AMI, twice the percentage of 1970 but lower than in 1990; and (5) exposure of VLI families to other VLI families and moderate-income groups has steadily fallen since 1970 and concomitantly increased for families that have very high incomes (VHIs); indeed, the exposure to VHI families is approximately the same as exposure to other VLI families. This article addresses the mixed implications of these trends for the potential socioeconomic mobility of VLI families.

Introduction

During the past two decades, increasing concern has arisen in many arenas concerning the family ills and impediments to upward socioeconomic mobility engendered by neighborhoods housing only those of limited economic means (for reviews, see Ellen and Turner, 2003; Leventhal and Brooks-Gunn, 2000; Sampson, Morenoff, and Gannon-Rowley, 2002). Regardless of whether such neighborhoods of concentrated deprivation have been generated by market forces or misguided housing policy, a consensus has arisen that they represent a serious problem. As a result, beginning in the 1990s, federal housing policy increasingly emphasized the deconcentration of very low-income (VLI) families, employing both demand- and supply-side housing assistance strategies. On the demand side, efforts were made to aid recipients of Section 8 (now Housing Choice) vouchers in finding apartments in more income-diverse communities. On the supply side, both HOPE VI public housing revitalization programs and public housing desegregation consent decrees worked toward increasing options for public housing residents to either move to low-poverty neighborhoods elsewhere or reside in new, mixed-income communities developed on site. Given these public concerns and federal policy initiatives, it is appropriate to inventory the extent to which VLI families reside today in more diverse alternatives, instead of in neighborhoods of concentrated deprivation.

There has been little systematic description and analysis of income-diverse neighborhoods across our major metropolitan areas and the degree to which VLI families live in them. We do not know enough about how the incidence of income-diverse neighborhoods in U.S. metropolitan areas has changed over time, how prevalent such neighborhoods are today, and the degree to which VLI families are exposed to them. We do not know enough about which other income groups live with VLI families in diverse neighborhoods, despite the importance of such diversity for intraneighborhood social interactions that can potentially benefit VLI families. The current research addresses these important gaps in our knowledge.

In particular, our study addresses the following questions:

- How much income diversity within neighborhoods is present in the 100 largest U.S. metropolitan areas in 2000 and how has the diversity changed since 1970?
- What share of VLI families lives in income-diverse neighborhoods during the 1970-to-2000 period?
- What higher income groups are typically present in neighborhoods occupied by VLI families?

To answer these questions we analyze census tract data for the 100 largest U.S. metropolitan areas in 2000 for the decadal censuses 1970 to 2000, which are contained in the Neighborhood Change Database (NCDB). But first, to situate our research within the existing framework of knowledge about income mixing in neighborhoods, we review the relevant literature.

Literature Review

A great deal of research has been conducted concerning urban economic inequality among groups and residential racial/ethnic segregation. As Jargowsky (1996a) points out, however, another

important aspect of socioeconomic differentiation—the distribution of economic groups across and within neighborhoods—has received less attention. Studies of economic segregation (that is, summary measures of the spatial distribution of different economic groups *across* neighborhoods comprising an entire metropolitan area) include Abramson, Tobin, and VanderGoot (1995); Jargowsky (1996a, 1997); Massey and Eggers (1993); Massey and Fischer (2003); Mayer (2001); Swanstrom et al. (2004); and Watson (2007). These studies are of less relevance to this article compared to those that analyze *within-neighborhood* diversity directly. We will briefly review these latter studies, explaining how they measure key concepts and what their main conclusions have been. We close the section by showing our study's contribution to this literature.

Studies of Income Diversity Within Neighborhoods

The modestly scaled empirical literature that considers the *mix* of economic groups *within* neighborhoods includes Hardman and Ioannides (2004a, 2004b); Immergluck and Smith (2002); Ioannides (2004); Ioannides and Seslen (2002); Jargowsky (1996b, 1997); Krupka (2006); Thomas, Schweitzer, and Darnton (2004); Talen (2006); and Turner and Fenderson (2006). These studies focus on many of the same questions as our study does. How much income diversity characterizes American neighborhoods? How frequently do high-diversity neighborhoods occur? What are their characteristics? How stable are they? What metropolitanwide forces seem to affect neighborhood-level diversity? The common finding is that a significant amount of income diversity typically is present in U.S. neighborhoods (Hardman and Ioannides, 2004a, 2004b; Ioannides, 2004; Ioannides and Seslen, 2002; Krupka, 2006; Talen, 2006; Turner and Fenderson, 2006), even those neighborhoods with poverty rates of more than 40 percent (Jargowsky, 1996b). Much less is known about trends in income-diverse neighborhoods, however, and the extent to which VLI families constitute a substantial part of the mix.

Immergluck and Smith (2002) and Thomas, Schweitzer, and Darnton (2004) classify neighborhoods in Chicago and Grand Rapids, respectively, according to their internal income distributions; Turner and Fenderson (2006) do the same for a national sample of neighborhoods. These studies assign neighborhoods to groups arbitrarily according to their internal income distributions. Immergluck and Smith (2002) categorize neighborhoods in the Chicago area as "highly restrictive," "moderately restrictive," "moderately diverse," "highly diverse," or "low-moderate income" based on the mix of lower and upper income residents in the neighborhood. They identify 72 moderately diverse neighborhoods and 21 highly diverse neighborhoods that were stable from 1993 to 2000.[1] Thomas, Schweitzer, and Darnton (2004) define mixed-income neighborhoods as those reflecting the mix of incomes that exists in the greater urban area. They identify a total of 11 block groups that are both diverse and stable from 1990 to 2000 in their income mix. These 11 neighborhoods tended to have less vacant housing, less rental housing, lower median income than the metropolitan area, lower proportions of families in poverty, and fewer people of color. Turner and Fenderson (2006) specify income groups according to national quintiles of the 2000 Public Use Microdata Sample, then categorize census tracts into 12 groups according to their share of lowest quintile households and mixes of higher income groups. They find a substantial incidence of income-

[1] The authors define *stability* as fluctuations that are less than plus or minus 5 percentage points during the study period.

diverse neighborhoods, with the greatest income mixing in neighborhoods with 10 to 20 percent of lowest quintile households. Conversely, middle- and high-income households are most likely to predominate in tracts with the smallest share of the lowest income group.

Hardman and Ioannides (2004a, 2004b) assess income mixing at the microneighborhood level by using clusters of 11 adjacent homes delineated by the American Housing Survey (AHS). In both studies, the authors measure income as a proportion of the adjusted median family income, as defined by the U.S. Department of Housing and Urban Development (HUD). They find that households that are most likely to live in neighborhoods with medians close to theirs are the richest, followed by the poorest households. They find evidence for some "perfect sorting" (that is, neighborhoods made up of concentrations of households in which all have very similar incomes) in many neighborhoods at both extremes of the income distribution, so it is more likely that neighborhoods with median incomes near the center of the income distribution will be diverse.

Ioannides and Seslen (2002) investigate the distribution of both income and wealth in neighborhoods and contrast these with national income and wealth distributions, using data from the AHS and the Panel Study of Income Dynamics.[2] They employ the Bourguignon decomposable inequality index in their analyses. Housing value showed the smallest amount of diversity within neighborhoods, followed by income, then total net wealth.

Jargowsky (1996b, 1997) comprehensively studies metropolitan neighborhoods where the percentage of population below the federal poverty line is greater than 40 percent. He finds that these neighborhoods are occupied predominantly by African Americans, often by Hispanics, and rarely by Whites. Concentrated poverty neighborhoods increased in prevalence from 1970 to 1990 (measured by the number of 40-percent poor census tracts and the populations living in them). During the 1990s, however, this trend seems to have abated (Jargowsky, 2003). Despite their concentrations of poverty, however, these neighborhoods contain considerable amounts of diversity on a variety of socioeconomic indicators (Jargowsky, 1996b).

Ioannides (2004), Krupka (2006), and Talen (2006) use multivariate techniques to probe the correlates of neighborhood income diversity. Ioannides uses a national AHS sample of microneighborhoods and measures income diversity by the variance of the natural log transformation of household incomes of those residing there. Talen uses census tracts in Chicago and measures income diversity by an entropy index based on Census-reported income groups. Krupka (2006) measures income diversity of block groups using the variance of Census-defined income group midpoints. Despite the variation in diversity measures and geographic scales of neighborhood analyzed, these studies consistently find a greater likelihood of income mixing in neighborhoods with more owner occupants, families with children, and non-White households; higher densities; lower vacancy rates; older housing stock; and greater diversity of housing by tenure and values. The evidence on housing values is contradictory, however.

[2] Ioannides and Seslen (2002) measure income synonymously as the Census Bureau defines family income.

The Contributions of This Study

This study contributes to the literature on neighborhood income diversity in two primary ways. First, for neighborhoods in the 100 largest U.S. metropolitan areas in 2000 we provide a series of comprehensive portraits from 1970 to 2000 of the distribution of six family-income groups, which are defined consistently across the nation and across time through the use of HUD's scheme relating them to metropolitan area median incomes (AMIs). In these portraits we present distributions of neighborhoods according to their degree of income diversity (measured by entropy). We also provide representative illustrations of neighborhoods within various groups of income diversity in five large metropolitan areas. Second, we focus on the residential experience of VLI families, tracing in detail the groups of neighborhoods that they occupy in terms of the income of their neighbors. This view provides much more nuance than the poor/nonpoor dichotomous analyses that have often been conducted.

Data and Measures

This data and measures section discusses the data, variables, and methods we used in the study. We start with the parameters of the study, time frame, and units of analysis. We proceed by describing our data sources and index measures.

Spatial and Temporal Parameters

The timeframe considered in this study is 1970 to 2000, with observations made at the following points in time: 1970, 1980, 1990, and 2000. We selected the 1970-to-2000 period for two reasons. First, before 1970 the requisite census tract data are either unavailable or cumbersome to employ.[3] Second, selecting the 1970-to-2000 period permits comparison of our findings with those of previous research (Abramson, Tobin, and VanderGoot, 1995; Farley, 1977; Massey and Eggers, 1993, 1990).

Spatially, we employ two types of units of analysis in this study: one primary and one secondary. Our primary units of analysis are the 100 largest U.S. metropolitan areas—metropolitan statistical areas (MSAs) and primary metropolitan statistical areas (PMSAs)—in the United States, according to the 2000 Census (see appendix A). Advantages to using the 100 largest U.S. metropolitan areas as the primary unit of analysis include (1) a reliable, adequately sized data set, (2) a representative regional sampling of the United States, and (3) a sample accounting for 61.4 percent (N = 172,896,354) of the total U.S. population in 2000 (http://factfinder.census.gov).

Following the reasoning of Abramson, Tobin, and VanderGoot (1995), we chose the metropolitan area as our primary unit of analysis because, by definition, its boundaries capture the widest range of income diversity in our urban regions. The alternative used in some other studies has been to focus on central cities. With the decline of central city population as a share of the region, especially

[3] Several data sets exist that contain tract-level data for the period of 1940 to 1970, including the Elizabeth and Donald Bogue data series housed at the University of Michigan's Inter-University Consortium for Political and Social Research (www.icpsr.org). Usability of the data, however, is cumbersome and, more importantly, not all of the metropolitan areas included in this study are covered uniformly over time.

in the Midwest and Northeast, however, we believe that central cities are not the best unit of analysis because they provide only a limited glimpse of the metropolitan neighborhood income spectrum.

As with most units of geography used in the U.S. Census, however, metropolitan area boundaries may change over time.[4] Providing a constant definition to metropolitan areas across our 30-year timeframe would be artificial and inappropriate.[5] We have chosen instead to use for metropolitan areas whichever boundaries were appropriate for the year in which particular data were measured. This means that we are allowing the boundaries of the metropolitan areas to change for each census period, thus permitting us to capture the full range of income diversity for the population then residing in each area. We agree with Abramson, Tobin, and VanderGoot (1995: 48-49) that "the changing boundaries of metropolitan areas generally reflect real changes in the way the areas are organized and should be incorporated into the analysis" (see also Jargowsky, 1994).

In keeping with most other quantitative studies that involved analysis of neighborhood income dynamics, we chose to use census tracts as our secondary unit of analysis (also see Abramson, Tobin, and VanderGoot, 1995; Galster and Mincy, 1993; Galster, Quercia, Cortes, et al., 2003; Jargowsky, 1997, 1994; Kasarda, 1993; Massey and Denton, 1988; Massey and Eggers, 1993, 1990). According to Iceland, Weinberg, and Steinmetz (2002: 8), "census tracts, which typically have between 2,500 and 8,000 people, are defined with local input, are intended to represent neighborhoods, and typically do not change much from census to census, except to subdivide." Although not without controversy,[6] census tracts remain the overwhelming choice of analysis, whether measuring income, race, or any other type of neighborhood-based measure of inequality.

Although the census tract is a key component to our research, we thought that the inclusion of all tracts would be inappropriate for this study. After considering our review of previous research (Ellen, 1998; Lee and Wood, 1990), we decided that census tracts had to meet the following criteria to be included in this study:

- A total population of 500 or greater.
- A group-quarters population that is not more than 50 percent of the total population.
- A reported family-income distribution.[7]

[4] Metropolitan areas have changed numerous times between 1970 and 2000—new ones have been created, some have expanded due to growth in outlying counties, and others have been subdivided based on changes in commuting trends. The U.S. Office of Management and Budget redefines metropolitan areas after each census as new data on population and commuting become available.

[5] One option would have been to include in subsequent years only those census tracts that constituted our 1970 sample of metropolitan areas, but this approach would have excluded areas of post-1970 suburban growth. Another option would have been to work backward from all tracts constituting metropolitan areas in 2000, but this approach would have produced many missing observations, because not all areas of the country were tracted in 1970 and 1980 (Tatian, 2002).

[6] According to Massey and Denton (1988), census tracts possess two flaws. First, by definition, they are intended to be homogenous in terms of race/ethnicity, income, occupation, and housing. Second, disparities exist in the geographic size of tracts between central cities and suburbs because population rather than geography determines tract size. In areas where the population is less dense (for example, outlying suburbs) census tracts tend to be larger when compared to more dense tracts in central cities. Yet, according to Massey and Denton (1988), "switching down to blocks or up to tract groups will not eliminate any of the problems."

[7] Because of respondent confidentiality, certain demographic measures such as income are suppressed under certain circumstances. Thus, we were presented with several situations in which we were provided with total population and racial characteristics but no income statistics.

Selecting tracts with a population greater than 500 provides us with a threshold that helps ensure a robust sample size for each tract. In addition, tracts with large group-quarters populations (prisons, college dorms, nursing homes) are irrelevant to this study and are excluded to prevent them from skewing our results. Finally, and most importantly, tracts without income data were eliminated from the sample.

We recognize that, despite its many analytical advantages, the census tract may not be the ideal unit of analysis for operationalizing "neighborhood." We note that urban residents conceive of several spatial scales of neighborhood, the smallest consisting of their own blockface (Suttles, 1972). Moreover, it is conceivable that census tracts are of a scale that internal segregation of different income groups may be possible. Thus, we urge caution when interpreting findings in this article to recognize that the calculated exposure of different groups to each other in the same census tract does not necessarily mean that these groups live on the same blocks or that they interact meaningfully or in a sustained way.

Data Sources

The primary data source used in the study is the Neighborhood Change Database (NCDB), which was created by GeoLytics, Inc., in conjunction with the Urban Institute. We used the NCDB census long form database, which contains sample data from the 1970, 1980, 1990, and 2000 Censuses. Using the NCDB provides the advantage of having an extensive and high-quality set of census data in an easy-to-access format. With just this one database, we were able to conduct with extraordinary efficiency census tract analysis across a 30-year timeframe.[8]

In addition to accessing information from the NCDB, we needed to obtain metropolitan-level characteristics for measures of income. Because the NCDB contains only tract-level data, median family-income statistics measured at the metropolitan level were obtained from other sources. We used Census-printed reports for 1970 and 1980 (U.S. Bureau of the Census, 1973, 1981). For 1990 and 2000 data we used the Census Bureau's FactFinder website (http://factfinder.census.gov). To create additional metropolitan-level variables used in our analyses, we aggregated census tract data, resulting in metropolitan area totals.

Socioeconomic Variables

The first set of variables that form the foundation of our study is the family-income distribution.[9] The NCDB provides a grouped frequency distribution of family income for each decade by census

[8] An alternative, cumbersome method would have been to assemble four national files by assembling state files for each of the four censuses. The files would then have had to be "cleaned" to sort out any unwanted variables and census tracts.

[9] The U.S. Census Bureau defines a family as two or more people who are related by birth, marriage, or adoption and living in the same household. Households represent all persons living together in a housing unit, and families are a type of household. Studies of income segregation use either households or families as the base of their income measure. Although the pattern of income distribution is likely not to differ, there are income differences between the two. Because households include families, unrelated persons, and persons living alone, it is a more inclusive measure leading to lower median income results than with families. Families do not include unrelated individuals or one-person households, thus resulting in income ranges and medians that trend higher. In this study, we have chosen to use families as the basis for our income calculations because NCDB does not provide household income distribution for the years before 2000 and because HUD uses the family as its unit of analysis for its programmatic income guidelines.

tract. From these distributions, we calculated family-income groupings based on HUD income guidelines (see HUD, 1996: appendix B). We specified the following six mutually exclusive income groups, based on the area median income[10] of families for the particular metropolitan area:

1. Very low-income (VLI) group: families earning 50 percent or less of AMI.
2. Low-income (LI) group: families earning 51 to 80 percent of AMI.
3. Moderate-income (MI) group: families earning 81 to 100 percent of AMI.
4. High-moderate-income (HMI) group: families earning 101 to 120 percent of AMI.
5. High-income (HI) group: families earning 121 to 150 percent of AMI.
6. Very high-income (VHI) group: families earning more than 150 percent of AMI.

Although not based on the same criteria that the Census Bureau uses when considering poverty, our VLI group generally measures the similar end of the income distribution, albeit more expansively, in most of our largest metropolitan areas. Our specification offers several advantages over the conventional use of the federally defined poverty line to create a simple dichotomy of poor and nonpoor, however. First, we are able to control implicitly for regional and metropolitan differences in income levels and cost of living by providing a standard that is based on each metropolitan area's median income. Second, because we are standardizing income distribution groups across metropolitan areas by relating each to its own AMI, we are able to make straightforward comparisons among metropolitan areas, both cross-sectionally and over time.

Although the grouped family-income distribution found in the NCDB provides us with the necessary data to create our six income groups, we were confronted by the fact that their numerical boundaries defined by HUD guidelines did not match the grouped NCDB income distribution data. Based on U.S. Census procedures (U.S. Bureau of the Census, 2002), we interpolated the data in the NCDB groups to obtain a reasonably accurate estimate of family counts within our six income groups. For the income range of $2,500 or less, we used linear interpolation and, for larger income ranges, we used Pareto interpolation (see appendix B for formulae).

Index Measures

We use two indices in our study; both use the aforementioned definitions of income groups, thereby enabling us to get beyond the poor/nonpoor dichotomy found in much of the previous research on metropolitan income inequality. The first is the P* index (xP*y), which measures the exposure of one group (x) to another (y) (Massey and Denton, 1988):[11]

$$ {}_{x}P^{*}_{y} = \sum_{i=1}^{n} \frac{x_i}{X} \frac{y_i}{t_i} $$

[10] The AMI we use is not adjusted for differences in family size.

[11] Note: when *X* and *Y* represent the same group, the index is referred to as an isolation index.

where:

x_i = Number of group *X* members

y_i = Number of group *Y* members

t_i = Total population of unit *i*

X = Total population of *X* members of the whole metropolitan area

The index varies between 0 and 1.0 and is interpreted in this study as the probability that a member of a very low-income group (*x*) will share the same neighborhood (census tract) with a member of another, higher income group (*y*). It also may be interpreted as the average percentage of group *y* residing in the neighborhood of group *x* families. In most studies of income inequality, the exposure index is computed for the poor and measures the degree to which they are exposed to the nonpoor income group. Instead, we compute exposure for VLI families to each individual higher income group in our six-group typology, thus providing a much richer portrait of the composition of the typical VLI family's neighborhood.

The other measure we employ is the entropy index (H):

$$H_i = \sum_{m=1}^{M} Q_{im} / \ln(M)$$

where:

$$Q_{im} = -\pi_{im} \ln(\pi_{im}) \text{ if } \pi_{im} > 0$$

$$= 0 \text{ otherwise}$$

π_{im} = the proportion of the population of tract i consisting of individuals from group m ($m = 1, 2, \ldots, M$)

M = Number of groups (six in our study)

H provides a measure of how evenly families are distributed across the various income groups within a neighborhood. It assumes its maximum value of 1.0 when each of the aforementioned six income groups is equally represented in the neighborhood. It assumes its minimum value of zero when only one of the groups is represented in the neighborhood. Many scholars have confirmed the usefulness of the entropy index and its numerous desirable technical qualities, such as handling multiple groups readily, easy calculation, and decomposability (Allison, 1978; Fischer, 2003; Iceland, 2004; James and Taeuber, 1985; Reardon and Firebaugh, 2002; Reardon and Yun, 2001; White, 1986). Entropy has been chosen as the preferred measure in a wide range of studies on income inequality and economic segregation (Firebaugh, 1999; Fischer, 2003; Fischer et al., 2004; Fong and Shibuya, 2000; Harsman and Quigley, 1995; Jones and Weinberg, 2000; Talen, 2006; Telles, 1995; White, 1986), and we follow in this tradition.[12]

[12] Several other measures of income diversity within neighborhoods have been employed, of course; cf. Hardman and Ioannides (2004a, 2004b); Immergluck and Smith (2002); Ioannides (2004); Krupka (2006); Thomas, Schweitzer, and Darnton (2004); Turner and Fenderson (2006).

Neighborhood Income Diversity Typology

After computing some measure of the diversity of income groups within a neighborhood, any study is confronted next with the challenge of specifying ranges of values for this measure that serve to categorize neighborhoods into various diversity groups. This process is inherently arbitrary and fraught with potential tautology: how one chooses the group definitions can shape the conclusions one reaches. Our approach appeals fundamentally to an intuitively pleasing, common-language notion of what constitutes diversity, then translates this into corresponding values of our entropy index for operationalization. Our approach thus does not beg the question of the incidence or distribution of neighborhoods according to our typology.

Specifically, our typology of income diversity at the neighborhood level has four groups (high diversity, moderate diversity, low diversity, and not diverse) defined intuitively and by entropy as follows:

Group Title	Income Group Mix Defining Minimum Threshold	Entropy Range
High diversity	1 group = 33.3%, 4 groups =16.7%, 1 group = 0%	$.87 \leq H$
Moderate diversity	1 group = 50%, 3 groups = 16.7%, 2 groups = 0%	$.69 \leq H < .87$
Low diversity	1 group = 66.7%, 2 groups = 16.7%, 3 groups = 0%	$.48 \leq H < .69$
Not diverse	NA	$H < .48$

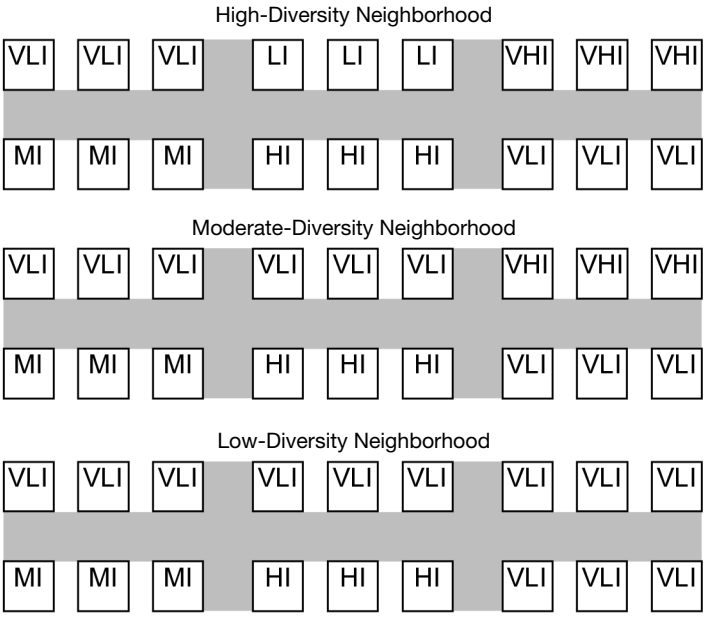
For a census tract to have high diversity, we think it reasonable to specify that it must meet the standard of four of the six income groups being represented to a substantial degree: each comprising at least 16.7 percent (one-sixth) and none exceeding 33.3 percent (one-third) of the population. This mixture translates into an entropy value of 0.87. We therefore categorize as "high diversity" any neighborhood meeting or exceeding this degree of diversity as embodied in this threshold entropy score. Exhibit 1 shows what an archetypical neighborhood of 18 dwellings might look like under our specification of high diversity. Similarly, the threshold for achieving a moderate-diversity neighborhood is one group comprising 50 percent of the population, three other groups at 16.7 percent, and two groups not represented, which corresponds to an entropy score of 0.69. Finally, the low-diversity neighborhood threshold is defined as one group at 66.7 percent, two groups at 16.7 percent each, and three groups not represented, which corresponds to an entropy score of 0.48. Anything less than this limited mixture is defined as "not diverse" in our scheme.

Neighborhood Median Income Typology

We also find it revealing in some of our analyses to categorize neighborhoods by their median family incomes (not their diversity of incomes). We thus define six groups of neighborhoods according to whether their median family income falls within one of the aforementioned six HUD income ranges. Thus, a "VLI neighborhood" means a census tract whose median family income was less than 50 percent of the area median income. Across our 100 largest U.S. metropolitan areas in 2000, the (unweighted) mean percentages of neighborhoods falling into these six neighborhood median income groups were as follows: VLI: 7.3 percent; LI: 23.8 percent; MI: 24.1 percent; HMI: 19.4 percent; HI: 15.3 percent; and VHI: 10.0 percent. Comparable statistics for individual metropolitan areas are presented in appendix A.

Exhibit 1

Neighborhood Diversity Archetypes by Income-Group Composition



HI = high income. LI = low income. MI = moderate income. VHI = very high income. VLI = very low income.

An Application of Our Neighborhood Income-Diversity Typology to Five Cities

We believe that our scheme for delineating groups of neighborhoods according to their entropy score has scientific and intuitive appeal; however, it is also vital to "ground test" the scheme in well-known neighborhoods to ensure that it comports well with commonsensical understandings. We do so in this section by mapping our four groups of neighborhood income diversity in five different metropolitan areas: Los Angeles, New York, Chicago, the District of Columbia, and Detroit. All maps follow the same format, whereby darker shades signify greater income diversity.

The map in exhibit 2 shows census tracts in the central region of Los Angeles. Note the vast swath of low-diversity neighborhoods extending through the central part of the city from the municipal civic core to the Watts and South Central areas. These neighborhoods are composed of predominately VLI and LI African-American and Latino families. Similarly, low-diversity but VHI White neighborhoods are observed in Beverly Hills, the Hollywood Hills just north, and the oceanfront communities of Santa Monica and Palos Verdes. Separating these two groups of low-diversity communities is a broad ring of high-diversity, moderate-income neighborhoods.

The central boroughs of New York are shown on the map in exhibit 3. The homogenous, VHI enclave of the Manhattan Upper East Side stands out dramatically on the east edge of Central Park (shown as large white rectangle). A similar cluster of HI and VHI neighborhoods is evident around Greenwich Village. By contrast, Chelsea, Harlem, and the Lower East Side evince considerably

more income diversity. Large swaths of high-diversity neighborhoods are obvious in the northern realms of Brooklyn and western realms of Queens (just east across the East River from Manhattan). Pockets of LI and VLI African-American neighborhoods evincing little diversity appear in the South Bronx (just east of Harlem).

Chicago and some of surrounding Cook County are shown on the map in exhibit 4. Substantial spatial irregularities exist in the older core neighborhoods of the city. Several homogenous (predominantly White) HI and VHI neighborhoods extend north and west from the "loop" central business district, epitomized by the "Gold Coast" running north through Lincoln Park adjacent to Lake Michigan. A contrasting band of homogenously VLI (predominantly African-American) neighborhoods extends south from the core, encompassing the now demolished) public housing projects (such as Robert Taylor homes) along State Street and continuing into Woodlawn and Englewood. The well-known, economically (and racially) diverse communities of Uptown and Hyde Park are clearly demarcated. Forming a wide crescent around this mixture of neighborhood groups in the core is a set of high-diversity, MI neighborhoods extending from Chicago into the inner-ring suburbs.

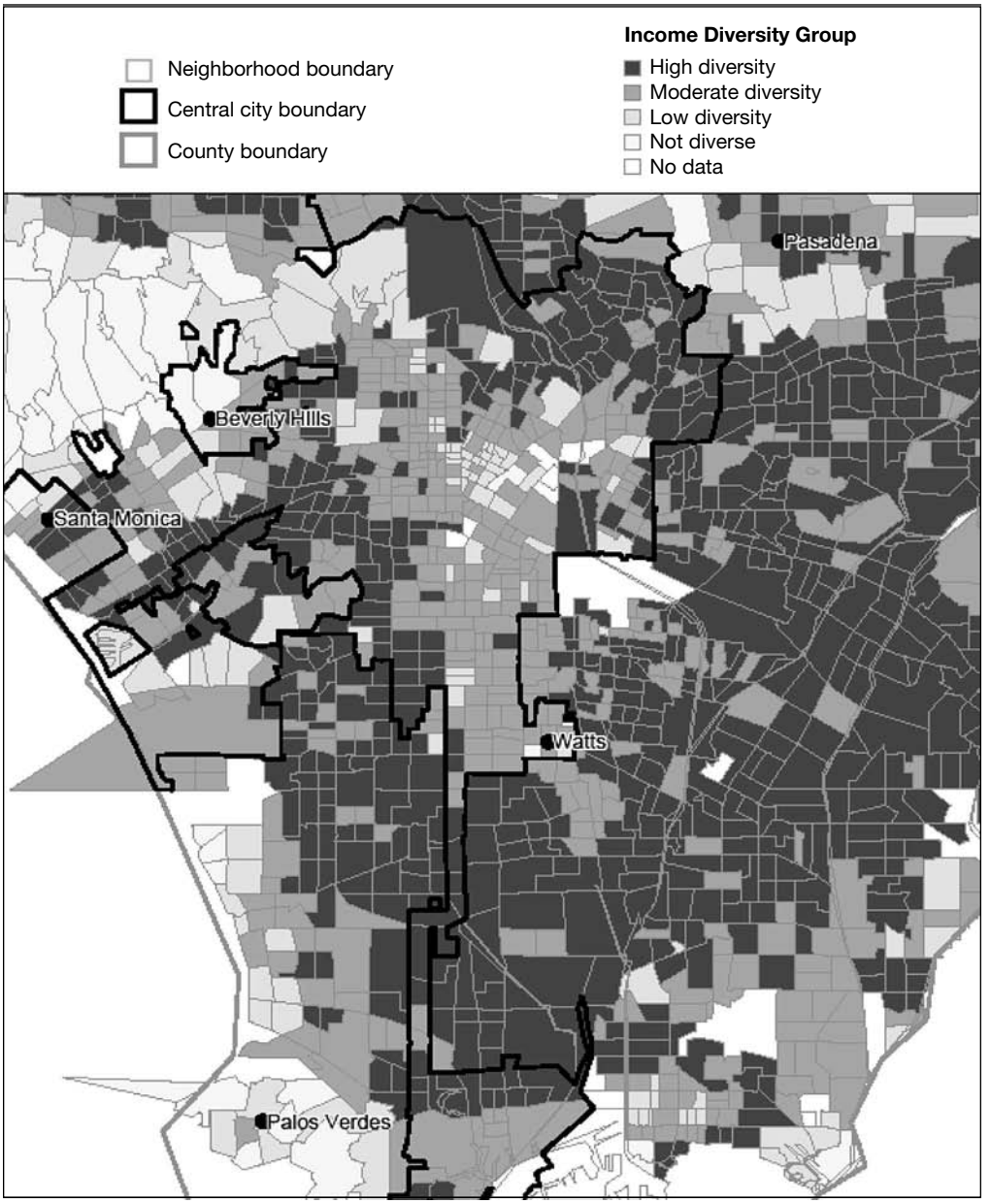
The District of Columbia is shown on the map in exhibit 5. Both Capitol Hill and Columbia Heights were under considerable gentrification pressure in 2000 and appropriately reflect moderate to high degrees of diversity. A wide swath of high-diversity (racially mixed) neighborhoods radiates northwest along the east side of Connecticut Avenue from Dupont Circle. Another (predominately African-American) set of high-diversity, MI neighborhoods extends from the northeast quadrant of the District into Prince George's County, Maryland. By contract, a swath of homogenous (predominately White) HI and VHI neighborhoods extends northwest from the Georgetown neighborhood in the District into the adjacent suburbs of Montgomery County, Maryland.

Finally, the core of the Detroit metropolitan area is shown on the map in exhibit 6. The pockets of high-diversity neighborhoods bordering the central business district along the Detroit River reflect a spotty pattern of small-scale redevelopment amid older, poor-quality housing. Just north of the central business district in the Cass Corridor, a group of homogenously VLI and LI (predominately African-American) neighborhoods is being diversified by gentrification pressures on the south flank of Wayne State University. The crescent-shaped pattern of low-diversity neighborhoods centered around Highland Park consists of homogenously poor areas, most of which were designated as Empowerment Zone territories. As in the case of Chicago, this polyglot pattern at the core changes into a consistent ring of high-diversity, MI neighborhoods constituting a vast area of southern Macomb County (for example, Warren), southern Oakland County, and western Wayne County. At the other extreme, the suburb of Grosse Pointe clearly appears as a not-diverse enclave, consistent with its homogenously VHI (White) population. Similar groups of neighborhoods appear in the northwestern reaches of Oakland County (for example, Bloomfield Hills, Birmingham).

In sum, we believe that our groups for neighborhood income diversity make sense when applied to a wide range of contexts in five of our largest metropolitan areas. This cartographic exploration also reveals some rough similarities in the spatial patterns of neighborhood income diversity. The core areas of our largest metropolitan areas generally are characterized by a more jumbled pattern, with a wide range of neighborhood diversity groups represented in a relatively small territory. High-diversity, moderate-diversity, not-diverse/HI, and not-diverse/LI groups all are typically

Exhibit 2

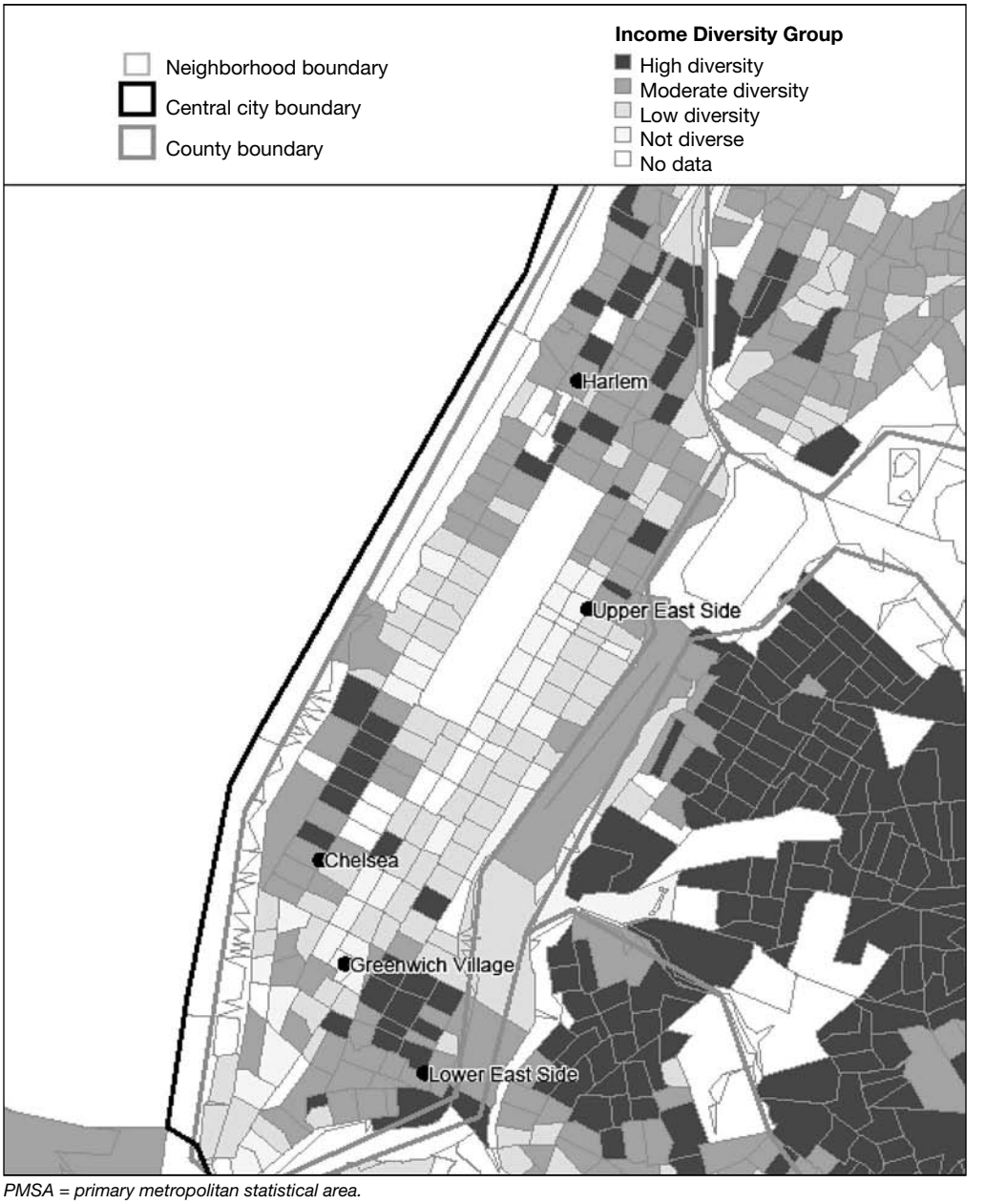
Los Angeles PMSA, 2000



PMSA = primary metropolitan statistical area.

Exhibit 3

New York PMSA, 2000



PMSA = primary metropolitan statistical area.

Exhibit 4

City of Chicago PMSA, 2000

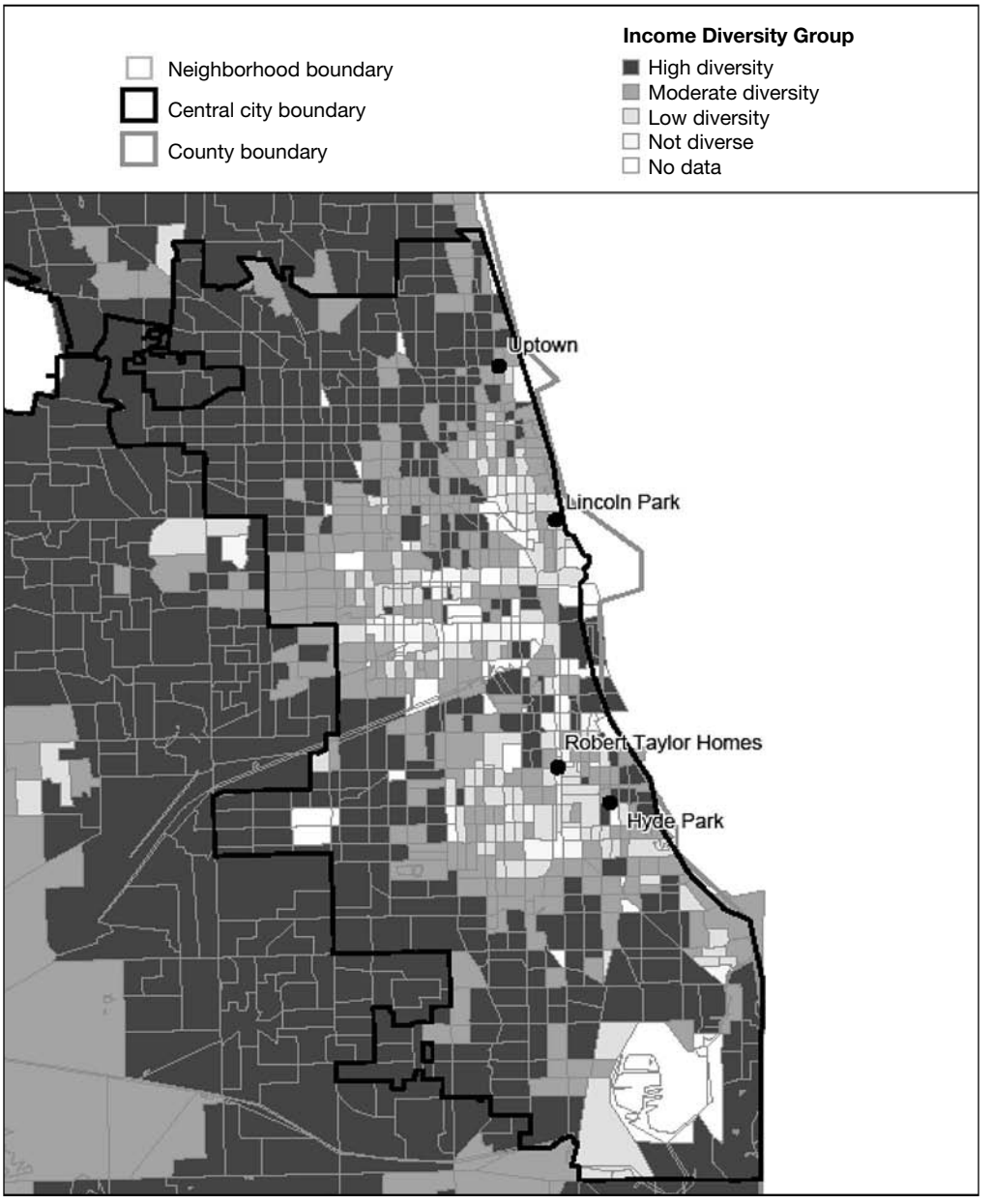
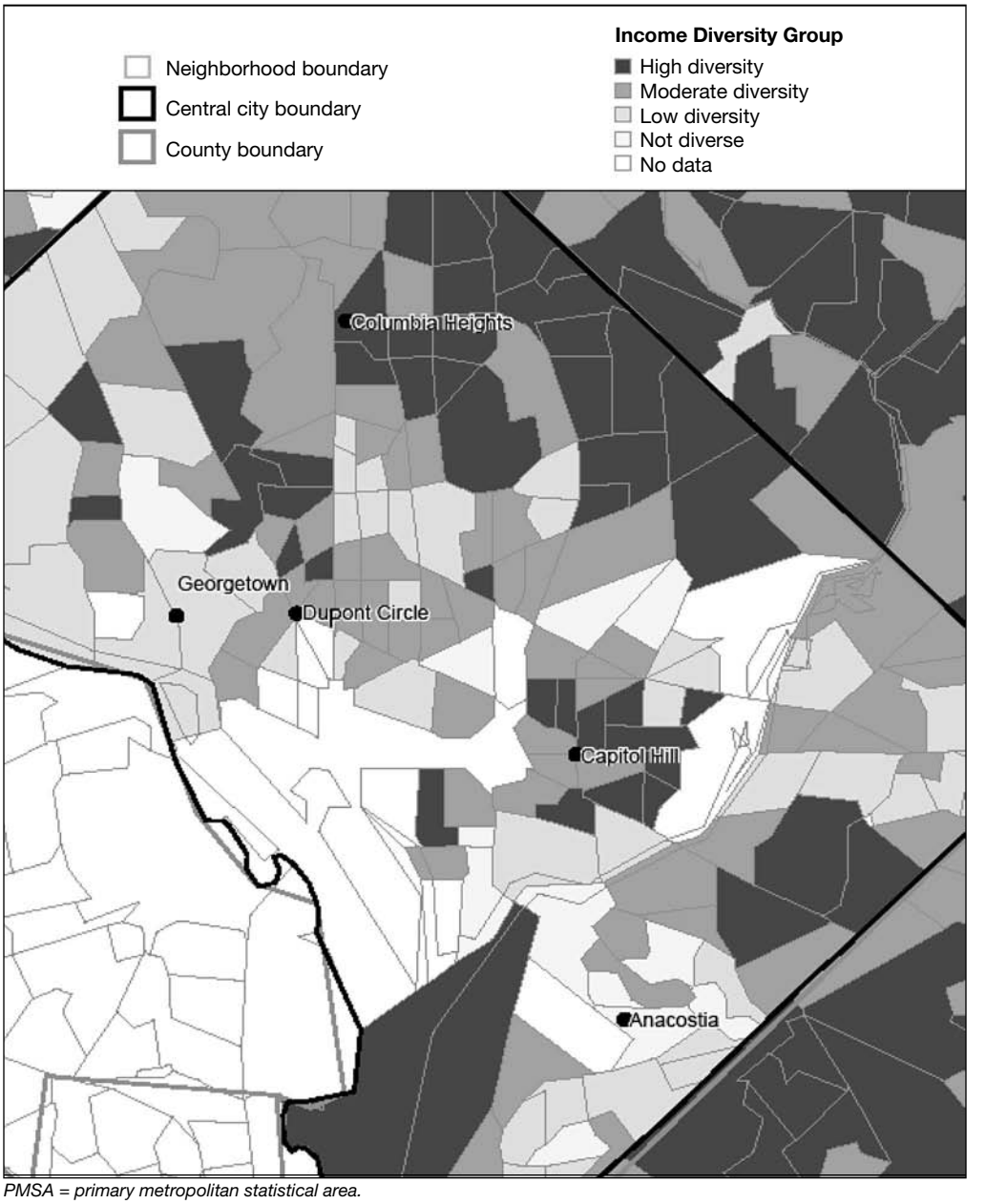


Exhibit 5

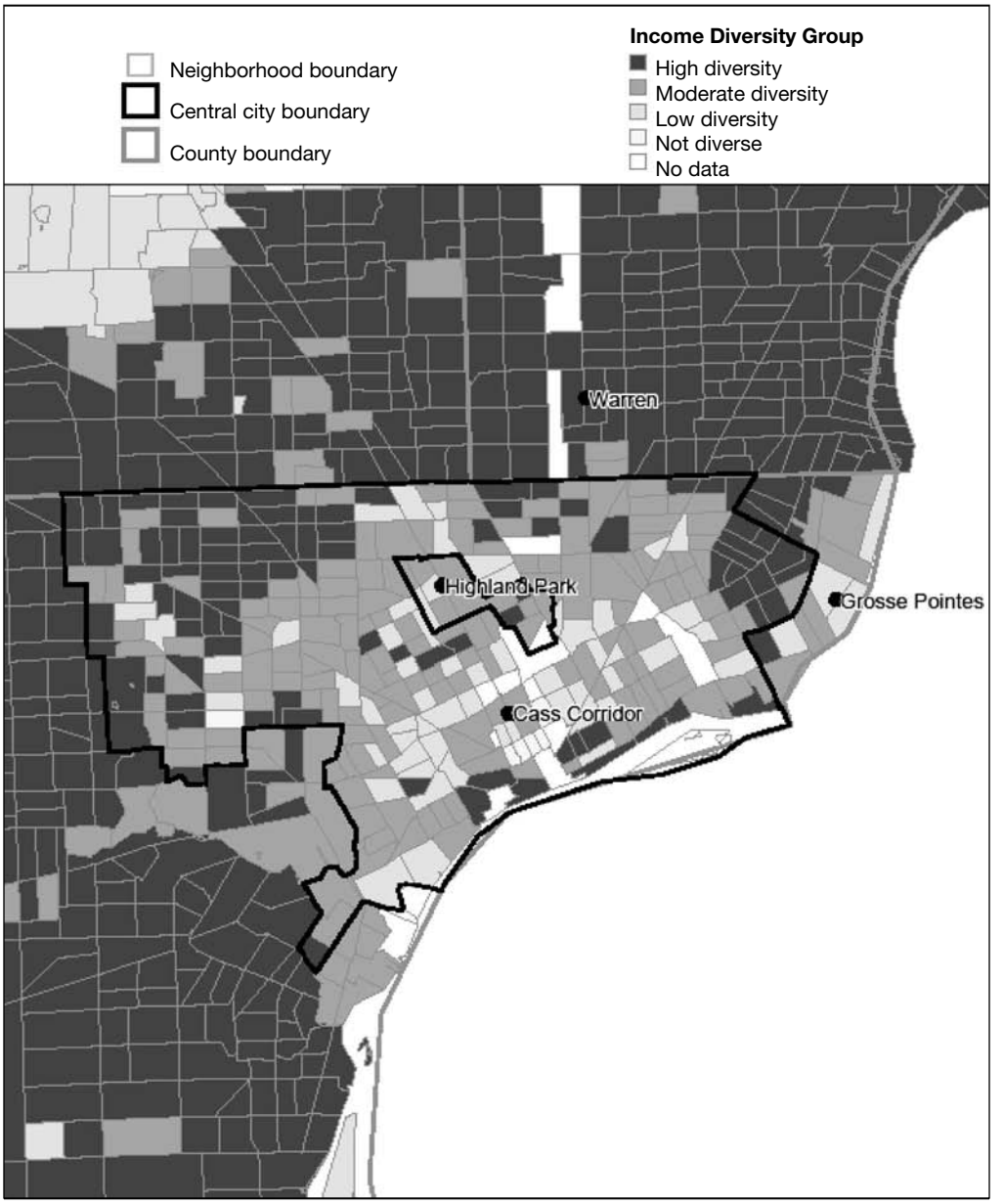
Washington, DC PMSA, 2000



PMSA = primary metropolitan statistical area.

Exhibit 6

Detroit PMSA, 2000



PMSA = primary metropolitan statistical area.

represented in areas within a few miles of the historical core. A ring of consistently high-diversity neighborhoods generally encompasses the aforementioned core region, sometimes punctuated by a few homogenous, HI enclaves. Closer to the exurban fringe, a larger share of not-diverse, HI and VHI neighborhoods is manifested.

Neighborhood Income Diversity in American Metropolitan Areas: A Portrait

In overview, we found that the norm for neighborhood income diversity, as measured by mean entropy scores, although high, is decreasing over time, although this trend varies by neighborhood median income. In terms of neighborhood median income group, VLI, LI, HI, and VHI neighborhoods all became more diverse, but MI and HMI neighborhoods became less diverse since 1970. Most neighborhoods have high diversity, although their share has declined substantially since 1970.

Neighborhood Income Diversity Patterns

Before presenting our findings on income-diverse neighborhoods, we discuss overall neighborhood income distribution patterns. Based on census tract entropy scores, we found that the mean across all 100 metropolitan areas decreased from 0.91 in 1970 to 0.90 in 1980, 0.88 in 1990, and 0.87 in 2000. Although an income entropy score above 0.8 is still considered very diverse by our standards, the trend shows a modest but steady decline during the 30-year period. Such aggregates obscure interesting variations across neighborhood median-income groups, however, both in terms of variations in levels and in cyclical trends. The table in exhibit 7 shows the average neighborhood income entropy score between 1970 and 2000 by neighborhood median-income group; corresponding statistics for the individual metropolitan areas are presented in appendix A.

Regardless of the decade analyzed, metropolitan neighborhoods with medians at the extremes of the family-income distribution (VLI and VHI) are by far the least diverse in terms of income, with entropy scores ranging from 0.64 to 0.69. Of course, this is to be expected given the mathematics of distribution characterized by extreme values for medians: for example, a very low median can be produced only if the vast majority of families have very low incomes. VLI neighborhoods are the least income-diverse, on average, followed closely by VHI neighborhoods. By contrast, MI and HMI neighborhoods are the most diverse, with entropy scores in the extremely high range of 0.96

Exhibit 7

Mean Family-Income Entropy Scores by HUD Neighborhood Group, 1970 to 2000, in the 100 Largest U.S. Metropolitan Areas

HUD Neighborhood Group (Median Income)	1970	1980	1990	2000	1970–2000 Change	Change as Percent of 1970 Value
Very low income	0.658	0.651	0.636	0.662	0.004	0.61
Low income	0.884	0.889	0.886	0.887	0.003	0.34
Moderate income	0.975	0.976	0.972	0.969	– 0.006	– 0.62
High moderate-income	0.967	0.971	0.965	0.958	– 0.008	– 0.83
High income	0.875	0.892	0.886	0.884	0.009	1.03
Very high income	0.658	0.685	0.678	0.685	0.027	4.10

to 0.98. The most diverse neighborhoods (MI and HMI) have been dramatically decreasing in share since 1970, but the least diverse neighborhoods (VLI and VHI) have been increasing in share. This decrease in the most diverse neighborhoods explains the aggregate results we found—slight declines in overall neighborhood income diversity during the past 30 years.

The 30-year trends in entropy scores across neighborhood groups were inconsistent from decade to decade in all cases. Scores for LI and VHI neighborhoods fluctuated across the decades, yet showed an overall increase in diversity during the period. MI, HMI, and HI neighborhoods increased in diversity between 1970 and 1980, but their diversity declined after that. Although the decline overcame the increase for MI and HMI neighborhoods, resulting in an overall decrease, this was not the case for HI neighborhoods. Finally, although VLI neighborhoods experienced decreasing average diversity during the first two decades, the increase in average entropy scores between 1990 and 2000 completely overshadowed the decreases, resulting in a net increase during the 30-year period. Although average entropy scores portray an interesting overview of neighborhood income diversity, the following section looks at our diversity typology in a more disaggregated way and how it relates to the distribution of VLI families.

The Incidence of Income-Diverse Neighborhoods in 2000

Turning now to the main focus of our study, we find that two-thirds of neighborhoods in the 100 largest U.S. metropolitan areas have high diversity in 2000 by our definition; see exhibit 8 and appendix A for results for individual metropolitan areas. This remarkable finding probably belies the conventional wisdom. Nevertheless, we would argue that this finding is not an artifact of our definition. We noted previously that our definition corresponds with common sense: if a neighborhood has at least five of the six HUD-specified income groups comprising at least one-sixth of the total, it can fairly be described as having high diversity Moreover, we reiterate that previous studies commonly find that most neighborhoods have high-income diversity as well, even though a variety of definitions of "highly diverse" has been employed. Considerably more income diversity exists within many neighborhoods than most people likely realize, despite the fact (as noted by Ioannides and Seslen, 2002) that there is less diversity of housing values. This scenario can easily arise, for example, by families aging in place, paying off their mortgages, and retiring at much lower income levels than currently earned by their younger neighbors in identical houses. Nevertheless, we acknowledge that our geographic unit of observation in this study—the census tract—may be larger than what most people commonly conceive of as their neighborhood. As such, our measures may be encompassing more diversity than is present at a smaller spatial scale.

Changes in Patterns of Neighborhood Income Diversity Since 1970

The table in exhibit 8 presents the 1970-to-2000 change in share of neighborhoods by diversity group. Although predominant, highly income-diverse neighborhoods decreased as a share of all metropolitan neighborhoods between 1970 and 2000 by 13.1 percentage points (16.6 percent). By contrast, the shares of all other groups increased. Moderate-diversity neighborhoods experienced the largest growth in share (8.7 percentage points) during the same period and by 2000 accounted for one-fourth of all neighborhoods. When we combine the moderate-diversity and high-diversity groups under our income-diverse rubric, the result is a net decline in share since 1970 of 4.4 per-

Exhibit 8

Distribution of Neighborhoods by Diversity Group, 1970 to 2000, in the 100 Largest U.S. Metropolitan Areas*

	Not Diverse	Low Diversity	Moderate Diversity	High Diversity
1970	0.6	4.0	16.1	79.3
1980	1.1	5.7	18.8	74.3
1990	1.8	7.7	22.0	68.4
2000	1.4	7.6	24.8	66.2
Change, 1970–2000	0.8	3.6	8.7	– 13.1
Change as percent of 1970 value	140.63	90.72	54.04	– 16.56

**Figures shown are percentages; first four rows each total 100.*

Note: Not-diverse neighborhoods are defined as having an entropy score less than 0.48. Low-diversity neighborhoods have a diversity score equal to or greater than 0.48 but less than 0.69. Moderate-diversity neighborhoods have an entropy score equal to or greater than 0.69 but less than 0.87. High-diversity neighborhoods have an entropy score equal to or greater than 0.87.

centage points. Although the combination of low-diversity and not-diverse neighborhoods comprised only 9 percent of the nation's metropolitan neighborhoods in 2000, their share was 4.4 percentage points higher than in 1970.

The decade of the 1990s brought with it some interesting modifications to previous trends in neighborhood income diversity. Low-diversity and not-diverse neighborhoods, although increasing their share between 1970-to-1980 and 1980-to-1990, experienced slight reversals during the past decade. Although moderate-diversity neighborhoods increased and high-diversity neighborhoods decreased during each decade, their combined total reached its low point in 1990 and experienced a very slight rebound during the 1990s. This trend of decreasing neighborhood income diversity until 1990 was mirrored in the overall distribution of family income across our metropolitan areas, with a slight increase in overall income diversity occurring between 1990 and 2000. Thus, although America's period of unprecedented economic growth arguably countered the trend of declining neighborhood diversity of the previous 20 years, it was not able to completely overcome the loss.

The aforementioned changes in the patterns of neighborhood income diversity must be viewed, of course, in the context of concurrent changes in the overall distribution of family incomes in the metropolitan areas in question. In exploratory multivariate work, we identified the entropy of the metropolitanwide family-income distribution as the more important explanatory (although by no means the only) correlate of changes in the share of a metropolitan area's neighborhoods that were highly income diverse.[13] These metropolitanwide-income entropy indices are presented for individual metropolitan areas in appendix A.

[13] Regression results available from first author, George C. Galster; also see Galster and Booza (2007) and Watson (2007).

Family-Income Distributions Across Neighborhoods With Different Income Diversity

The table in exhibit 9 shows the percentage distribution of family-income group by neighborhood diversity group.[14] The results show that not-diverse and low-diversity neighborhoods consist of, on average, roughly one-half VHI families and one-fourth VLI families. This portrait reinforces one painted earlier: the least diverse neighborhoods in American metropolitan areas typically are those where the broad range of families (MI, HMI) is virtually absent. Our other two diversity groups, moderate-diversity and high-diversity neighborhoods, present progressively more income mixing. Although VLI families continue to account for one-fourth of families in moderate-diversity neighborhoods, the representation of VHI families drops to one-third. In high-diversity neighborhoods, the VLI family share represents 19 percent and VHI families represent less than one-fourth of the total.

In addition to analyzing aggregate changes in diversity groups, we were also interested in understanding how diversity has changed in VLI neighborhoods. The table in exhibit 10 shows the distribution of neighborhoods predominantly occupied by VLI families by neighborhood income diversity group.

Exhibit 10 shows that slightly more than one-half of VLI neighborhoods in 2000 had moderate diversity, with the remainder containing little or no income diversity. During the entire 30-year period, the distribution of VLI neighborhoods has been moving in two directions, although different decades have brought reversals in each. The shares of both not-diverse and moderate-diversity VLI neighborhoods have risen, but the share of low-diversity neighborhoods has fallen between 1970 and 2000. Although the mean entropy score for VLI neighborhoods showed an increase in diversity, it is obvious that not all VLI neighborhoods became more diverse. Rather, it was the increasing share of moderate-diversity VLI neighborhoods that produced this aggregate mean result.

Exhibit 9

Distribution of Family-Income Mix by Neighborhood Diversity Groups, 2000, in the 100 Largest U.S. Metropolitan Areas*

HUD Family-Income Group	Neighborhood Diversity Group			
	Not Diverse	Low Diversity	Moderate Diversity	High Diversity
Very low income	24.0	22.6	23.6	19.3
Low income	5.3	9.8	15.3	19.5
Moderate income	2.7	5.4	8.8	12.9
High moderate income	2.8	5.1	7.9	11.5
High income	4.5	7.8	10.4	13.2
Very high income	60.7	49.3	34.0	23.6

**Figures shown are percentages; columns total 100.*

[14] We summed all families in each diversity group and used this sum as the denominator for each family income group to get the percentages shown in exhibit 9.

Exhibit 10

Distribution of Very Low-Income Neighborhoods by Neighborhood Income Diversity Group, 1970 to 2000, in the 100 Largest U.S. Metropolitan Areas*

Very Low-Income (Median) Neighborhoods' Percentage Distribution in—	Not Diverse	Low Diversity	Moderate Diversity	High Diversity
1970	6.3	48.7	45.1	0.0
1980	9.7	43.2	47.1	0.0
1990	12.2	43.9	43.9	0.0
2000	7.9	41.3	50.8	0.0

** Figures shown are percentages; rows each total 100.*

Note: Not-diverse neighborhoods are defined as having an entropy score less than 0.48. Low-diversity neighborhoods have a diversity score equal to or greater than 0.48 but less than 0.69. Moderate-diversity neighborhoods have an entropy score equal to or greater than 0.69 but less than 0.87. High-diversity neighborhoods have an entropy score equal to or greater than 0.87.

Note: A very low-income neighborhood is one where median family income is less than 50 percent of the metropolitan median.

Very Low-Income Families and the Neighborhood Income Diversity They Experience

In this section we examine the distribution of VLI families across neighborhood groups categorized by income diversity and median incomes and by the families' degree of exposure to other income groups. This empirical issue is important because, as we discuss further in the following text, a variety of studies suggests that social interactions among neighbors will depend on their socioeconomic differences. Thus the networking and social capital that VLI families may gain from their neighborhood will depend on which other groups are present (Galster et al., 2008; Galster and Booza, 2007). We note at the outset that the terms "very low-income neighborhoods" and "very low-income families' neighborhoods" are not tautologically related. Because the former is defined by the median of the family-income distribution in a neighborhood, many varieties of income distributions can be subsumed within the same group. Similarly, VLI families may live in a wide variety of neighborhoods categorized by median incomes; a small share may actually live in VLI neighborhoods.

Distribution of VLI Families Across Neighborhood Diversity Groups

The table in exhibit 11 presents the distribution of VLI families by neighborhood diversity group. At least two-thirds of VLI families resided in high-diversity neighborhoods during the 1970-to-2000 period. Roughly one-fifth resided in moderate-diversity neighborhoods, and approximately one-tenth resided in low-diversity or not-diverse ones. The VLI share in high-diversity neighborhoods is substantially lower in 2000 than in 1970, however; the pattern is opposite for all other diversity groups. In particular, the share of VLI in high-diversity neighborhoods fell more than 10 percentage points (14 percent) in the past 30 years, from 75.3 to 65.0.

Exhibit 11

Distribution of Very Low-Income Families by Neighborhood Diversity Group, 1970 to 2000, in the 100 Largest U.S. Metropolitan Areas*

Very Low-Income Families' Percentage Distribution in—	Not Diverse	Low Diversity	Moderate Diversity	High Diversity
1970	0.5	4.8	19.4	75.3
1980	1.4	6.5	21.0	71.2
1990	2.0	8.2	23.9	65.8
2000	1.1	7.2	26.7	65.0

** Figures shown are percentages; rows total 100.*

Income Groups in Neighborhoods With VLI Median Income

We next address the question: What higher income groups are typically present in neighborhoods occupied by VLI families? This question really has two parts. First, we are asking what families live in neighborhoods in which median family incomes designate them as VLI and, second, we are asking about the income distribution of all neighborhoods in which VLI families reside. To answer the first part we present exhibit 12, a table that shows the distribution of family-income groups in VLI neighborhoods from 1970 to 2000.

Data presented in exhibit 12 show that VLI neighborhoods are made up of mostly VLI families (59 percent, on average), with LI families constituting roughly another one-fifth and the remainder divided evenly across the other income groups. As for their trends over time, the share of VLI families in VLI neighborhoods peaked in 1990, with a small drop by 2000, but showed continued growth in LI neighborhoods through 2000.

As for other income groups in these neighborhoods, the share of VHI families experienced growth of 2.1 percentage points in VLI neighborhoods during the 30-year period. This remarkable rise equated to an increase of 101,942 VHI families across our sample. We suspect that this result has been produced by recent redevelopment projects in core neighborhoods previously occupied by VLI, but it is beyond the scope of this study to test this empirically. By contrast, during the 30 years, MI families experienced a consistent decline in share in VLI neighborhoods, while the share of HMI families peaked for VLI neighborhoods in 1980, with declines since.

Exhibit 12

Distribution of Families by Income Group in Very Low-Income Neighborhoods, 1970 and 2000, in the 100 Largest U.S. Metropolitan Areas*

HUD Family-Income Group	Very Low-Income (Median) Neighborhoods			
	1970	1980	1990	2000
Very low income	57.9	59.7	60.7	58.9
Low income	22.8	18.9	18.2	19.3
Moderate income	8.1	7.8	7.5	7.5
High moderate income	4.7	5.1	4.9	4.7
High income	3.1	4.2	4.3	4.1
Very high income	3.4	4.3	4.4	5.5

** Figures shown are percentages; columns total 100.*

Median Neighborhood Incomes of VLI Families

Thus far in this study, we have shown that by 2000 in the 100 largest U.S. metropolitan areas, 20 percent of all families in the United States were considered VLI, and 65 percent of VLI families lived in high-diversity neighborhoods. We have yet to show, however, the neighborhood income groups in which most VLI families live. These statistics can be found in exhibit 13, a table that shows the distribution of VLI families across neighborhood income groups from 1970 to 2000. According to these data, in 2000 most VLI families (roughly 60 percent) lived in neighborhoods where the median family incomes qualify them as LI and MI, while only 15 percent lived in VLI neighborhoods.

Comparing trends over time, there has been a mix of both unbroken trends during the 30-year period and decade-to-decade fluctuations. The most obvious change is the continual decline in the share of VLI families who reside in MI and HMI neighborhoods. A further unbroken trend is the increased shares of VLI families in HI and VHI neighborhoods. As the extremes of the neighborhood distribution increase disproportionately, we would expect to see increased shares of families in these groups; however, this was not the case with the observed changes in shares at the lower end of the *neighborhood* income distribution. VLI families did generally increase their percentages living in VLI neighborhoods, but not consistently over time. The shares of all VLI families living in VLI neighborhoods peaked in 1990. Similar volatility is shown by the share of VLI families residing in LI neighborhoods, which was on the decline between 1970 and 1980, reversed itself for 1990, and experienced such a rise by 2000 that the earlier decline was completely overridden.

Exhibit 13

Distribution of VLI Families by Neighborhood Median Income Group, 1970 to 2000 in the 100 Largest U.S. Metropolitan Areas*

Very Low-Income Families' Percentage Distribution in—	Neighborhood Median Income Group					
	Very Low Income	Low Income	Moderate Income	High Moderate Income	High Income	Very High Income
1970	8.1	33.5	32.4	18.3	6.2	1.5
1980	14.2	31.5	27.4	17.8	7.2	2.0
1990	17.4	32.5	25.3	14.5	7.5	2.8
2000	15.0	36.7	23.2	13.5	7.7	3.8

**Figures shown are percentages; rows total 100.*

Exposure of VLI Families to Other Income Groups

Another research question considers the average income mixture in the neighborhoods in which VLI families reside. In the previous section we focused on the share of families comprising each neighborhood group and how families were distributed across neighborhood groups. In this section we further explore the mixture of income groups by using an exposure index to describe the residential patterns of VLI families with regard to other income groups.

The table in exhibit 14 reports the exposure of VLI families to every income group, including VLI. An entry in any row can be interpreted as the proportion of the particular income group (shown

in the corresponding column) that resides, on average, in the census tract occupied by the typical VLI (row for a specific year) family in the year shown. Equivalently, it can be interpreted as the probability that a member of the particular income group will reside in a VLI family's neighborhood. The sum across any row equals one and represents the full distribution of exposures of VLI families. The joint VLI/VLI cell represents intragroup exposure. This intragroup exposure can be interpreted as the isolation of VLI families: the percentage of the average VLI family's neighbors who are also VLI.

Exhibit 14 shows that, by 2000, VLI families were about as exposed to other families in their same income group as they were to LI and VHI families: from 20 percent to 23 percent in each case. The remaining three income groups accounted for the remaining one-third of all of VLIs' exposure. Although consistent with findings above, the substantial and perhaps unexpected exposure of VLI to VHI families is a subject worthy of further discussion below.

Exposure patterns for VLI families have changed considerably over time. The isolation of VLI families is lower in 2000 than in 1970, the result of a large drop between 1990 and 2000, following a small increase between 1980 and 1990. Their exposure to LI families has remained stable during the entire period. It is the increase in exposure to VHI families that is of special interest to us and will be the subject of further discussion in the following text. Whereas we saw the isolation of VLI families peak in 1990 and then decrease, we saw the reverse with exposure to VHI families—they declined up until 1980, slightly increased by 1990, and then showed a large gain during the 1990s. The net result was that VLI families in 2000 had almost a 4-percentage-point greater exposure to VHI families than in 1970, representing a 21-percent increase in exposure. Thus, since 1970, VLI families in our 100 largest U.S. metropolitan areas experienced a decrease in isolation and increased exposure to all other groups, especially VHI families.

Exhibit 14

Interincome Group Exposure Indexes for Very Low-Income Families, by Family-Income Group, 1970 to 2000, in the 100 Largest U.S. Metropolitan Areas

Very Low-Income Families' Exposure to:	HUD Family-Income Group					
	Very Low Income	Low Income	Moderate Income	High Moderate Income	High Income	Very High Income
1970	0.307	0.202	0.113	0.092	0.100	0.186
1980	0.292	0.197	0.125	0.107	0.114	0.164
1990	0.311	0.199	0.117	0.097	0.106	0.170
2000	0.234	0.203	0.120	0.102	0.116	0.225

Discussion: What Might These Patterns Portend for the Socioeconomic Mobility of VLI Families?

In the foregoing empirical work we found that the 100 largest U.S. metropolitan areas across the country in 2000 were primarily composed of high-diversity neighborhoods (entropy scores above 0.69), although average entropy scores of neighborhood income diversity decreased slightly since

1970. We found that a majority of neighborhoods with median incomes categorized as VLI fall in the high-diversity group, and a large majority of VLI families live in high-diversity neighborhoods. VLI families are similarly exposed to VLI, LI, and, remarkably, VHI families. These facts provide considerable nuance to the commonly accepted nostrum often associated with the concentrated poverty debate that the disadvantaged typically live in homogenously deprived neighborhoods. Trends since 1970, however, show that the share of all neighborhoods that are high diversity and the proportion of VLI families living in high-diversity neighborhoods have been declining steadily.

Our discussion here connects these core findings to issues related to a realm of the potential social consequences of neighborhood income diversity that have often been at the core of policymakers' concerns: enhancing upward socioeconomic mobility for the disadvantaged. Unfortunately, extant empirical and theoretical scholarship provides mixed messages about the degree to which impacts may ensue from the neighborhood income diversification trends we are witnessing and whether they ultimately will prove beneficial to VLI families.

Empirically, several sophisticated multivariate statistical models have found that higher shares of affluent (instead of low-income) neighbors are associated with various positive outcomes for VLI families and their children, although they cannot identify the underlying mechanism of such correlations; see Chase-Lansdale et al. (1997), Crane (1991), Duncan, Connell, and Klebanov (1997), and Kohen et al. (2002). Nevertheless, Galster et al. (2008) find that it is the presence of middle-income (not high-income) neighbors that proves most efficacious in boosting the incomes of disadvantaged adult neighbors. This finding suggests that the increasingly extreme income differences among neighbors that we are witnessing in American neighborhoods are less likely to encourage the upward socioeconomic mobility of VLI families than if they were increasingly exposed to MI families. This suggestion is consistent with skeptical reviews of the evidence on potential benefits of mixed-income neighborhoods for the disadvantaged (Joseph, 2006; Joseph, Chaskin, and Webber, 2006).

The key for predicting socioeconomic mobility impacts is the mechanism through which income diversity within neighborhoods affects VLI residents. Neighborhood conditions in general are seen as a crucial component of what analysts now commonly describe as life chances being influenced by the "geography of opportunity" (Briggs 2005; Galster and Killen, 1995). It is crucial, however, to distinguish three groups of potential neighborhood effects:[15] (1) local resources and institutions, (2) networking, and (3) role modeling and social control. It first may be argued that increasing numbers of HI and VHI neighbors will aid the less well off who live nearby because the former will financially support a stronger set of local institutions (both secular and religious), exert superior political clout in ensuring the delivery of the highest quality municipal services and facilities (including public schools), and create demands for local retail establishments that will generate new job opportunities for those of modest skills (Wilson, 1987). Although this argument may be valid, empirical validation has not been forthcoming, complicated as it is by challenges in measurement and the likelihood of nonlinear, threshold-like relationships (Quercia and Galster, 1997).

[15] There also may be other salutary mechanisms for opportunity enhancement at work that do not involve intraneighborhood processes, such as improvements in neighborhood access to jobs or the reduction of place-based stigmatization.

Second, it may be argued that social scientists have hypothesized many potential varieties of social interactions among neighbors of different economic statuses that could serve to enhance the lower status group's opportunities for upward socioeconomic mobility (Ellen and Turner, 2003; Gephardt, 1997). Granovetter (2005), for example, has stressed the instrumental value of "weak ties" among networked acquaintances in supplying critical information about employment and other opportunities for social advancement. But such ties require certain kinds of social interactions among groups, and the existing evidence about the likelihood of such interactions among highly disparate income groups is not sanguine.

Many studies have capitalized on "natural experiments" involving public housing redevelopment, rent vouchers, or inclusionary zoning laws to create co-locations within neighborhoods of disparate income groups; see especially Rosenbaum (1995, 1991), Rosenbaum, Reynolds, and DeLuca (2002), Briggs (1998), Kleit (2005, 2002, 2001a, 2001b,), Schill (1997), Clampet-Lundquist (2004), Popkin, Harris, and Cunningham (2002), and Rosenbaum, Harris, and Denton (2003). In sum, these works consistently show that the social relationships among members of different (especially widely different) income groups are quite limited, even within the same neighborhood or housing complex. Members of the lower income group often do not take advantage of propinquity to broaden their weak ties and enhance the resource-producing potential of their networks, instead often restricting their networks to nearby members of their own group or to those remaining in the old neighborhood. This tendency suggests that social networking may be a powerful neighborhood force *among* members of a given group, but less so in an intergroup context. Thus, neighborhoods dominated by both VLI and VHI families are unlikely to be places where socioeconomic mobility is substantially enhanced by informally connecting VLI residents to resource-rich networks of their VHI neighbors.

So, is there any other reason to think that increasing exposure of VLI to VHI families may provide enhanced opportunities through other intraneighborhood social processes besides networking? The answer may be affirmative to the extent that the role model and social control mechanisms operate strongly, as has been argued by Rosenbaum (1991). Despite this argument, the evidence once again is indirect and inconclusive regarding this mechanism.

Conclusion

The current research set out to paint a portrait of income-diverse neighborhoods and the degree to which very low-income families experience them. We analyzed census tracts in the 100 largest metropolitan areas in the United States in 2000 and assessed with an entropy index how their number and share by diversity group have changed between 1970 and 2000. In addition, we looked at the particulars of income mix within such neighborhoods, with an eye toward better understanding the residential contexts to which VLI families are exposed.

Among our major descriptive findings, we found that in 2000 two-thirds of neighborhoods have high degrees of income diversity, but highly income-diverse neighborhoods decreased as a share of all neighborhoods during the 30-year period. No neighborhoods have high diversity if their median income falls below 50 percent of the AMI. VLI families constitute 19 percent of high-diversity neighborhoods' populations, on average, although the corresponding percentage is 24 percent

for not-diverse neighborhoods. Two-thirds of VLI families live in high-diversity neighborhoods, although this share has fallen steadily and substantially since 1970. VLI families are increasingly being exposed to VHI neighbors; indeed the exposure to VHI families is approximately the same as exposure to other VLI families; however, VLI exposure to MI and HMI groups is declining correspondingly.

We have proposed that VLI families' increasing exposure to VHI (and decreasing exposure to MI) families raises important issues related to socioeconomic mobility. There are theoretical reasons to believe that this development may hold felicitous prospects for the well-being of the disadvantaged residents living in income-diverse neighborhoods; however, this outcome is by no means certain, as the empirical evidence indicates. This uncertainty suggests that scholars and policymakers should assume heightened vigilance regarding this phenomenon to ascertain whether it produces desirable or undesirable consequences.

Future research could well build upon our work by addressing the interaction of race/ethnicity and income by studying trends in neighborhoods that are diverse in both income and race/ethnicity (for example, Turner and Fenderson, 2006). In addition, although the current study and most previous studies have used the decennial census as the primary source of data, the Census Bureau's new American Community Survey, designed to be used as a replacement to the decennial long form questionnaire, will begin to produce census tract-level data on a rolling multiyear basis toward the end of this decade. Such a rich data set will enable researchers to test hypotheses and track changes on a more frequent and timely basis. In addition, this valuable and current database holds great promise for further illuminating the factors affecting the growth and/or contraction of income-diverse neighborhoods and the living arrangements of VLI families. Such knowledge will greatly contribute to future policy decisions.

Appendix A

2000 Descriptive Statistics for Neighborhood Income Diversity, Individual Metropolitan Areas in Sample (1 of 8)

Rank (Population)	Name	Total Population (2000)	Metro-wide Entropy Score*	Distribution of Neighborhoods by HUD Income Group (%)						Distribution of Neighborhoods by Income Diversity Group (%)				
				Very Low Income	Low Income	Moderate Income	High Moderate Income	High Income	Very High Income	Not Diverse	Low Diversity	Moderate Diversity	High Diversity	Average Neighborhood Entropy
NA	100 metropolitan area average (unweighted)	1,734,693	0.96	7.3	23.8	24.1	19.4	15.3	10.0	1.0	6.5	23.1	69.5	0.89
1	Los Angeles-Long Beach, CA PMSA	9,519,338	0.93	8.5	28.7	14.8	13.5	13.6	20.8	2.7	11.5	32.8	53.0	0.84
2	New York, NY PMSA	9,314,235	0.91	11.1	23.4	16.2	13.4	15.1	20.8	3.5	12.2	33.0	51.2	0.83
3	Chicago, IL PMSA	8,272,768	0.96	12.3	24.8	19.8	16.6	14.7	11.8	3.1	10.5	27.7	58.8	0.85
4	Philadelphia, PA-NJ PMSA	5,100,931	0.96	10.7	18.2	20.6	20.1	17.9	12.6	1.1	8.6	24.5	65.8	0.87
5	Washington, DC-MD-VA-WV PMSA	4,923,153	0.97	7.9	24.8	20.0	19.8	14.3	13.3	1.5	10.2	24.2	64.1	0.87
6	Detroit, MI PMSA	4,441,551	0.96	12.7	19.6	21.5	20.6	14.5	11.1	1.3	9.4	25.8	63.5	0.87
7	Houston, TX PMSA	4,177,646	0.94	8.4	31.3	15.4	14.6	12.0	18.3	3.2	9.7	31.6	55.5	0.84
8	Atlanta, GA MSA	4,112,198	0.96	10.5	25.8	22.0	15.4	13.8	12.5	2.3	10.0	22.3	65.4	0.87
9	Dallas, TX PMSA	3,519,176	0.95	9.1	30.1	18.7	12.5	12.2	17.3	2.6	11.5	28.1	57.8	0.85
10	Boston, MA-NH PMSA	3,406,829	0.97	8.2	20.5	26.0	18.5	15.3	11.4	0.6	6.1	26.3	67.1	0.89
11	Riverside-San Bernardino, CA PMSA	3,254,821	0.95	4.5	28.7	23.7	17.9	13.6	11.7	0.0	4.9	24.7	70.4	0.89
12	Phoenix-Mesa, AZ MSA	3,251,876	0.96	5.3	29.0	16.5	18.3	16.4	14.5	1.0	8.9	27.8	62.3	0.87
13	Minneapolis-St. Paul, MN-WI MSA	2,968,806	0.99	6.1	20.7	29.5	20.7	16.8	6.3	0.4	4.6	18.5	76.5	0.91

Appendix A

2000 Descriptive Statistics for Neighborhood Income Diversity, Individual Metropolitan Areas in Sample (2 of 8)

Rank (Population)	Name	Total Population (2000)	Metro-wide Entropy Score*	Distribution of Neighborhoods by HUD Income Group (%)						Distribution of Neighborhoods by Income Diversity Group (%)				
				Very Low Income	Low Income	Moderate Income	High Moderate Income	High Income	Very High Income	Not Diverse	Low Diversity	Moderate Diversity	High Diversity	Average Neighborhood Entropy
14	Orange County, CA PMSA	2,846,289	0.96	3.7	27.3	17.1	15.6	20.6	15.7	0.3	6.3	27.6	65.7	0.88
15	San Diego, CA MSA	2,813,833	0.95	7.6	22.3	18.8	19.6	16.6	15.1	1.0	9.6	26.1	63.3	0.87
16	Nassau-Suffolk, NY PMSA[d]	2,753,913	0.98	0.7	14.4	36.7	28.0	13.3	6.9	0.0	2.2	10.9	86.9	0.93
17	St. Louis, MO-IL MSA	2,603,607	0.97	10.8	24.0	24.2	20.2	11.9	8.8	1.0	8.3	23.8	66.9	0.88
18	Baltimore, MD PMSA	2,552,994	0.97	12.6	22.1	22.1	17.7	16.9	8.5	2.0	9.2	24.4	64.4	0.87
19	Seattle-Bellevue-Everett, WA PMSA	2,414,616	0.98	1.9	20.7	28.1	25.8	17.2	6.3	0.4	3.1	11.3	85.3	0.92
20	Tampa-St. Petersburg-Clearwater, FL MSA	2,395,997	0.96	2.8	26.1	27.0	18.0	14.3	11.8	0.4	4.2	20.2	75.2	0.90
21	Oakland, CA PMSA[e]	2,392,557	0.96	11.0	21.5	24.6	14.7	14.1	14.1	0.4	9.3	29.0	61.3	0.87
22	Pittsburgh, PA MSA	2,358,695	0.97	4.9	24.4	31.9	18.4	12.9	7.5	0.7	4.6	16.8	77.9	0.91
23	Miami, FL PMSA	2,253,362	0.94	7.6	29.0	18.8	14.4	13.2	17.0	3.2	5.9	29.0	61.9	0.85
24	Cleveland-Lorain-Elyria, OH PMSA	2,250,871	0.97	14.4	20.4	20.0	21.0	15.6	8.5	2.5	8.7	26.2	62.6	0.86
25	Denver, CO PMSA	2,109,282	0.97	4.1	27.4	19.5	19.9	17.9	11.0	1.0	4.9	29.2	64.9	0.88
26	Newark, NJ PMSA	2,032,989	0.96	16.0	23.4	14.3	16.0	15.4	14.8	1.7	13.7	30.8	53.8	0.85
27	Portland-Vancouver, OR-WA PMSA	1,918,009	0.97	2.2	22.2	31.3	21.2	16.9	6.3	0.0	2.9	13.0	84.1	0.92

Appendix A

2000 Descriptive Statistics for Neighborhood Income Diversity, Individual Metropolitan Areas in Sample (3 of 8)

Rank (Population)	Name	Total Population (2000)	Metro-wide Entropy Score*	Distribution of Neighborhoods by HUD Income Group (%)						Distribution of Neighborhoods by Income Diversity Group (%)				
				Very Low Income	Low Income	Moderate Income	High Moderate Income	High Income	Very High Income	Not Diverse	Low Diversity	Moderate Diversity	High Diversity	Average Neighborhood Entropy
28	Kansas City, MO-KS MSA	1,776,062	0.97	9.4	26.0	23.7	17.0	13.4	10.5	1.3	6.7	27.0	65.0	0.88
29	San Francisco, CA PMSA	1,731,183	0.95	7.3	21.2	23.9	15.6	17.2	14.8	1.1	8.3	27.4	63.2	0.87
30	Fort Worth-Arlington, TX PMSA[a]	1,702,625	0.96	6.6	26.2	24.5	14.7	17.0	11.0	2.0	5.5	25.9	66.6	0.88
31	San Jose, CA PMSA	1,682,585	0.96	3.9	22.6	24.6	22.8	14.2	11.9	0.0	3.9	22.3	73.9	0.90
32	Cincinnati, OH-KY-IN PMSA	1,646,395	0.97	11.1	22.9	24.1	21.6	12.3	8.0	2.5	7.5	18.8	71.1	0.88
33	Orlando, FL MSA	1,644,561	0.97	2.2	23.5	29.9	15.7	14.8	13.9	0.0	7.1	17.3	75.6	0.90
34	Sacramento, CA PMSA	1,628,197	0.96	6.4	24.8	20.1	22.0	16.7	10.0	0.8	3.6	26.2	69.4	0.89
35	Fort Lauderdale, FL PMSA	1,623,018	0.96	4.0	26.0	22.0	19.9	13.0	15.2	0.4	7.9	23.5	68.2	0.88
36	Indianapolis, IN MSA	1,607,486	0.97	7.8	29.4	20.4	24.3	11.1	6.9	0.6	4.2	24.9	70.3	0.90
37	San Antonio, TX MSA	1,592,383	0.96	3.5	37.8	17.3	17.0	10.3	14.1	1.0	7.7	26.3	65.1	0.87
38	Norfolk-Virginia Beach-Newport News, VA-NC MSA	1,569,541	0.97	6.9	27.4	22.6	15.7	18.0	9.4	1.1	4.6	28.3	66.0	0.88
39	Las Vegas, NV-AZ MSA	1,563,282	0.97	1.6	22.8	22.5	18.5	23.9	10.7	0.5	2.9	23.9	72.7	0.90
40	Columbus, OH MSA	1,540,157	0.97	9.5	27.5	22.3	16.9	12.0	11.7	1.4	8.4	22.6	67.6	0.88
41	Milwaukee-Waukesha, WI PMSA	1,500,741	0.97	18.4	20.3	23.3	16.4	16.1	5.5	1.7	12.7	23.8	61.8	0.86

Appendix A

2000 Descriptive Statistics for Neighborhood Income Diversity, Individual Metropolitan Areas in Sample (4 of 8)

Rank (Population)	Name	Total Population (2000)	Metro-wide Entropy Score*	Distribution of Neighborhoods by HUD Income Group (%)						Distribution of Neighborhoods by Income Diversity Group (%)				
				Very Low Income	Low Income	Moderate Income	High Moderate Income	High Income	Very High Income	Not Diverse	Low Diversity	Moderate Diversity	High Diversity	Average Neighborhood Entropy
42	Charlotte-Gastonia-Rock Hill, NC-SC MSA	1,499,293	0.97	5.1	26.1	30.2	15.9	10.5	12.2	0.7	7.5	21.7	70.2	0.89
43	Bergen-Passaic, NJ PMSA	1,373,167	0.96	9.3	18.6	22.3	20.6	17.0	12.1	0.8	8.1	25.1	66.0	0.88
44	New Orleans, LA MSA	1,337,726	0.94	14.3	23.9	19.0	16.1	13.2	13.5	3.6	9.6	31.9	54.8	0.84
45	Salt Lake City-Ogden, UT MSA	1,333,914	0.98	2.9	21.1	26.4	22.9	18.9	7.9	0.0	5.4	19.3	75.4	0.91
46	Greensboro--Winston-Salem--High Point, NC MSA	1,251,509	0.98	4.3	21.8	30.0	21.4	15.2	7.4	0.4	4.3	18.3	77.0	0.91
47	Austin-San Marcos, TX MSA	1,249,763	0.97	7.5	27.8	21.0	17.9	13.9	11.9	2.4	7.9	27.8	61.9	0.87
48	Nashville, TN MSA	1,231,311	0.97	7.1	21.0	31.5	20.6	9.2	10.5	1.7	8.0	16.4	73.9	0.89
49	Providence-Fall River-Warwick, RI-MA MSA	1,188,613	0.97	9.1	20.9	22.0	21.3	20.5	6.3	0.4	3.9	27.2	68.5	0.90
50	Raleigh-Durham-Chapel Hill, NC MSA	1,187,941	0.97	9.8	22.9	21.0	21.0	15.1	10.2	1.0	9.3	22.0	67.8	0.88
51	Hartford, CT MSA	1,183,110	0.97	13.8	16.3	22.3	23.4	17.4	6.7	2.1	9.2	18.4	70.2	0.88
52	Buffalo-Niagara Falls, NY MSA	1,170,111	0.97	10.8	21.0	23.8	23.8	15.7	4.9	0.3	5.6	23.8	70.3	0.89

Appendix A

2000 Descriptive Statistics for Neighborhood Income Diversity, Individual Metropolitan Areas in Sample (5 of 8)

Rank (Population)	Name	Total Population (2000)	Metro-wide Entropy Score*	Distribution of Neighborhoods by HUD Income Group (%)						Distribution of Neighborhoods by Income Diversity Group (%)				
				Very Low Income	Low Income	Mode-rate Income	High Mode-rate Income	High Income	Very High Income	Not Diverse	Low Diversity	Mode-rate Diversity	High Diversity	Average Neigh-borhood Entropy
53	Middlesex-Somerset-Hunterdon, NJ PMSA[b]	1,169,641	0.98	4.2	19.7	30.1	21.2	17.8	6.9	0.0	1.9	22.0	76.1	0.92
54	Memphis, TN-AR-MS MSA	1,135,614	0.95	16.3	25.5	15.2	14.4	14.1	14.4	2.7	11.8	35.7	49.8	0.84
55	West Palm Beach-Boca Raton, FL MSA	1,131,184	0.95	5.4	26.8	18.8	15.3	16.9	16.9	0.4	7.7	29.5	62.5	0.87
56	Monmouth-Ocean, NJ PMSA[c]	1,126,217	0.97	5.5	20.5	27.2	20.5	15.0	11.4	0.0	5.9	21.3	72.8	0.90
57	Jacksonville, FL MSA	1,100,491	0.97	5.1	26.2	31.8	19.5	9.7	7.7	2.1	2.6	20.5	74.9	0.90
58	Rochester, NY MSA	1,098,201	0.97	14.7	17.4	26.4	19.8	15.9	5.8	1.2	6.6	19.4	72.9	0.89
59	Grand Rapids-Muskegon-Holland, MI MSA	1,088,514	0.98	5.4	18.3	30.4	29.0	12.9	4.0	0.0	3.1	17.0	79.9	0.92
60	Oklahoma City, OK MSA	1,083,346	0.96	5.4	30.8	21.5	16.3	16.7	9.3	0.3	5.4	20.5	73.7	0.89
61	Louisville, KY-IN MSA	1,025,598	0.97	6.3	28.5	21.3	18.4	15.5	10.0	1.3	7.9	21.8	69.0	0.88
62	Richmond-Petersburg, VA MSA	996,512	0.97	10.2	22.0	24.9	19.2	15.1	8.6	1.6	6.9	23.3	68.2	0.88

Appendix A

2000 Descriptive Statistics for Neighborhood Income Diversity, Individual Metropolitan Areas in Sample (6 of 8)

Rank (Population)	Name	Total Population (2000)	Metro-wide Entropy Score*	Distribution of Neighborhoods by HUD Income Group (%)						Distribution of Neighborhoods by Income Diversity Group (%)				
				Very Low Income	Low Income	Moderate Income	High Moderate Income	High Income	Very High Income	Not Diverse	Low Diversity	Moderate Diversity	High Diversity	Average Neighborhood Entropy
63	Greenville-Spartanburg-Anderson, SC MSA	962,441	0.97	4.4	22.3	35.9	18.4	12.1	6.8	0.0	2.4	20.9	76.7	0.91
64	Dayton-Springfield, OH MSA	950,558	0.97	7.1	21.4	27.3	23.5	14.7	5.9	0.0	5.9	21.4	72.7	0.90
65	Fresno, CA MSA	922,516	0.94	4.6	29.3	19.0	17.2	10.3	19.5	0.6	12.1	25.3	62.1	0.86
66	Birmingham, AL MSA	921,106	0.96	9.2	25.0	24.0	13.8	15.8	12.2	1.5	10.2	21.9	66.3	0.87
67	Honolulu, HI MSA	876,156	0.96	3.4	29.8	18.5	19.0	21.0	8.3	1.0	3.9	26.3	68.8	0.89
68	Albany-Schenectady-Troy, NY MSA	875,583	0.97	8.5	21.4	28.1	19.2	18.3	4.5	0.4	2.7	21.0	75.9	0.91
69	Tucson, AZ MSA	843,746	0.96	5.1	29.7	17.9	14.9	16.4	15.9	0.5	9.2	26.7	63.6	0.87
70	Tulsa, OK MSA	803,235	0.97	3.2	25.9	25.9	15.4	15.0	14.6	0.8	5.3	24.7	69.2	0.89
71	Ventura, CA PMSA	753,197	0.97	4.5	24.0	25.3	19.5	18.2	8.4	0.6	5.2	21.4	72.7	0.90
72	Syracuse, NY MSA	732,117	0.97	9.8	18.0	28.8	18.0	20.0	5.4	0.5	7.3	18.0	74.1	0.90
73	Omaha, NE-IA MSA	716,998	0.98	5.0	24.9	26.2	19.5	15.4	9.0	0.9	5.9	23.5	69.7	0.89
74	Albuquerque, NM MSA	712,738	0.96	3.4	26.1	23.9	16.5	18.8	11.4	0.6	4.5	24.4	70.5	0.88
75	Tacoma, WA PMSA	700,820	0.98	3.2	18.7	21.3	36.8	18.1	1.9	0.6	1.9	15.5	81.9	0.92
76	Akron, OH PMSA	694,960	0.97	11.5	22.4	23.0	21.2	13.3	8.5	0.6	6.7	24.8	67.9	0.89
77	Knoxville, TN MSA	687,249	0.97	10.2	21.9	27.7	21.9	10.2	8.0	1.5	5.8	21.9	70.8	0.89
78	El Paso, TX MSA	679,622	0.94	6.3	32.5	20.6	11.9	13.5	15.1	0.0	7.9	23.8	68.3	0.87

Appendix A

2000 Descriptive Statistics for Neighborhood Income Diversity, Individual Metropolitan Areas in Sample (7 of 8)

Rank (Population)	Name	Total Population (2000)	Metro-wide Entropy Score*	Distribution of Neighborhoods by HUD Income Group (%)						Distribution of Neighborhoods by Income Diversity Group (%)				
				Very Low Income	Low Income	Mode-rate Income	High Mode-rate Income	High Income	Very High Income	Not Diverse	Low Diversity	Mode-rate Diversity	High Diversity	Average Neigh-borhood Entropy
79	Bakersfield, CA MSA	661,645	0.94	3.7	29.9	15.7	16.4	18.7	15.7	2.2	9.0	24.6	64.2	0.85
80	Allentown-Bethlehem-Easton, PA MSA	637,958	0.98	6.5	17.4	29.7	25.4	16.7	4.3	0.0	2.9	21.7	75.4	0.91
81	Gary, IN PMSA	631,362	0.98	11.0	26.5	19.9	20.6	20.6	1.5	0.7	7.4	17.6	74.3	0.90
82	Harrisburg-Lebanon-Carlisle, PA MSA	629,401	0.98	4.3	20.3	32.6	24.6	14.5	3.6	0.0	1.4	15.2	83.3	0.93
83	Scranton--Wilkes-Barre--Hazleton, PA MSA	624,776	0.97	0.5	12.6	47.8	26.4	9.9	2.7	0.0	0.5	7.1	92.3	0.94
84	Toledo, OH MSA	618,203	0.97	10.0	21.9	26.9	21.3	13.1	6.9	1.3	5.0	23.8	70.0	0.89
85	Jersey City, NJ PMSA	608,975	0.94	0.6	24.5	25.8	21.9	15.5	11.6	0.0	5.2	20.6	74.2	0.89
86	Baton Rouge, LA MSA	602,894	0.95	11.9	22.9	22.0	15.3	18.6	9.3	0.8	6.8	32.2	60.2	0.87
87	Youngstown-Warren, OH MSA	594,746	0.97	9.0	22.4	27.6	25.6	12.8	2.6	0.6	1.3	21.2	76.9	0.91
88	Springfield, MA MSA	591,932	0.97	14.8	16.5	22.6	20.9	21.7	3.5	1.7	7.8	14.8	75.7	0.88
89	Sarasota-Bradenton, FL MSA[f]	589,959	0.97	0.7	21.7	27.3	27.3	12.6	10.5	0.0	3.5	16.8	79.7	0.91
90	Wilmington-Newark, DE-MD PMSA	586,216	0.98	6.5	18.0	30.9	23.0	13.7	7.9	0.7	7.2	15.1	77.0	0.90
91	Little Rock-North Little Rock, AR MSA	583,845	0.97	5.9	21.3	33.8	18.4	14.7	5.9	0.0	2.9	19.9	77.2	0.91

Appendix A

2000 Descriptive Statistics for Neighborhood Income Diversity, Individual Metropolitan Areas in Sample (8 of 8)

Rank (Population)	Name	Total Population (2000)	Metro-wide Entropy Score*	Distribution of Neighborhoods by HUD Income Group (%)						Distribution of Neighborhoods by Income Diversity Group (%)				
				Very Low Income	Low Income	Moderate Income	High Moderate Income	High Income	Very High Income	Not Diverse	Low Diversity	Moderate Diversity	High Diversity	Average Neighborhood Entropy
92	Ann Arbor, MI PMSA	578,736	0.98	5.4	19.9	21.7	29.5	18.7	4.8	0.6	4.8	20.5	74.1	0.90
93	McAllen-Edinburg-Mission, TX MSA	569,463	0.93	0.0	28.8	31.3	16.3	7.5	16.3	0.0	7.5	16.3	76.3	0.89
94	Stockton-Lodi, CA MSA	563,598	0.95	6.7	25.2	16.0	23.5	21.0	7.6	0.0	5.9	22.7	71.4	0.89
95	Charleston-North Charleston, SC MSA	549,033	0.96	9.7	25.7	23.0	18.6	11.5	11.5	0.9	7.1	23.0	69.0	0.88
96	Wichita, KS MSA	545,220	0.98	3.7	29.4	22.8	19.9	14.7	9.6	0.7	4.4	21.3	73.5	0.90
97	New Haven-Meriden, CT PMSA	542,149	0.97	12.3	22.1	19.7	22.1	15.6	8.2	1.6	7.4	25.4	65.6	0.88
98	Mobile, AL MSA	540,258	0.96	13.2	19.1	31.6	12.5	17.6	5.9	1.5	5.9	28.7	64.0	0.88
99	Columbia, SC MSA	536,691	0.97	7.1	29.2	22.1	15.0	18.6	8.0	1.8	4.4	27.4	66.4	0.89
100	Vallejo-Fairfield-Napa, CA PMSA	518,821	0.97	1.9	27.2	24.3	22.3	20.4	3.9	0.0	0.0	23.3	76.7	0.92

MSA = metropolitan statistical area. PMSA = primary metropolitan statistical area. SMSA = Standard metropolitan statistical area.

[a] Fort Worth was part of the Dallas SMSA in 1980.

[b] Middlesex-Somerset-Hunterdon, NJ PMSA did not exist in 1970 and 1980.

[c] Monmouth-Ocean, NJ PMSA did not exist in 1970.

[d] Nassau-Suffolk, NY PMSA was part of New York, NY SMSA in 1970.

[e] Oakland, CA PMSA was part of the San Francisco SMSA in 1970 and 1980.

[f] Sarasota-Bradenton, FL MSA did not exist in 1970.

** Entropy score based on overall metropolitan income distribution, not average H (entropy index) across neighborhoods.*

Appendix B. Interpolation Formulae Employed

Linear Interpolation

$$P = \frac{(Y - a)}{(b - a)} \times (P_b - P_a) + P_a$$

Pareto Interpolation

$$\Theta = \frac{\ln(1 - P_a) - \ln(1 - P_b)}{\ln(b) - \ln(a)}$$

Where:
Y = Income at percentile of interest
P = Percentile of interest
a = The income value at the lower limit of the group containing P
b = The income value at the upper limit of the group containing P
P_a = Proportion of the distribution that lies below the lower limit
P_b = Proportion of the distribution that lies below the upper limit

Source: Berube and Tiffany (2004)

Example

The following example provides an illustration of how Pareto interpolation can be used to estimate a specific frequency based on a group frequency distribution. To determine the frequency of cases below a certain income value (Y), we would use grouped income distribution parameters provided in the decennial census, including the income value at the lower limit of the group containing the income in question (a), the upper limit of the group (b), the proportion of the population that lies below the lower limit (P_a), and the proportion of the population that lies below the upper limit (P_b). Using the following hypothetical values, Pareto interpolation can be used to determine the proportion of the population (P) that lies below the income value of interest (Y).

Y = $54,491
a = $50,000
b = $60,000
P_a = 0.5
P_b = 0.6

Using the Pareto interpolation formula, the unknown values of k, Θ, and P are as follows:

k = $27,742
Θ = 1.28
P=0.58

In other words, the proportion of the population that lies below a value of $54,491 is estimated to be 0.58

$$\Theta = \left(\frac{\ln(1 - P_a) - \ln(1 - P_b)}{\ln(b) - \ln(a)} \right)$$

$$\Theta = \left(\frac{\ln(1-0.5) - \ln(1-0.6)}{\ln(\$60,000) - \ln(\$50,000)} \right)$$

$\Theta = 1.28$

$$k = \left(\frac{P_b - P_a}{\frac{1}{a^{\Theta}} - \frac{1}{b^{\Theta}}} \right)^{\frac{1}{\Theta}}$$

$$k = \left(\frac{0.6 - 0.5}{\frac{1}{\$50,000^{1.28}} - \frac{1}{\$60,000^{1.28}}} \right)^{\frac{1}{1.28}}$$

$k = \$27,742$

$$\mathrm{P} = 1 - \left(\frac{\$27,742}{\$54,491} \right)^{1.28}$$

$$\mathrm{P} = \left(1 - \frac{k}{Y} \right)^{\Theta}$$

P = 0.58

Acknowledgments

The authors thank Mark Shroder and anonymous referees for their valuable suggestions for modifying an earlier version of this article.

Authors

George C. Galster is the Clarence Hilberry Professor of Urban Affairs in the Department of Geography and Urban Planning, Wayne State University.

Jason C. Booza is a research assistant in the Department of Family Medicine and Public Health Sciences, Wayne State University.

Jackie M. Cutsinger is a research assistant in the Center for Urban Studies, Wayne State University.

References

Abramson, Alan. J., Mitchell S. Tobin, and Matthew R. VanderGoot. 1995. "The Changing Geography of Metropolitan Opportunity: The Segregation of the Poor in U.S. Metropolitan Areas, 1970 to 1990," *Housing Policy Debate* 6 (1): 45–72.

Allison, Paul D. 1978. "Measures of Inequality," *American Sociological Review* 43 (6): 865–880.

Berube, Alan, and Thatcher Tiffany. 2004. *The Shape of the Curve: Household Income Distributions in U.S. Cities, 1979–1999*. Washington, DC: Brookings Institution.

Briggs, Xavier deSouza, editor. 2005. *The Geography of Opportunity*. Washington, DC: Brookings Institution.

Briggs, Xavier deSouza. 1998. "Brown Kids in White Suburbs: Housing Mobility and the Many Faces of Social Capital," *Housing Policy Debate* 9 (1): 177–221.

Chase-Lansdale, P. Lindsay, Rachel A. Gordon, Jeanne Brooks-Gunn, and Pamela K. Klebanov. 1997. "Neighborhood and Family Influences on the Intellectual and Behavioral Competence of Preschool and Early School-Age Children." In *Neighborhood Poverty: Vol. 1. Context and Consequences for Children,* edited by Jeanne Brooks-Gunn, Greg J. Duncan, and J. Lawrence Aber. New York: Russell Sage Foundation: 79–118.

Clampet-Lundquist, Susan. 2004. "HOPE VI Relocation: Moving to New Neighborhoods and Building New Ties," *Housing Policy Debate* 15 (3): 415–447.

Crane, Jonathan. 1991. "The Epidemic Theory of Ghettos and Neighborhood Effects on Dropping Out and Teenage Childbearing," *American Journal of Sociology* 96 (5): 1226–1259.

Duncan, Greg J., James P. Connell, and Pamela K. Klebanov. 1997. "Conceptual and Methodological Issues in Estimating Causal Effects of Neighborhoods and Family Conditions on Individual Development." In *Neighborhood Poverty: Vol. 1. Context and Consequences for Children,* edited by Jeanne Brooks-Gunn, Greg J. Duncan, and J. Lawrence Aber. New York: Russell Sage Foundation: 219–250

Ellen, Ingrid Gould. 1998. "Stable Racial Integration in the Contemporary United States: An Empirical Overview," *Journal of Urban Affairs* 20 (1): 27–42.

Ellen, Ingrid Gould, and Margery Austin Turner. 2003. "Do Neighborhoods Matter and Why?" In *Choosing a Better Life? Evaluating the Moving To Opportunity Experiment,* edited by John Goering and Judith Feins. Washington, DC: Urban Institute Press: 313–338

Farley, Reynolds. 1977. "Residential Segregation in Urbanized Areas of the United States in 1970: An Analysis of Social Class and Racial Differences," *Demography* 14 (4): 497–518.

Firebaugh, Glen. 1999. "Empirics of World Income Inequality," *American Journal of Sociology* 104 (6): 1597–1630.

Fischer, Claude S., Gretchen Stockmayer, Jon Stiles, and Michael Hout. 2004. "Distinguishing the Geographic Levels and Social Dimensions of U.S. Metropolitan Segregation, 1960–2000," *Demography* 41 (1): 37–59.

Fischer, Mary J. 2003. "The Relative Importance of Income and Race in Determining Residential Outcomes in U.S. Urban Areas 1970–2000," *Urban Affairs Review* 38 (5): 669–696.

Fong, Eric, and Kumiko Shibuya. 2000. "The Spatial Separation of the Poor in Canadian Cities," *Demography* 37 (4): 449–459.

Galster, George, Roger Andersson, Sako Musterd, and Timo Kaupinnen. 2008. "Does Neighborhood Income Mix Affect Adult Incomes? New Evidence from Sweden," *Journal of Urban Economics* 63: 858–870.

Galster, George, and Jason Booza. 2007. "The Rise of the Bipolar Neighborhood," *Journal of the American Planning Association* 73 (4): 421–435.

Galster, George, and Sean Killen. 1995. "The Geography of Metropolitan Opportunity: A Reconnaissance and Conceptual Framework," *Housing Policy Debate* 6 (1): 7–43.

Galster, George, and Ron Mincy. 1993. "Explaining the Changing Fortunes of Metropolitan Neighborhoods, 1980–1990," *Housing Policy Debate* 4 (3): 303–354.

Galster, George, Roberto Quercia, Alvaro Cortes, and Ron Malega. 2003. "The Fortunes of Poor Neighborhoods," *Urban Affairs Review* 39 (2): 205–227.

Galster, George, Peter Tatian, Anna Santiago, Kathryn Pettit, and Robin Smith. 2003. *Why NOT in My Back Yard? The Neighborhood Impacts of Assisted Housing*. New Brunswick, NJ: Rutgers University, Center for Urban Policy Research Press.

Gephardt, Martha A. 1997. "Neighborhoods and Communities as Contexts for Development." In *Neighborhood Poverty: Vol. 1. Context and Consequences for Children,* edited by Jeanne Brooks-Gunn, Greg J. Duncan, and J. Lawrence Aber. New York: Russell Sage Foundation: 1–43.

Granovetter, Mark. 2005. "The Impact of Social Structures on Economic Outcomes," *Journal of Economic Perspectives* 19 (1): 33–50.

Hardman, Anna, and Yannis M. Ioannides. 2004a. "Neighbors' Income Distribution: Economic Segregation and Mixing in U.S. Urban Neighborhoods," *Journal of Housing Economics* 13: 368–382.

———. 2004b. Income Mixing and Housing in U.S. Cities: Evidence from Neighborhood Clusters of the American Housing Survey. Unpublished paper. Tufts University, Department of Economics,

Harsman, Bjorn, and John M. Quigley. 1995. "The Spatial Segregation of Ethnic and Demographic Groups: Comparative Evidence from Stockholm and San Francisco," *Journal of Urban Economics* 37: 1–16.

Iceland, John. 2004. "Beyond Black and White: Residential Segregation in Multiethnic America," *Social Science Research* 33 (2): 248–271.

Iceland, John., Daniel Weinberg, and Erika Steinmetz. 2002. *Racial and Ethnic Segregation in the United States: 1980–2000.* U.S. Census Bureau, Census Special Report, CENSR-3. Washington, DC: U.S. Government Printing Office.

Immergluck, Dan., and Geoff Smith. 2002. "Who's Buying Where? The Second of Two Reports on Home Buying and Neighborhood Change in the Chicago Area in the 1990s." Chicago: The Woodstock Institute.

Ioannides, Yannis M. 2004. "Neighborhood Income Distributions," *Journal of Urban Economics* 56: 435–457.

Ioannides, Yannis M., and Tracey N. Seslen. 2002. "Neighborhood Wealth Distributions," *Economic Letters* 76: 357–367.

James, David R., and Karl E. Taeuber, 1985. "Measures of Segregation," *Sociological Methodology* 15: 1–32.

Jargowsky, Paul A. 2003. *Stunning Progress, Hidden Problems: The Dramatic Decline of Concentrated Poverty in the 1990s.* Washington, DC: Brookings Institution.

———. 1997. *Poverty and Place: Ghettos, Barrios, and the American City*. New York: Russell Sage Foundation.

———. 1996a. "Take the Money and Run: Economic Segregation in U.S. Metropolitan Areas," *American Sociological Review* 61 (6): 984–998.

———. 1996b. "Beyond the Street Corner: The Hidden Diversity of High-Poverty Neighborhoods," *Urban Geography* 17 (7): 579–603.

———. 1994. "Ghetto Poverty among Blacks in the 1980s," *Journal of Policy Analysis and Management* 13: 288–310.

Jones, Arthur. F., and Daniel H. Weinberg. 2000. *The Changing Shape of the Nation's Income Distribution.* Washington, DC: U.S. Census Bureau: 60–204.

Joseph, Mark L. 2006. "Is Mixed-Income Development an Antidote to Urban Poverty?" *Housing Policy Debate* 17 (2): 209–234.

Joseph, Mark L., Robert J. Chaskin, and Henry S. Webber. 2006. "The Theoretical Basis for Addressing Poverty Through Mixed-Income Development," *Urban Affairs Review* 42 (3): 369–409.

Kasarda, John D. 1993. "Inner-City Concentrated Poverty and Neighborhood Distress: 1970 to 1990," *Housing Policy Debate* 4 (3): 253–302.

Kleit, Rachel. 2005. "HOPE VI New Communities: Neighborhood Relationships in Mixed-Income Housing," *Environment and Planning A* 37 (8): 1413–1441.

———. 2002. "Job Search Networks and Strategies in Scattered-Site Public Housing," *Housing Studies* 17 (1): 83–100.

———. 2001a. "The Role of Neighborhood Social Networks in Scattered-Site Public Housing Residents' Search for Jobs," *Housing Policy Debate* 12 (3): 541–573.

———. 2001b. "Neighborhood Relations in Scattered-Site and Clustered Public Housing," *Journal of Urban Affairs* 23 (3, 4): 409–430.

Kohen, Dafna E., Jeanne Brooks-Gunn, Tama Leventhal, and Clyde Hertzman. 2002. "Neighborhood Income and Physical and Social Disorder in Canada: Associations with Young Children's Competencies," *Child Development* 73 (6): 1844–1860.

Krupka, Douglas J. 2006. The Stability of Mixed-Income Neighborhoods in America, 1990–2000. Working paper no. 06-08. Atlanta: Georgia State University, Urban and Regional Analysis Working Group.

Lee, Barrett A., and Peter B. Wood. 1990. "The Fate of Residential Integration in American Cities: Evidence from Racially Mixed Neighborhoods, 1970–1980," *Journal of Urban Affairs* 12 (4): 425–436.

Leventhal, Tama, and Jeanne Brooks-Gunn. 2000. "The Neighborhoods They Live In," *Psychological Bulletin* 126 (2): 309–337.

Massey, Douglas S., and Nancy A. Denton. 1988. "The Dimensions of Residential Segregation," *Social Forces* 67 (2): 281–315.

Massey, Douglas S., and Mitchell Eggers. 1993. "The Spatial Concentration of Affluence and Poverty During the 1970s," *Urban Affairs Quarterly* 29 (2): 299–315.

———. 1990. "The Ecology of Inequality: Minorities and the Concentration of Poverty 1970–1980," *American Journal of Sociology* 95 (5): 1153–1188.

Massey, Douglas S., and Mary Fischer. 2003. "The Geography of Inequality in the United States, 1950–2000." In *Brookings-Wharton Papers on Urban Affairs.*

Mayer, Susan E. 2001. How the Growth of Income Inequality Increased Economic Segregation. JCPR working papers. Chicago: Northwestern University, University of Chicago Joint Center for Poverty Research.

Quercia, Roberto, and George C. Galster. 1997. "Threshold Effects and the Expected Benefits of Attracting Middle-Income Households to the Central City," *Housing Policy Debate* 8 (2): 409–435.

Popkin, Susan, Laura Harris, and Mary Cunningham. 2002. *Families in Transition: A Qualitative Analysis of the MTO Experience*. Report prepared for the U.S. Department of Housing and Urban Development. Washington, DC: Urban Institute.

Reardon, Sean F., and Glenn Firebaugh. 2002. "Measures of Multigroup Segregation," *Sociological Methodology* 32 (1): 33–67.

Reardon, Sean F., and John T. Yun. 2001. "Suburban Racial Change and Suburban School Segregation, 1987–95," *Sociology of Education* 74 (2): 79–101.

Rosenbaum, Emily, Laura Harris, and Nancy Denton. 2003. "New Places, New Faces: An Analysis of Neighborhoods and Social Ties Among MTO Movers in Chicago." In *Choosing a Better Life? Evaluating the Moving To Opportunity Experiment,* edited by John Goering and Judith Feins. Washington, DC: Urban Institute Press: 275–310.

Rosenbaum, James. 1995. "Changing the Geography of Opportunity by Expanding Residential Choice: Lessons from the Gautreaux Program," *Housing Policy Debate* 6 (1): 231–269.

———. 1991. "Black Pioneers: Do Moves to the Suburbs Increase Economic Opportunity for Mothers and Children?" *Housing Policy Debate* 2 (4): 1179–1213.

Rosenbaum, James, Lisa Reynolds, and Stefanie DeLuca. 2002. "How Do Places Matter? The Geography of Opportunity, Self-Efficacy, and a Look Inside the Black Box of Residential Mobility," *Housing Studies* 17 (1): 71–82.

Sampson, Robert, Jeffrey Morenoff, and Thomas Gannon-Rowley. 2002. "Assessing 'Neighborhood Effects': Social Processes and New Directions in Research," *Annual Review of Sociology* 28: 443–478.

Schill, Michael. 1997. "Chicago's New Mixed-Income Communities Strategy: The Future Face of Public Housing?" In *Affordable Housing and Urban Redevelopment in the United States,* edited by Willem Van Vliet. Thousand Oaks, CA: Sage: 135–157.

Suttles, Gerald. 1972. *The Social Construction of Communities*. Chicago: University of Chicago Press.

Swanstrom, Todd, Colleen Casey, Robert Flack, and Peter Dreier. 2004. "Pulling Apart: Economic Segregation among Suburbs and Central Cities in Major Metropolitan Areas." Washington, DC: The Brookings Institution.

Talen, Emily. 2006. "Neighborhood-level Social Diversity: Insights from Chicago," *Journal of the American Planning Association, 72*(4), 431–446.

Tatian, Peter. A. 2002. *Census CD Neighborhood Change Database (NCDB) Data Users' Guide: Short Form Release*. Washington, DC: The Urban Institute.

Telles, Edward E. 1995. "Structural Sources of Socioeconomic Segregation in Brazilian Metropolitan Areas," *American Journal of Sociology* 100 (5): 1199–1223.

Thomas, June M., John H. Schweitzer, and Julia A. Darnton. 2004. "Mixed Income Neighborhoods: Issues of Assessment." Paper presented at the annual meeting of the Urban Affairs Association, Washington, DC.

Turner, Margery Austin, and Julie Fenderson. 2006. "Understanding Diverse Neighborhoods in an Era of Demographic Change." Washington, DC: Urban Institute, Metropolitan Housing and Policy Center.

U.S. Bureau of the Census. 1981. *Census of Population: 1980. Vol. I, Characteristics of the Population PC80-1, Part I, United States Summary, Section C: SCSAs.* Washington, DC: U.S. Government Printing Office.

———. 1973. *Census of Population: 1970. Vol. I, Characteristics of the Population, Part I, United States Summary-Section 2.* Washington, DC: U.S. Government Printing Office.

U.S. Department of Housing and Urban Development (HUD). 1996. *Rental Housing Assistance at a Crossroads: A Report to Congress on Worst Case Housing Needs.* Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research. http://www.huduser.org/Publications/PDF/worstcse.pdf (accessed May 11, 2004).

Watson, Tara. 2007. "New Housing, Income Inequality, and Distressed Metropolitan Areas." Washington, DC: Brookings Institution, Metropolitan Policy Program. http://www.brookings.edu/reports/2007/09newhousing_watson.aspx (accessed December 20, 2007).

White, Michael J. 1986. "Segregation and Diversity Measures in Population Distribution," *Population Index* 52 (2): 198–221.

Wilson, William Julius. 1987. *The Truly Disadvantaged.* Chicago: University of Chicago Press.

Changes in Rental Housing Discrimination Since 1989

Seok Joon Choi
University of Seoul

Jan Ondrich
John Yinger
Syracuse University

The work in this study was supported by a grant from the U.S. Department of Housing and Urban Development (HUD) (Grant No: H-21441RG). Points of view or opinions in this article are those of the authors and do not necessarily reflect the official position or policies of HUD.

Abstract

This study examines the incidence and causes of housing discrimination in qualitative treatment by rental agents, using national audit data sets from the 2000 Housing Discrimination Study (HDS 2000) and the 1989 Housing Discrimination Study (HDS 1989). Using the fixed-effects logit method described by Chamberlain (1980), we control for unobservable factors shared by audit teammates and conduct hypothesis tests for the incidence and causes of discrimination. We find evidence that discrimination is present in HDS 2000 and is caused by both the prejudice of agents and their response to the prejudice of White clients. We also explore changes in discrimination since 1989 and changes in the causes of discrimination since 1989.

As did previous studies of HDS 1989 and HDS 2000, we find that rental housing discrimination against Blacks still exists but also that it declined significantly between 1989 and 2000. These studies indicate that, since 1989, discrimination against Hispanics has not declined as much or as consistently as has discrimination against Blacks. Our new analysis yields several hints about changes in the causes of discrimination between 1989 and 2000. We find a significant increase in discrimination against Blacks by large rental housing agencies and by Hispanic rental agents. We also find significant decreases in discrimination against Hispanics by female agents and that Hispanic renters with children face less discrimination in 2000 than they did in 1989.

Section 1. Background and Introduction

Housing discrimination remains an important urban policy issue. Housing agents who discriminate may both impose financial loss on homeseekers[1] and increase social inequality. Housing discrimination may restrict access to local public goods, because these goods are directly linked to residential location. Housing discrimination may also play an important role in the labor market, especially in regard to employment opportunities, by limiting minority access to some locations. The Fair Housing Act, as amended in 1988, prohibits housing discrimination, and the federal government has supported fair housing audits to determine how much housing discrimination still exists. This study examines the current status of and changes in the incidence and causes of housing discrimination in qualitative treatment by rental agents, using audit data from two national audit studies: the 2000 Housing Discrimination Study (HDS 2000) and the 1989 Housing Discrimination Study (HDS 1989).

This research complements previous studies of HDS 1989 and HDS 2000. Our regressions add new control variables and other refinements to the analysis of the same types of behavior in Turner et al. (2002). Our analysis also overlaps to some degree with Choi, Ondrich, and Yinger (2005), but this article addresses a wider range of rental agents' behaviors. Moreover, this study is the first to explore changes in the causes of rental housing discrimination over time.

By way of preview, we find, as did previous studies, that rental housing discrimination against Blacks still exists but also that it declined significantly between 1989 and 2000. These studies indicate that, since 1989, discrimination against Hispanics has not declined as much or as consistently as has discrimination against Blacks. Our new analysis yields several hints about changes in the causes of discrimination between 1989 and 2000. We find a significant increase in discrimination against Blacks by large rental housing agencies and by Hispanic rental agents. We also find significant decreases in discrimination against Hispanics by female agents and that Hispanic renters with children face less discrimination in 2000 than they did in 1989. As discussed in the following text, these findings are linked to specific hypotheses about the causes of discrimination but are also clearly worthy of further investigation.

The Paired-Test Methodology

In the housing discrimination studies, HDS 1989 and HDS 2000, each audit consists of successive visits to the same housing agency by two audit teammates, or auditors: one a non-Hispanic White and one a minority. The teammates are matched by gender and age and receive training in representing themselves as having similar socioeconomic characteristics, such as marital status, number of children, and income, which the audit manager adjusts for the cost and type of unit about which they are inquiring. Advertised units are found by randomly sampling advertisements from major metropolitan newspapers. Both teammates then visit, in random order, the agency placing the randomly selected advertisement and inquire about the advertised unit. Each auditor independently records the behavior and characteristics of the agent that he or she meets. (For more information about audit methodology, see Turner et al., 2002; Yinger, 1995.)

[1] Yinger (1995) estimates that the annual cost of housing discrimination in the sales housing market is about $2.0 billion for Blacks and $1.2 billion for Hispanics.

The Housing Discrimination Studies

The audit methodology has been used to examine the incidence and causes of discrimination in housing since the 1970s. HDS 2000 is the third national audit study sponsored by the U.S. Department of Housing and Urban Development (HUD) to examine racial and ethnic discrimination in housing. Both the 1977 Housing Market Practices Study and HDS 1989 found a significant level of discrimination in sales and rental housing markets.

We focus on the HDS 2000 data on rental housing markets. These data include 1,152 Black-White, 731 Hispanic-White, 226 Asian-White, and 100 Native American-White rental audits.[2] The Black-White audits were conducted in 16 metropolitan areas,[3] the Hispanic-White audits in 10 areas,[4] and the Asian-White and Native American-White audits in 2 areas[5] during 2000.

The next section presents the methodologies implemented in this study, including the fixed-effects logit method and several methods for measuring the incidence of discrimination. The third section presents hypotheses concerning the causes of discrimination. The estimation results for HDS 2000 are reported in the fourth section. Changes in the incidence of discrimination are discussed in the fifth section. The sixth section presents the changes in causes of discrimination between 1989 and 2000. The last section presents conclusions and discusses policy implications.

Section 2. Econometric Models

Yinger (1986) explains that audit teammates who go through the same training, visit the same agency, and ask about the same advertised unit will share values of unobservable variables. Chamberlain's (1980) fixed-effects logit framework can be used to account for the role of shared unobservable characteristics in the determination of qualitative dependent variables, such as discrete actions by real estate agents. Chamberlain's (1980) fixed-effects logit framework has been used by Whittington (1992), Christian, Gupta, and Lin (1993), Korenman and Winship (1995), and, more recently, Fisman and Raturi (2003) and Anderson and Newell (2004). Ondrich, Stricker, and Yinger (1999, 1998) used the fixed-effects logit framework to analyze sales and rental data from HDS 1989. The present study refines and extends analysis in Choi, Ondrich, and Yinger (2005) on differences in the incidence of discrimination in rental housing between HDS 2000 and HDS 1989 and uses the fixed-effects logit methodology to present new results on differences in the causes of discrimination.

The probability that a real estate agent treats a customer favorably can be estimated using a logit model. In the usual case, customers can be treated as being independent of each other; however, the case of an audit is different. Because the audit teammates share unobservable variables, the visits constituting the audit can no longer be considered independent of each other. The probabilities

[2] HDS 1989 conducted 781 Black-White and 767 Hispanic-White rental housing audits.

[3] Atlanta, Austin, Birmingham, Chicago, Dayton-Springfield, Denver, Detroit, Houston, Los Angeles, Macon, New Orleans, New York, Philadelphia, Pittsburgh, Orlando, and Washington, D.C.

[4] Austin, Chicago, Denver, Houston, Los Angeles, New York, Pueblo, San Antonio, San Diego, and Tucson.

[5] Los Angeles and Minneapolis.

that each member of the pair is treated favorably are determined by a common unobserved fixed effect that reflects visits to the same agency and the identical training of the auditors. This fixed effect may be related to the other characteristics of the auditors.

Although it is not possible to estimate the fixed effect as in linear regression, Chamberlain (1980) shows that the fixed effect can be removed from the logistic probability function by conditioning on the event that exactly one auditor is treated favorably. When both auditors are treated favorably or when both auditors are treated unfavorably, the observations constituting the audit pair are dropped from the analysis. The loss of degrees of freedom is the price that must be paid to achieve consistent estimates when the unobservables are correlated with the included regressors. Random-effects techniques that do not control for these correlations produce inconsistent estimates. Chamberlain's (1980) estimation allows for the recovery of the intercept (which we weight to be nationally representative) and a coefficient vector that can be used to test hypotheses about the causes of discrimination. (For further details, see Ondrich, Stricker, and Yinger, 1998.)

The Fixed Absolute Gap

The intercept in this analysis can be interpreted as a log odds ratio in a perfect audit; that is, an audit in which teammates differ only in their minority status. The odds ratio is important in the paired-audit methodology because it can be identified when fixed-effects techniques are used. Fixed-effects techniques preserve the consistency of parameter estimates without estimating the group-specific intercepts of the model. In the classical linear regression model, this result is achieved by using deviations from the group mean in place of the original variable. Because of the linearity of this model, it is possible to recover the fixed effects because the group-specific residual mean is an unbiased estimator of each fixed effect. Where fixed-effects techniques are available for nonlinear models (for example, Chamberlain's (1980) fixed-effects method for the binary logit model), the values of the fixed effects typically cannot be recovered. Therefore, the logit event probabilities cannot be predicted.

It is possible, however, to estimate the odds ratio, defined as

$$R = \frac{P_w / (1 - P_w)}{P_m / (1 - P_m)}, \tag{1}$$

where P_w is the probability that favorable treatment is given to the White auditor and P_m is the probability that favorable treatment is given to the minority auditor. In our regressions, the intercept is the log of this odds ratio with the same values of the explanatory variables for the White and minority auditors. It is possible to calculate synthetic probabilities of discrimination based on the odds ratio (see Ondrich, Stricker, and Yinger, 1998). In this study, the method of the fixed absolute gap will be used. We assume that P_m falls short of P_w by the fixed absolute amount d. Combining this assumption with equation 1 leads to

$$d = \frac{P_w (R - 1)(1 - P_w)}{P_w + R(1 - P_w)}. \tag{2}$$

In section 4, we present estimates of d based on our fixed-effect logit estimations.

Section 3. Hypotheses and Related Issues

The hypotheses that we want to explain are based on the beliefs or perceptions of the rental agents. Measuring or testing these hypotheses can be done only by indirect means, however, because agents' beliefs and perceptions cannot be observed. The existing audit studies test the hypotheses about the causes of discrimination by determining whether differences in treatment between minority and White auditors are related to the auditor's, agent's, or neighborhood's characteristics (Ondrich, Ross, and Yinger, 2003; Ondrich, Stricker, and Yinger, 1999, 1998; Page, 1995). These papers identify several hypotheses about the causes of discrimination. These hypotheses are not mutually exclusive, and more than one cause is involved in most cases. In this section, we review the three main hypotheses and associated tests.

The Agent-Prejudice Hypothesis

The agent-prejudice hypothesis states that discrimination may occur because agents have strong personal biases against racial or ethnic minorities. This hypothesis cannot be tested directly, because no method exists for measuring an agent's prejudice, but it can be tested indirectly by determining whether an agent's treatment of minorities varies with characteristics that are possibly related to the agent's prejudice.

The race, age, and gender of the agent and the age and gender of the auditors may affect the agent's prejudice against minorities.[6] A minority agent may be less prejudiced against his or her own minority customers than a White agent would be. Therefore, evidence that Black agents are less likely to discriminate against Blacks or that Hispanic agents are less likely to discriminate against Hispanics supports the agent-prejudice hypothesis. Also, the finding that bias against minorities is higher among older male agents predicts that, compared with female agents, male agents are more likely to discriminate and that older agents may be more averse to dealing with minority customers than are younger agents. In addition, this finding suggests that agents may be less favorably disposed to minority male auditors than to minority female auditors (Ondrich, Ross, and Yinger, 2003; Ondrich, Stricker, and Yinger, 1999, 1998).

The Customer-Prejudice Hypothesis

The customer-prejudice hypothesis states that rental agents may avoid renting to minority customers to protect their actual or potential business with prejudiced White customers. Agents may assume that Whites feel uncomfortable when Hispanics or Blacks move into their building or neighborhood; the agents then cater to these perceived feelings by discriminating against minorities.

The customer-prejudice hypothesis predicts that agents discriminate more against a minority customer if some of that customer's characteristics are particularly likely to upset their prejudiced White customers. Such characteristics may include low income and having children in the family. The customer-prejudice hypothesis also predicts more discrimination when the agent's office is in a White neighborhood. Although we do not observe the location of the agent's office directly, the

[6] Evidence on variation in prejudice by age and gender is provided by Schuman, Steeh, and Bobo (1985).

racial/ethnic composition of the neighborhood in which the advertised unit is located provides a proxy for the rental agent's current customer base, because the agent's office is likely to be at the same location or nearby (Ondrich, Stricker, and Yinger, 1999).[7]

Our specification recognizes that the predictions described previously may interact with each other. For example, the discrimination Blacks or Hispanics encounter in a largely White neighborhood may depend on their income. To explore this possibility, we interact the income level assigned to an audit with an indicator variable for whether the unit is located in a largely minority neighborhood. More specifically, we use six categorical variables to represent the following groups: (1) high-income minorities who seek housing in largely White areas, (2) high-income minorities who seek housing in largely minority areas, (3) middle-income minorities who seek housing in largely White areas, (4) middle-income minorities who seek housing in largely minority areas, (5) low-income minorities who seek housing in largely White areas, and (6) low-income minorities who seek housing in largely minority areas.

The sixth category is omitted in our regressions, so a positive sign for any of the other variables indicates that a minority household in that category encounters more discrimination than does a low-income minority household seeking housing in a largely minority area. According to the customer-prejudice hypothesis, discrimination is higher in White neighborhoods than in minority neighborhoods and higher against low-income households than against high-income households. Thus, the hypothesis of an interaction between neighborhood and minority income predicts a negative sign for the second and fourth variables and a positive sign for the fifth variable. These two effects conflict with each other in the first and third variables, however, so the hypothesis does not make a clear prediction about their signs. A positive sign for the first or third variable indicates that the effect of the neighborhood on an agent's discrimination is stronger than the effect of income; a negative sign indicates the reverse.

The customer-prejudice hypothesis can also be linked to some characteristics of the rental agency (Ondrich, Stricker, and Yinger, 1999; Yinger, 1995). Larger agencies may discriminate less because they have a broader client base and, therefore, need not be as concerned as smaller agencies about the impact of their actions on their attractiveness to White customers.[8] To test this prediction, we include a proxy for agency size, namely the maximum number of agents encountered by either teammate. To distinguish the role of agency size from the number of rental units a particular agent has to work with, we also include a variable indicating whether a unit similar to the advertised unit was available to show to either teammate. This variable is not linked to a particular hypothesis but indicates whether agents are more likely to discriminate when the advertised unit is the only one they have to show.

[7] In HDS 2000, as in HDS 1989, the vast majority of advertised apartments are in neighborhoods with a White majority. To ensure that a reasonable number of audits fall into the minority neighborhood category, we follow Ondrich, Stricker, and Yinger (1999) by defining a largely White area as one in which the minority composition is less than 20 percent. In the case of property managers, a more precise test of the customer-prejudice hypothesis might come from the racial/ethnic composition of the building in which the advertised unit is located, but this information is not available.

[8] Turner et al. (2002) discuss the possibility that larger firms have more experience serving customers in a range of different customer groups and are more likely to tailor their practices to fit their perceptions of each group's preference.

Some predictions of the agent-prejudice and customer-prejudice hypotheses cannot be separated. For example, it is difficult to determine whether it is the housing agents or their potential White customers who have stronger prejudices against younger Blacks and Hispanics than against older ones.

The Statistical Discrimination Hypothesis

The statistical discrimination hypothesis[9] states that statistical discrimination occurs when agents treat people in different groups differently because they believe that group membership is correlated with unobserved characteristics that affect the profitability of their actions. In the rental housing market, for example, a rental agent may use customers' race or ethnicity as a signal about their preferences for housing type or neighborhood.

As with the customer-prejudice hypothesis, the statistical discrimination hypothesis can be linked to the racial or ethnic composition of the neighborhood in which an apartment is located. Rental agents may believe, for example, that all households prefer to live with their own racial or ethnic group and that a housing rental is unlikely to be successful when a minority customer is matched to an advertised unit located in a largely White neighborhood area (Ondrich, Ross, and Yinger, 2003). If agents have these beliefs and act on them, the probability of discrimination is higher when the advertised unit is located in a White instead of a minority neighborhood. This prediction is, of course, the same as the prediction based on customer prejudice.

Ondrich, Ross, and Yinger (2003) find that real estate brokers discriminate more against higher income Black customers, apparently discounting statements by these customers (but not by their identically qualified White teammates) that they can afford to buy expensive houses. A similar stereotype may be at work in the rental housing market. If so, agents may discriminate against high-income minorities to save themselves the time of showing units that they believe these minority customers cannot afford. More specifically, this hypothesis predicts that higher income minority customers will encounter more discrimination, even in minority neighborhoods.

Thus, the statistical discrimination hypothesis predicts a positive sign for the first, third, and fifth interaction variables described in the previous section. Its predictions for the second and fourth variables are ambiguous, however, because these variables combine a higher income (meaning more discrimination) with a minority neighborhood (meaning less discrimination). A positive sign for these variables would suggest that the impact of higher income on discrimination is stronger than the impact of location in a minority neighborhood.

Summary

This discussion is summarized in exhibit 1, which lists the variables we use to test these three hypotheses and their expected signs in our fixed-effects logit estimations. As indicated earlier, these tests are all indirect, and any rejection of the expected signs in this exhibit could indicate either that the underlying hypothesis is incorrect or that the variable we have identified is not closely linked to that hypothesis.

[9] Several scholars have proposed a perceived preference hypothesis that is equivalent to the statistical discrimination hypothesis (Ondrich, Ross, and Yinger, 2003).

Exhibit 1

Expected Signs

Explanatory Variables	Hypotheses		
	Agent Prejudice	Customer Prejudice	Statistical Discrimination
Agent's characteristics			
Agent is Black	(–)		
Agent is Hispanic	(–)		
Agent's age[a]	(+)		
Agent is female	(–)		
Agency's size		(–)	
Auditor's characteristics			
Auditor's age	(–)		
Auditor has children		(+)	
Auditor is female			
Neighborhood and other variables			
High-income * White area[b, c]		(?)	(+)
High-income * minority area[b, c]		(–)	(?)
Middle-income * White area[b, c]		(?)	(+)
Middle-income * minority area[b, c]		(–)	(?)
Low-income * White area[b, c]		(+)	(+)
Both auditors meet same agent			
Similar unit is available		(–)	

[a] *Agent's age is coded as 1 = 18–30, 2 = 31–45, 3 = 46–65, and 4 = older than 65.*

[b] *High income: monthly income greater than $7,500; middle income: monthly income $2,500–$7,500; low income: monthly income less than $2,500.*

[c] *White area: percentage of minority neighbors less than 20 percent; minority area: percentage of minority neighbors at least 20 percent.*

Section 4. Estimation and Test Results for HDS 2000

Exhibit 2 presents the results for discrimination against Blacks, and exhibit 3 presents the results for Hispanics. Each exhibit includes eight types of treatment: (1) "advertised unit available" means that the auditor is told that the unit in the advertisement is available for rent; (2) "advertised unit inspected" means that the auditor is allowed to inspect the advertised unit; (3) "similar unit available" means that the auditor is told that a unit similar to the advertised unit is available; (4) "similar unit inspected" means that the auditor is allowed to inspect a unit similar to the advertised unit; for (5) "how many units recommended" and (6) "how many units inspected," the value for the White auditor is 1 and the value for the minority auditor is 0 if more units are recommended to (or, in the second case, inspected by) the White auditor. The opposite assignment is made when more units are recommended to (inspected by) the minority auditor. When the number of units is identical across auditors, the value for both auditors is 1. For (7) "incentive provided," the agent offers the auditor a rebate or free rent for a period of time or waives a security deposit. Finally, (8) "asked to fill out application" means that the agent asked the auditor to fill out an application for the apartment at some point during the audit.

For the eight types of treatment, the first three rows of exhibits 2 and 3 present the proportion of audits in which the White and minority auditors are favored as well as the difference between these two proportions, which is often called net incidence of discrimination.[10] In exhibit 2, the net incidence in the third row ranges from 0.0 percent for "similar unit available" to 7.4 percent for "how many units inspected." Exhibit 3 indicates that non-Hispanic Whites are more favored than their Hispanic teammates in HDS 2000 for most of the treatment types. The net incidence ranges from 0.6 percent for "asked to fill out application" to 9.0 percent for "how many units recommended."

Exhibit 2

Incidence of Discrimination in HDS 2000 (Black-White Audits)

	Type of Treatment			
	Advertised Unit Available	**Advertised Unit Inspected**	**Similar Unit Available**	**Similar Unit Inspected**
Probability of				
White favored	0.141	0.159	0.159	0.085
Black favored	0.090	0.110	0.159	0.072
Net incidence	0.051	0.049	0.000	0.013
Estimate of				
Discrimination	0.620	0.586	0.036	0.031
(Standard error)	(0.383)	(0.337)	(0.286)	(0.479)
Odds ratio	1.861	1.788	1.037	1.032
Fixed-absolute-gap measure	0.060	0.064	0.005	0.002
Number of observations	258	303	360	178

	Type of Treatment			
	How Many Units Recommended	**How Many Units Inspected**	**Incentive Provided**	**Asked To Fill Out Application**
Probability of				
White favored	0.285	0.235	0.097	0.185
Black favored	0.226	0.161	0.062	0.161
Net incidence	0.059	0.074	0.035	0.025
Estimate of				
Discrimination	0.672	0.695	1.543	0.375
(Standard error)	(0.240)	(0.282)	(26.331)	(0.250)
Odds ratio	1.958	2.005	4.703	1.456
Fixed-absolute-gap measure	0.116	0.102	0.075	0.050
Number of observations	576	446	180	390

HDS 2000 = 2000 Housing Discrimination Study.

[10] Another measure, called gross incidence, is the share of audits in which the White auditor is favored over the minority. As discussed in the literature (Ondrich, Ross, and Yinger, 2000; Turner et al., 2002), the net measure is a lower bound on the incidence of discrimination while the gross measure approximates an upper bound.

Exhibit 3

Incidence of Discrimination in HDS 2000 (Hispanic-White Audits)

	Type of Treatment			
	Advertised Unit Available	**Advertised Unit Inspected**	**Similar Unit Available**	**Similar Unit Inspected**
Probability of				
White favored	0.150	0.139	0.156	0.093
Black favored	0.073	0.093	0.107	0.073
Net incidence	0.077	0.046	0.049	0.020
Estimate of				
Discrimination	1.866	0.362	0.040	0.428
(Standard error)	(0.442)	(0.342)	(0.243)	(0.545)
Odds ratio	6.464	1.432	1.041	1.535
Fixed-absolute-gap measure	0.123	0.038	0.005	0.030
Number of observations	157	165	194	118

	Type of Treatment			
	How Many Units Recommended	**How Many Units Inspected**	**Incentive Provided**	**Asked To Fill Out Application**
Probability of				
White favored	0.316	0.235	0.107	0.179
Black favored	0.226	0.161	0.074	0.173
Net incidence	0.090	0.074	0.033	0.006
Estimate of				
Discrimination	0.435	0.106	– 0.208	– 0.017
(Standard error)	(0.197)	(0.226)	(0.420)	(0.221)
Odds ratio	1.546	1.112	0.812	0.983
Fixed-absolute-gap measure	0.086	0.018	– 0.022	– 0.003
Number of observations	384	259	129	250

HDS 2000 = 2000 Housing Discrimination Study.

The Existence of Discrimination

If the intercept in the fixed-effects logit estimation is positive and significant, the result supports the existence of discrimination. The test results for the Black-White and Hispanic-White audits are presented in exhibits 2 and 3 for each type of behavior. The fourth row of each exhibit presents estimates of the intercept and its standard error. The fifth row gives the results for the estimated White-minority odds ratio for receiving favorable treatment from the rental agent (the exponential of the intercept). The sixth row of each exhibit presents the results for the fixed-absolute-gap measure of the difference in treatment based on the estimated odds ratio.

In the Black-White audits, the null hypothesis of no discrimination can be rejected at the 5-percent level (based on a one-tailed test) for the "advertised unit available," "advertised unit inspected," "how many units recommended," and "how many units inspected" treatment types. In the Hispanic-White audits, "advertised unit available" and "how many units recommended" are the only treatment types for which the null hypothesis is rejected at the 5-percent level (based on a one-tailed test).

When many significance tests of the same type are performed, the null hypothesis may be rejected by chance a number of times even when the null is true. As discussed by Heckman and Walker (1990), the criterion for rejecting the null hypothesis when multiple comparisons are made involves an adjustment of the significance level for a single test. If n tests are performed, then an α-percent significance test can be achieved by rejecting the null if at least one of the p-values is below α/n.

In the present context, we are examining eight treatment types for the Black-White audits and eight treatment types for the Hispanic-White audits. Therefore, for each type of audit, a 5-percent significance test of discrimination can be achieved by rejecting the null if at least one of the p-values is below 0.0625 percent. Similarly, a 1-percent significance test of discrimination can be achieved by rejecting the null if at least one of the p-values is below 0.0125 percent. For a two-tailed test, the null is rejected at the 5-percent level if any of the eight test statistics exceeds 2.73 in absolute value and is rejected at the 1-percent level if any of the eight test statistics exceeds 3.23 in absolute value. For a one-tailed test of discrimination, the null is rejected at the 5-percent level if any of the eight test statistics exceeds 2.50 and is rejected at the 1-percent level if any of the eight test statistics exceeds 3.02. The maximal test statistic (in absolute value) is 2.80 in the Black-White audits and 4.22 in the Hispanic-White audits. Thus, the null hypothesis of no discrimination is rejected at the 5-percent level in both sets of audits.

The regression-based fixed-absolute-gap measure of differential treatment is greater than the simple net incidence measure in all cases except one—"similar unit inspected" in the Black-White audits, where the net incidence is 1.3 percent while the fixed-absolute-gap measure is only 0.2 percent. In Hispanic-White audits, on the other hand, the situation is largely reversed. The fixed-absolute-gap measure is greater than the simple net measure in only two cases—"advertised unit available" and "similar unit inspected."

Overall, these results imply a disturbing pattern of discrimination against minorities by rental agents. The types of treatment with relatively high probabilities of discrimination by agents include those with a great impact on access to rental housing, such as making the advertised unit available and showing the advertised unit.

The Causes of Discrimination

Exhibits 4 and 5 present brief descriptions of the explanatory variables and summary statistics. A positive coefficient for a level variable indicates that the variable increases the probability that the White auditor receives more favorable treatment than does the minority auditor. Because of the interrelationships across the three sets of hypotheses (agent prejudice, customer prejudice, and statistical discrimination), it seems advantageous to present all of the results for the Black-White audits followed by the results for the Hispanic-White audits. Coefficient estimates for difference variables are not reported. Unless otherwise indicated, we focus on results that are significant at the 5-percent level based on a two-tailed test.

Exhibit 6 presents the results for the Black-White audits. We find a limited degree of support for the agent-prejudice hypothesis in the Black-White audits. Specifically, in the "advertised unit inspected" estimation, significantly less difference in treatment occurs when the agent is Black. We also find evidence that a Hispanic agent is more likely to discriminate against a Black customer in

the "how many units recommended" treatment type. Neither of the associated test statistics is large enough to reject the null hypothesis of no discrimination using the multiple comparisons test.

Several results in the Black-White audits support the customer-prejudice hypothesis. We find evidence that high-income minorities are less likely to encounter discrimination in the "advertised unit available" treatment type, but the magnitude of the test statistic is not large enough to reject the null in a multiple comparisons test. The coefficient of "similar unit available" has a negative sign and is significant at the 5-percent level in the "advertised unit available," "advertised unit inspected," and "how many units inspected" estimations. (The maximal value of the test statistics is high enough to reject the null in a multiple comparisons test.) These results support the prediction that discrimination in introducing or showing an advertised unit will decrease when the agent has some flexibility in what can be shown; that is, the agent has similar units.

Despite this prediction, we also find results that contradict the customer-prejudice hypothesis. The results for the "advertised unit inspected," "how many units inspected," and "incentive

Exhibit 4

Variables Used in Testing the Hypotheses and Basic Statistics (Black-White Audits)

Explanatory Variables	HDS 2000		HDS 1989	
	Mean	Standard Deviation	Mean	Standard Deviation
Agent's characteristics				
Agent is Black	0.134	0.341	0.071	0.257
Agent is Hispanic	0.052	0.222	0.039	0.195
Agent's age[a]	2.001	0.863	1.621	0.801
Agent is female	0.603	0.484	0.681	0.444
Agency's size	1.454	0.723	1.515	0.911
Auditor's characteristics				
Auditor's age	32.350	9.500	35.594	8.437
Auditor has children	0.345	0.472	0.068	0.253
Auditor is female	0.537	0.498	0.568	0.495
Auditor's monthly income	$4,050	$2,100	$2,921	$1,598
Neighborhood and other variables				
High-income * White area[b, c]	0.035	0.323	0.027	0.163
High-income * minority area[b, c]	0.038	0.192	0.018	0.135
Middle-income * White area[b, c]	0.279	0.441	0.196	0.397
Middle-income * minority area[b, c]	0.510	0.501	0.280	0.449
Low-income * White area[b, c]	0.009	0.091	0.234	0.424
Both auditors meet same agent	0.473	0.499	0.586	0.492
Neighborhood's characteristics				
Percent of Black neighbors	23.247	30.873	15.053	19.268
Percent of Hispanic neighbors	7.738	11.956	10.034	13.655
Number of observations	1,128		801	

HDS 2000 = 2000 Housing Discrimination Study. HDS 1989 = 1989 Housing Discrimination Study.

[a] Agent's age is coded as 1 = 18–30, 2 = 31–45, 3 = 46–65, and 4 = older than 65.

[b] High income: monthly income greater than $7,500; middle income: monthly income $2,500–$7,500; low income: monthly income less than $2,500.

[c] White area: percentage of minority neighbors less than 20 percent; minority area: percentage of minority neighbors at least 20 percent.

Exhibit 5

Variables Used in Testing the Hypotheses and Basic Statistics (Hispanic-White Audits)

Explanatory Variables	HDS 2000		HDS 1989	
	Mean	Standard Deviation	Mean	Standard Deviation
Agent's characteristics				
Agent is Black	0.039	0.194	0.033	0.178
Agent is Hispanic	0.141	0.348	0.099	0.299
Agent's age[a]	1.994	0.895	1.501	0.911
Agent is female	0.616	0.482	0.629	0.465
Agency's size	1.357	0.643	1.481	0.979
Auditor's characteristics				
Auditor's age	35.740	11.520	35.594	8.437
Auditor has children	0.324	0.464	0.068	0.253
Auditor is female	0.569	0.495	0.568	0.495
Auditor's monthly income	$4,112	$2,834	$2,921	$1,598
Neighborhood and other variables				
High-income * White area[b, c]	0.023	0.151	0.027	0.163
High-income * minority area[b, c]	0.070	0.252	0.018	0.135
Middle-income * White area[b, c]	0.122	0.322	0.184	0.387
Middle-income * minority area[b, c]	0.671	0.478	0.270	0.444
Low-income * White area[b, c]	0.016	0.123	0.179	0.383
Both auditors meet same agent	0.418	0.493	0.588	0.492
Neighborhood's characteristics				
Percent of Black neighbors	5.742	10.766	5.962	9.307
Percent of Hispanic neighbors	20.677	20.532	22.830	19.984
Number of observations	709		787	

HDS 2000 = 2000 Housing Discrimination Study. HDS 1989 = 1989 Housing Discrimination Study.

[a] Agent's age is coded as 1 = 18–30, 2 = 31–45, 3 = 46–65, and 4 = older than 65.

[b] High income: monthly income greater than $7,500; middle income: monthly income $2,500–$7,500; low income: monthly income less than $2,500.

[c] White area: percentage of minority neighbors less than 20 percent; minority area: percentage of minority neighbors at least 20 percent.

provided" estimation suggest that larger agencies discriminate more against minority customers than do smaller agencies. This conclusion is also supported by the multiple comparisons test. It is inconsistent with the prediction that minority customers who visit large agencies encounter less discrimination because large agencies have a broad customer base.

No evidence to support the statistical discrimination hypothesis in the Black-White audits exists. When we ran specifications that included minority percentages in the neighborhood along with the interactions of level of income with dummies for whether the unit is in a minority neighborhood, we obtained results (arguably) consistent with statistical discrimination in two cases. Despite this observation, we believe that interpreting the minority percentage coefficients in the presence of the income-racial composition interaction variables is problematic. The specifications that include the interaction variables but exclude minority percentages have the cleanest interpretations. In these specifications, there is no evidence to support the statistical discrimination hypothesis in the Black-White audits.

Exhibit 6

Estimates of the Causes of Discrimination in HDS 2000 (Black-White Audits)[a] (1 of 2)

Explanatory Variables	Type of Treatment							
	Advertised Unit Available		Advertised Unit Inspected		Similar Unit Available		Similar Unit Inspected	
	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error
Intercept	0.6209	0.3836	0.5865	0.3373	0.0364	0.2862	0.0319	0.4748
Agent's characteristics								
Agent is Black	0.1698	0.5049	**– 1.0972**	**0.4751**	0.2535	0.3885	0.3699	0.5962
Agent is Hispanic	0.2009	0.7262	0.2407	0.7233	0.9446	0.6020	– 0.4229	0.9500
Agent's age[b]	0.0207	0.2149	– 0.0797	0.2027	– 0.0047	0.1686	0.2093	0.2868
Agent is female	– 0.1599	0.3901	– 0.4197	0.3602	– 0.1130	0.2937	0.1472	0.4801
Agency's size	– 0.1082	0.2211	**0.5501**	**0.2352**	0.1850	0.1949	0.5491	0.3191
Auditor's characteristics								
Auditor's age	0.0211	0.0188	0.0238	0.0168	– 0.0214	0.0130	– 0.0258	0.0232
Auditor has children	– 0.2290	0.3406	– 0.1597	0.3126	0.1889	0.2723	0.1192	0.4077
Auditor is female	0.0190	0.3397	0.0255	0.3009	– 0.4681	0.2556	– 0.0190	0.4143
Neighborhood and other variables								
High-income * White area[c, d]	– 0.9393	0.8129	– 0.4413	0.8089	– 0.5046	0.6337	– 0.7948	0.9589
High-income * minority area[c, d]	**– 1.6371**	**0.8271**	– 1.2512	0.9128	– 0.4064	0.7654	1.6094	1.2863
Middle-income * White area[c, d]	– 0.5449	0.7140	– 0.5245	0.6350	0.0134	0.5175	– 0.0541	0.8064
Middle-income * minority area[c, d]	– 0.2934	0.6738	– 0.4742	0.5782	0.3953	0.5110	0.2320	0.7764
Low-income * White area[c, d]	– 1.5702	1.6624	– 0.2987	0.9840	0.3972	0.7284	1.4249	1.4128
Both auditors meet same agent	– 0.0450	0.3521	0.2650	0.3116	0.2163	0.2488	– 0.2177	0.3927
Similar unit is available	**– 0.9917**	**0.3575**	**– 0.9637**	**0.3101**	—	—	0.9622	0.6209

Exhibit 6

Estimates of the Causes of Discrimination in HDS 2000 (Black-White Audits)[a] (2 of 2)

Explanatory Variables	Type of Treatment							
	How Many Units Recommended		How Many Units Inspected		Incentive Provided		Asked To Fill Out Application	
	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error
Intercept	**0.6012**	**0.2345**	**0.6955**	**0.2823**	1.5483	26.3319	0.3759	0.2503
Agent's characteristics								
Agent is Black	0.0873	0.3225	– 0.5421	0.3737	– 0.0427	0.6823	0.1277	0.4307
Agent is Hispanic	**1.2002**	**0.4894**	0.0962	0.5433	0.0192	1.1588	0.3640	0.6168
Agent's age[b]	– 0.0689	0.1314	0.1262	0.1550	0.3932	0.2690	0.2095	0.1549
Agent is female	– 0.1572	0.2344	– 0.1978	0.2787	0.1068	0.4987	– 0.2591	0.2757
Agency's size	0.2687	0.1440	**0.4923**	**0.1746**	**0.6704**	**0.3139**	0.0087	0.1677
Auditor's characteristics								
Auditor's age	– 0.0075	0.0106	0.0014	0.0123	0.0255	0.0232	– 0.0118	0.0119
Auditor has children	0.2633	0.2113	– 0.0609	0.2500	0.3640	0.4319	0.0388	0.2478
Auditor is female	– 0.0238	0.2016	– 0.0380	0.2385	– 0.7311	0.4494	0.0873	0.2430
Neighborhood and other variables								
High-income * White area[c, d]	0.2259	0.4916	– 0.4665	0.6168	– 0.2296	1.0888	– 0.5310	0.5180
High-income * minority area[c, d]	– 0.1203	0.6024	0.1984	0.8218	1.5594	1.9439	1.2475	0.9167
Middle-income * White area[c, d]	0.3495	0.4183	– 0.1841	0.5224	0.1937	0.8133	– 0.3088	0.4646
Middle-income * minority area[c, d]	0.5253	0.4056	– 0.1194	0.4944	**1.5734**	**0.7943**	– 0.0603	0.4461
Low-income * White area[c, d]	0.9227	0.6260	0.8758	0.7134	15.019	532.20	– 1.4363	0.7048
Both auditors meet same agent	**0.4387**	**0.2008**	0.1876	0.2414	– 0.3630	0.4645	– 0.2386	0.2416
Similar unit is available	– 0.4839	0.2538	**– 0.7744**	**0.2680**	0.0331	0.4641	0.0476	0.2481

HDS 2000 = 2000 Housing Discrimination Study.

[a] Bold coefficients are statistically significant at the 5-percent level (two-tailed test).

[b] Agent's age is coded as 1 = 18–30, 2 = 31–45, 3 = 46–65, and 4 = older than 65.

[c] High income: monthly income greater than $7,500; middle income: monthly income $2,500–$7,500; low income: monthly income less than $2,500.

[d] White area: percentage of minority neighbors less than 20 percent; minority area: percentage of minority neighbors at least 20 percent.

We turn now to the results for the Hispanic-White audits, which are presented in exhibit 7. First, there is evidence to support the agent-prejudice hypothesis. Specifically, for "similar unit inspected," female agents are significantly less likely to discriminate against Hispanics than are male agents (at the 1-percent level for the individual significance test and at the 5-percent level for the multiple comparisons test). Contrary to the agent-prejudice hypothesis, older agents are less likely to discriminate against Hispanics than are younger agents in the "how many units recommended" regression. Despite this observation, the result that older agents are less likely to discriminate against Hispanics is not supported by a multiple comparisons test.

As was the case with the statistical discrimination hypothesis in the Black-White audits, conclusions for both the customer-prejudice hypothesis and the statistical discrimination hypothesis in the Hispanic-White audits changed across preliminary specifications. Specifications that included minority percentages in the neighborhood along with the interactions of level of income with dummies for whether the unit is in a minority neighborhood frequently found significance for the minority-percentage coefficient. Despite this finding, in the cleanest specification, which excludes the minority-percentage variable, all coefficient estimates for the interaction variables are statistically insignificant. Therefore, there is no evidence for or against the statistical discrimination hypothesis in the Hispanic-White audits.

Because the coefficient estimates for the interaction variables are all statistically insignificant, they also provide no support for or against the customer-prejudice hypothesis. Moreover, none of the other coefficient estimates is consistent with the customer-prejudice hypothesis in the Hispanic-White audits. Some results, however, are inconsistent with the customer-prejudice hypothesis. In the "similar unit inspected" estimation, for example, a Hispanic prospective renter with children receives more favorable treatment from an agent than a non-Hispanic White in similar circumstances, which contradicts the prediction of the customer-prejudice hypothesis.

To summarize the results for the three hypotheses, there is (1) support for the agent-prejudice hypothesis in the Hispanic-White audits, (2) conflicting evidence on the customer-prejudice hypothesis in the Black-White audits, and, finally, (3) no support for or against the statistical discrimination hypothesis in either the Black-White audits or the Hispanic-White audits.

Exhibit 7

Estimates of the Causes of Discrimination in HDS 2000 (Hispanic-White Audits)[a] (1 of 2)

Explanatory Variables	Type of Treatment							
	Advertised Unit Available		Advertised Unit Inspected		Similar Unit Available		Similar Unit Inspected	
	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error
Intercept	**1.8861**	**0.4428**	0.3623	0.3422	0.0400	0.2433	0.4283	0.5450
Agent's characteristics								
Agent is Black	0.4871	2.0628	0.6429	1.5129	0.0418	1.2467	0.7376	2.1296
Agent is Hispanic	1.3298	0.9178	1.1462	0.7715	– 0.8181	0.6140	– 0.2424	1.1085
Agent's age[b]	– 0.4127	0.3398	– 0.2191	0.2617	– 0.2462	0.2516	– 0.5025	0.3824
Agent is female	– 0.8933	0.6129	0.2145	0.4874	– 0.0322	0.4157	**– 2.2907**	**0.8326**
Agency's size	– 0.1648	0.2839	– 0.0878	0.2464	0.1453	0.2543	– 0.5717	0.3711
Auditor's characteristics								
Auditor's age	0.0103	0.0314	0.0283	0.0265	0.0109	0.0265	– 0.0479	0.0372
Auditor has children	0.0261	0.5013	0.4209	0.4766	– 0.7209	0.3933	**– 1.4611**	**0.7051**
Auditor is female	– 0.6877	0.5368	– 0.3629	0.4298	– 0.3993	0.3627	0.7380	0.6378
Neighborhood and other variables								
High-income * White area[c, d]	1.1255	1.3580	– 0.9686	1.4687	0.7376	1.1545	0.2669	1.9007
High-income * minority area[c, d]	0.5360	1.8345	– 1.8801	1.4929	0.2862	1.1520	– 0.1656	2.2057
Middle-income * White area[c, d]	– 0.4065	1.0396	– 1.3180	1.3313	1.0959	0.9370	1.0936	1.3057
Middle-income * minority area[c, d]	0.8793	0.9427	– 1.0417	1.2384	0.5360	0.8732	1.5434	1.2873
Low-income * White area[c, d]	– 0.5880	1.6237	—	—	0.2399	1.7585	—	—
Both auditors meet same agent	0.7057	0.5791	0.1427	0.4348	0.0235	0.3906	**– 3.2505**	**0.8764**
Similar unit is available	0.5511	0.4899	0.6698	0.4635	—	—	– 0.5898	1.0701

Exhibit 7

Estimates of the Causes of Discrimination in HDS 2000 (Hispanic-White Audits)[a] (2 of 2)

Explanatory Variables	Type of Treatment							
	How Many Units Recommended		How Many Units Inspected		Incentive Provided		Asked To Fill Out Application	
	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error
Intercept	**0.4355**	**0.1977**	0.1062	0.2245	– 0.2088	0.4203	– 0.0174	0.2210
Agent's characteristics								
Agent is Black	– 0.3928	0.7888	– 0.4147	0.9386	– 1.2460	1.1770	– 0.0028	0.9709
Agent is Hispanic	– 0.5105	0.4041	0.5309	0.4858	– 1.1279	0.9881	– 0.7276	0.5061
Agent's age[b]	**– 0.4078**	**0.1627**	– 0.2333	0.1990	– 0.4597	0.3977	0.1829	0.2044
Agent is female	– 0.1457	0.2808	– 0.0092	0.3595	– 1.3465	0.7234	– 0.3328	0.3469
Agency's size	– 0.0910	0.1576	– 0.1073	0.1999	0.2713	0.3292	– 0.1493	0.2415
Auditor's characteristics								
Auditor's age	0.0105	0.0164	– 0.0065	0.0208	– 0.0320	0.0346	– 0.0117	0.0194
Auditor has children	– 0.3508	0.2615	0.2155	0.3460	– 0.4511	0.5853	– 0.4656	0.3189
Auditor is female	– 0.3147	0.2412	– 0.1128	0.3115	– 0.7210	0.6090	0.5774	0.2997
Neighborhood and other variables								
High-income * White area[c, d]	0.4619	0.7472	– 0.0715	0.9310	0.7092	1.7157	1.2177	0.9588
High-income * minority area[c, d]	0.6056	0.8024	– 0.8721	1.0110	– 2.2430	2.0358	0.8591	1.3237
Middle-income * White area[c, d]	0.0970	0.6119	– 0.3806	0.7426	1.6344	1.2623	0.4751	0.8100
Middle-income * minority area[c, d]	0.0393	0.5788	– 0.3739	0.6876	– 0.1853	1.1238	0.3360	0.7636
Low-income * White area[c, d]	– 0.9413	1.3803	—	—	—	—	1.2700	1.2408
Both auditors meet same agent	0.2452	0.2673	– 0.4497	0.3274	**1.8546**	**0.6808**	– 0.5138	0.3276
Similar unit is available	– 0.1511	0.3410	0.4085	0.3928	– 0.3867	0.6268	0.4543	0.3043

HDS 2000 = 2000 Housing Discrimination Study.

[a] Bold coefficients are statistically significant at the 5-percent level (two-tailed test).

[b] Agent's age is coded as 1 = 18–30, 2 = 31–45, 3 = 46–65, and 4 = older than 65.

[c] High income: monthly income greater than $7,500; middle income: monthly income $2,500-$7,500; low income: monthly income less than $2,500.

[d] White area: percentage of minority neighbors less than 20 percent; minority area: percentage of minority neighbors at least 20 percent.

Section 5. Changes in the Incidence of Discrimination Between 1989 and 2000

We compare the results for HDS 2000 and HDS 1989 to examine the trend in discrimination in the rental housing market over the past decade. The dependent variables that we examine in exhibits 6 and 7 provide an overview of treatments concerning housing availability and sales effort. Because we use the same econometric methodology and the data are based on similar data collection efforts, the estimation results of the HDS 1989 and the HDS 2000 should be comparable.

We begin with the results for the Black-White audits. Exhibit 8 presents the estimates of the intercept from our logit models, associated significance tests results, results for the net incidence measures, and, for completeness, the fixed-absolute-gap measures.[11] As explained earlier, a significance test for the intercept is a test of the existence of discrimination. HDS 2000 uncovers discrimination in four out of eight treatment types (two at the 1-percent level and two at the 5-percent level), while HDS 1989 finds discrimination in seven out of eight treatment types (five at the 1-percent level and two at the 5-percent level). In the "similar unit available," "similar unit inspected," and "incentive provided" estimations, we find evidence of the existence of discrimination only in HDS 1989.

In HDS 2000, as mentioned earlier, the net incidence of discrimination against Black customers ranges from 0.0 percent for "asked to fill out application" to 7.4 percent for "how many units inspected." These results are substantially lower than the corresponding net measures found in HDS 1989, which range from 1.8 percent for "asked to fill out application" to 16.1 percent for "how many units inspected." The drops in this incidence measure range from 2.3 percentage points for "incentive provided" to 9.6 percentage points for "how many units recommended."

Declines in the fixed absolute gap between 1989 and 2000 range from 3.6 percent for the "how many units recommended" estimation to 10.6 percent in the "how many units recommended" estimation. Increases in the fixed absolute gap range from 0.2 percent for the "advertised unit available" estimation to 7.4 percent for the "asked to fill out application" estimation.

We turn now to the results for the Hispanic-White audits, which are presented in exhibit 9. For the Hispanic-White audits, HDS 2000 finds discrimination at the 5-percent level in two out of the eight estimations. The null hypothesis of no discrimination for "similar unit inspected" and "how many units inspected" is rejected at the 5-percent level in HDS 1989 but not in HDS 2000.

For most of the treatment types, non-Hispanic Whites are more favored than their Hispanic teammates are in HDS 2000. The net incidence discrimination in HDS 1989 ranges from 3.1 percent for "asked to fill out application" to 11.2 percent for "how many units recommended." Between 1989 and 2000, this measure of discrimination declines in six of the eight cases. The largest decline, 2.6 percentage points, is for "how many units inspected"; the largest increase, 3.0 percentage points, is for "similar unit available."

[11] To calculate net incidence, we exclude nonnewspaper-advertised samples from HDS 2000 because, in HDS 1989, only newspaper-advertised units were used.

Exhibit 8

Changes in the Incidence of Discrimination Between 1989 and 2000 (Black-White Audits)

Type of Treatment	Intercept (Standard Error)			Net Incidence			Fixed Absolute Gap		
	2000	1989	1989–2000 Change[a]	2000	1989	1989–2000 Change[a]	2000	1989	1989–2000 Change[a]
Advertised unit available	0.620*	0.398 **	0.222	0.051	0.070	– 0.019	0.059	0.057	0.002
	(0.383)	(0.188)	(0.427)						
Advertised unit inspected	0.586*	0.790 **	– 0.204	0.049	0.125	– 0.076	0.063	0.112	– 0.048
	(0.337)	(0.198)	(0.391)						
Similar unit available	0.036	0.373 *	– 0.337	0.000	0.044	– 0.044	0.004	0.040	– 0.036
	(0.286)	(0.224)	(0.363)						
Similar unit inspected	0.031	0.542 *	– 0.511	0.013	0.040	– 0.027	0.002	0.038	– 0.036
	(0.424)	(0.288)	(0.513)						
How many units recommended	0.601**	1.069 **	– 0.468	0.059	0.155	– 0.096	0.105	0.211	– 0.106
	(0.274)	(0.163)	(0.319)						
How many units inspected	0.695**	1.199 **	– 0.504	0.074	0.161	– 0.087	0.102	0.197	– 0.095
	(0.282)	(0.193)	(0.342)						
Incentive provided	1.548	0.658 **	0.890	0.035	0.048	– 0.013	0.075	0.046	0.028
	(26.331)	(0.255)	(26.332)						
Asked to fill out application	0.375	– 0.179	0.554	0.025	0.018	0.007	0.050	– 0.024	0.074
	(0.250)	(0.265)	(0.364)						

*** Significant at 1-percent level (one-tailed test for first and second columns; two-tailed test for third column).*

** Significant at 5-percent level (one-tailed test for first and second columns; two-tailed test for third column).*

[a] *Change computed as the value for 2000 minus the value for 1989.*

Exhibit 9

Changes in the Incidence of Discrimination Between 1989 and 2000 (Hispanic-White Audits)

Type of Treatment	Intercept (Standard Error)			Net Incidence			Fixed Absolute Gap		
	2000	1989	1989–2000 Change[a]	2000	1989	1989–2000 Change[a]	2000	1989	1989–2000 Change[a]
Advertised unit available	1.886 **	0.718 **	1.168 *	0.077	0.090	– 0.013	0.125	0.093	0.032
	(0.442)	(0.228)	(0.497)						
Advertised unit inspected	0.362	0.145	0.217	0.046	0.052	– 0.006	0.046	0.019	0.027
	(0.342)	(0.200)	(0.396)						
Similar unit available	0.040	0.075	– 0.035	0.049	0.019	0.030	– 0.002	– 0.001	– 0.001
	(0.243)	(0.205)	(0.318)						
Similar unit inspected	0.428	0.742 **	– 0.314	0.019	0.019	0.000	0.029	0.061	– 0.032
	(0.545)	(0.326)	(0.635)						
How many units recommended	0.361 **	0.435 **	– 0.074	0.090	0.112	– 0.022	0.083	0.088	– 0.005
	(0.157)	(0.197)	(0.252)						
How many units inspected	0.179	0.361 *	– 0.182	0.074	0.100	– 0.026	0.029	0.054	– 0.025
	(0.226)	(0.157)	(0.275)						
Incentive provided	– 0.208	1.271	– 1.479	0.033	0.042	– 0.009	0.023	0.077	– 0.054
	(0.423)	(11.118)	(11.126)						
Asked to fill out application	– 0.017	0.252	– 0.269	0.006	0.031	– 0.025	0.005	0.030	– 0.025
	(0.221)	(0.390)	(0.448)						

*** Significant at 1-percent level (one-tailed test for first and second columns; two-tailed test for third column).*

** Significant at 5-percent level (one-tailed test for first and second columns; two-tailed test for third column).*

[a] *Change computed as the value for 2000 minus the value for 1989.*

Between 1989 and 2000, the discrimination in the fixed absolute gap declines in six cases and increases in two. The largest decline, 5.4 percentage points, is for "incentive provided"; the largest increase, 3.2 percentage points, is for "advertised unit available."

Taken together, the overall results for the Black-White audits suggest that discrimination against Blacks has declined significantly over that time period, although considerable discrimination still exists. (It should be noted, however, that this conclusion is not supported by formal significance tests for a change in the intercept; none of the changes are significantly different from 0.) On the other hand, the estimation results for Hispanic-White audits overall indicate that discrimination against Hispanics has not declined as much or as consistently as has discrimination against Blacks since 1989.

Section 6. Changes in the Causes of Discrimination Between 1989 and 2000

To examine changes in the causes of discrimination between 1989 and 2000, we use the same econometric method (that is, fixed-effects logit estimation with identical dependent variables and explanatory variables) that we used to identify the incidence of discrimination. Unless otherwise indicated, we focus on the results for the estimated differences of coefficients between HDS 1989 and HDS 2000 that are significant at the 5-percent level based on a two-tailed test.

Exhibit 10 presents the results for the Black-White audits. In each of the estimations in the Black-White audits, at least one significant difference occurs in a coefficient estimate related to the causes of discrimination. The first significant difference relates to the agent-prejudice hypothesis. In the "how many units recommended" estimation, Hispanic agents are more likely to discriminate against Blacks in 2000 than in 1989. This result is supported by the multiple comparisons test and is consistent with an increase in tensions between Blacks and Hispanics.

The second set of differences concerns agency size. We hypothesized that, because larger agencies have a broader client base, they need not be as concerned as smaller agencies about the effect of their actions regarding minorities on how they are regarded by their potential White customers. As a result, larger agencies may discriminate less than smaller agencies do. In four of the eight estimations in exhibit 10, the likelihood of discrimination by larger agencies against Blacks increased significantly between 1989 and 2000. (The result is confirmed by the multiple comparisons test.) One possible interpretation of these results is that incentives identified by the customer-prejudice hypothesis have become weaker over time; another possibility is that the growth of the Internet or some other development has diminished the differences in the incentives facing large and small agencies.

The third set of differences in the Black-White audits concerns the income-racial composition interaction variables. The customer-prejudice hypothesis maintains that discrimination is not only higher in White neighborhoods than in minority neighborhoods but also is higher against low-income than against high-income households. In the "how many units inspected" estimation, discrimination encountered in White areas by Blacks in all income groups increased significantly between 1989 and 2000. In the "how many units recommended" estimation, discrimination against high-income Black households seeking rental housing in largely White areas increased

Exhibit 10

Changes in Causes of Discrimination Between 1989 and 2000 (Black-White Audits)[a] (1 of 2)

Explanatory Variables	Type of Treatment							
	Advertised Unit Available		Advertised Unit Inspected		Similar Unit Available		Similar Unit Inspected	
	1989–2000 Change[b]		1989–2000 Change[b]		1989–2000 Change[b]		1989–2000 Change[b]	
	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error
Intercept	0.2222	0.4274	– 0.2041	0.3911	– 0.3367	0.3636	– 0.5107	0.5554
Agent's characteristics								
Agent is Black	– 0.0296	0.9552	– 1.4521	0.8118	0.9434	0.9621	0.0438	1.1981
Agent is Hispanic	1.4714	1.4325	0.1099	1.1944	2.3780	1.3332	—	—
Agent's age[c]	0.3537	0.2926	0.1340	0.2799	– 0.0728	0.2746	– 0.0850	0.4002
Agent is female	– 0.4638	0.5987	– 0.9269	0.5422	– 0.3146	0.5678	– 0.4786	0.8180
Agency's size	0.1932	0.2727	**0.7762**	**0.2903**	**0.6972**	**0.2990**	0.3452	0.4264
Auditor's characteristics								
Auditor's age	0.0308	0.0314	0.0498	0.0307	0.0238	0.0325	– 0.0528	0.0401
Auditor has children	– 0.1985	0.5745	– 0.3543	0.5282	0.6115	0.5615	0.6820	0.8781
Auditor is female	0.6237	0.5531	0.2899	0.5107	– 0.0708	0.5329	– 0.1302	0.7904
Neighborhood and other variables								
High-income * White area[d, e]	– 1.7975	1.1919	– 0.2091	1.1675	0.8292	1.1901	0.8448	1.6419
High-income * minority area[d, e]	– 2.0377	1.2225	– 0.6640	1.2081	0.8574	1.3000	2.6122	1.7027
Middle-income * White area[d, e]	– 0.7330	0.9057	– 0.1686	0.8731	0.6204	0.9649	1.8824	1.3054
Middle-income * minority area[d, e]	**– 2.0476**	**0.8917**	– 0.6555	0.8338	1.0512	0.8999	0.0742	1.2096
Low-income * White area[d, e]	– 2.3000	1.8202	– 0.2637	1.1963	0.7334	1.1785	2.5526	1.9819
Both auditors meet same agent	0.3879	0.4863	**0.9158**	**0.4400**	0.1513	0.4511	– 0.7720	0.6704
Similar unit is available	**– 1.2026**	**0.5057**	– 0.5315	0.4444	—	—	**2.1815**	**0.8083**

Exhibit 10

Changes in Causes of Discrimination Between 1989 and 2000 (Black-White Audits)[a] (2 of 2)

Explanatory Variables	Type of Treatment							
	How Many Units Recommended		How Many Units Inspected		Incentive Provided		Asked To Fill Out Application	
	1989–2000 Change[b]		1989–2000 Change[b]		1989–2000 Change[b]		1989–2000 Change[b]	
	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error
Intercept	– 0.4680	0.2856	– 0.5037	0.3423	0.8897	26.3331	0.5552	0.3645
Agent's characteristics								
Agent is Black	0.1373	0.5812	– 1.0342	0.7771	– 1.0553	1.0776	0.1880	0.8035
Agent is Hispanic	**2.5329**	**0.9075**	0.7059	1.1461	—	—	0.8605	1.2501
Agent's age[c]	– 0.1098	0.1898	0.0051	0.2170	0.1479	0.3961	**0.5846**	**0.2763**
Agent is female	0.0286	0.3826	– 0.5958	0.4649	0.0112	0.8007	0.0294	0.5059
Agency's size	0.2818	0.1876	**0.7751**	**0.2209**	**1.1451**	**0.3912**	0.0003	0.2967
Auditor's characteristics								
Auditor's age	0.0193	0.0199	**0.1796**	**0.0249**	– 0.0023	0.0399	0.0277	0.0306
Auditor has children	0.2432	0.3665	0.0220	0.4274	– 0.0330	0.6597	0.0094	0.5024
Auditor is female	– 0.1846	0.3502	– 0.3290	0.4211	– 0.4494	0.6816	0.0452	0.4827
Neighborhood and other variables								
High-income * White area[d, e]	**1.6344**	**0.8016**	**2.4890**	**1.2280**	0.7871	1.6132	0.2772	1.1794
High-income * minority area[d, e]	0.2867	0.8307	2.0871	1.2466	2.9670	2.2795	1.6995	1.3437
Middle-income * White area[d, e]	0.9228	0.5987	**1.6618**	**0.8475**	0.1111	1.2877	– 1.3809	0.9829
Middle-income * minority area[d, e]	1.0008	0.5767	0.9752	0.7555	2.1352	1.2516	– 0.5605	0.9421
Low-income * White area[d, e]	– 0.6290	0.8146	**2.1805**	**1.0556**	14.3907	532.3012	– 2.3068	1.2724
Both auditors meet same agent	0.4290	0.2943	0.1585	0.3531	– 0.2099	0.6360	0.0740	0.4175
Similar unit is available	– 0.4022	0.3409	– 0.2003	0.3851	– 0.2026	0.6395	– 0.1298	0.4320

[a] *Bold coefficients are statistically significant at the 5-percent level (two-tailed test).*

[b] *The changes computed as the value for 2000 minus the value for 1989.*

[c] *Agent's age is coded as 1 = 18–30, 2 = 31–45, 3 = 46–65, and 4 = older than 65.*

[d] *High income: monthly income greater than $7,500; middle income: monthly income $2,500-$7,500; low income: monthly income less than $2,500.*

[e] *White area: percentage of minority neighbors less than 20 percent; minority area: percentage of minority neighbors at least 20 percent.*

significantly over the same time period. Finally, in the "advertised unit available" estimation, the coefficient for a middle-income customer seeking a unit in a minority neighborhood decreased significantly. These results, taken together, suggest that rental agents responded more strongly to the prejudices of their customers in 1989 than in 2000;[12] however, none of these four results are supported by a multiple comparisons test.

The results for the Hispanic-White audits presented in exhibit 11 are more varied. No significant differences occur in four of the eight estimations. In two of the estimations, the likelihood of discrimination against Hispanics by female agents decreased significantly between 1989 and 2000; this result is supported by the multiple comparisons test. The results of multiple comparisons tests also suggest that younger auditors and auditors with children face less discrimination in 2000 than they do in 1989.

[12] A fourth set of differences is not linked to a specific hypothesis but suggests a change in discriminatory tactics by rental agents. Specifically, compared with behavior in 1989, agents in 2000 are less likely to withhold the advertised unit from a Black customer when a similar unit is available but are more likely to discriminate in inspections of these similar units. In other words, in 2000, rental agents with more than one available unit are more likely to advertise the unit they are willing to show to Blacks and to withhold other units that they are willing to show only to Whites. These results do not hold for the Hispanic-White audits. In fact, when similar units are available, rental agents are more likely to discriminate against Hispanics in showing the advertised unit in 2000 than in 1989.

Exhibit 11

Changes in Causes of Discrimination Between 1989 and 2000 (Hispanic-White Audits)[a] (1 of 2)

Explanatory Variables	Type of Treatment							
	Advertised Unit Available		Advertised Unit Inspected		Similar Unit Available		Similar Unit Inspected	
	1989–2000 Change[b]		1989–2000 Change[b]		1989–2000 Change[b]		1989–2000 Change[b]	
	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error
Intercept	1.1476	0.4982	0.2168	0.3968	0.1157	0.3184	– 0.3137	0.6351
Agent's characteristics								
Agent is Black	0.0477	2.6401	– 0.5793	1.8554	0.8380	1.6631	0.2299	2.5929
Agent is Hispanic	2.0100	1.1651	1.4135	0.9576	– 0.6356	0.8479	– 1.3080	1.4956
Agent's age[c]	– 0.0479	0.4172	0.0693	0.3215	– 0.2817	0.3019	– 0.3693	0.4619
Agent is female	– 0.6075	0.7921	0.7091	0.6428	– 0.7081	0.5712	– 2.8000	1.0185
Agency's size	– 0.0492	0.3406	0.0653	0.2864	0.2942	0.2980	– 0.2423	0.4421
Auditor's characteristics								
Auditor's age	0.0141	0.0394	0.0328	0.033	0.0049	0.0342	– 0.0893	0.0519
Auditor has children	– 0.9561	0.7292	0.1488	0.6159	– 0.8332	0.5528	– 0.7095	0.9412
Auditor is female	– 0.2716	0.6871	– 0.3163	0.5664	– 0.2836	0.4983	– 0.2156	0.8087
Neighborhood and other variables								
High-income * White area[d, e]	1.8881	1.7210	0.7286	1.6859	0.6877	1.4373	– 1.0270	2.3106
High-income * minority area[d, e]	1.1473	2.0531	– 0.7591	1.7146	– 0.2674	1.4346	– 0.5061	2.5203
Middle-income * White area[d, e]	– 0.1552	1.3204	– 0.0722	1.493	0.8428	1.1777	0.2808	1.6845
Middle-income * minority area[d, e]	1.5384	1.1756	– 0.1993	1.3939	0.3744	1.0911	0.9831	1.5862
Low-income * White area[d, e]	0.1587	1.8905	—	—	0.3865	1.9099	—	—
Both auditors meet same agent	0.9784	0.7028	0.9019	0.5378	0.1795	0.5136	– 3.6111	0.9986
Similar unit is available	0.9296	0.6274	1.3249	0.5678	—	—	– 1.0510	1.1713

Exhibit 11

Changes in Causes of Discrimination Between 1989 and 2000 (Hispanic-White Audits)[a] (2 of 2)

Explanatory Variables	Type of Treatment							
	How Many Units Recommended		How Many Units Inspected		Incentive Provided		Asked To Fill Out Application	
	1989–2000 Change[b]		1989–2000 Change[b]		1989–2000 Change[b]		1989–2000 Change[b]	
	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error
Intercept	0.0742	0.2524	– 0.2551	0.2740	– 1.4800	11.1261	– 0.2697	0.3881
Agent's characteristics								
Agent is Black	– 1.3925	1.2349	– 1.4144	1.3356	– 11.9640	467.5015	– 0.8682	1.6320
Agent is Hispanic	– 0.1752	0.6202	0.8662	0.6763	0.6486	1.4338	– 1.0114	0.9576
Agent's age[c]	– 0.2189	0.2148	– 0.0444	0.2435	– 0.8664	0.5203	0.5268	0.2895
Agent is female	– 0.8599	0.4185	– 0.7234	0.4691	– 2.4417	0.9592	– 0.4441	0.5843
Agency's size	0.1015	0.2028	0.0852	0.2372	0.4674	0.4798	0.3534	0.3248
Auditor's characteristics								
Auditor's age	– 0.0027	0.0230	– 0.0197	0.0264	– 0.1343	0.0531	0.0134	0.0351
Auditor has children	– 0.7888	0.4240	– 0.2225	0.4810	– 2.3388	0.8967	– 0.6832	0.5569
Auditor is female	– 0.5572	0.3630	– 0.3553	0.4135	– 1.3404	0.8214	1.1877	0.4811
Neighborhood and other variables								
High-income * White area[d, e]	0.5519	0.9957	0.0185	1.1402	2.7755	2.3948	2.1685	1.3726
High-income * minority area[d, e]	0.7268	1.0390	– 0.7509	1.2074	0.5832	2.6687	1.9608	1.6487
Middle-income * White area[d, e]	0.7687	0.7938	0.2911	0.8985	3.2527	1.5938	1.1236	1.1432
Middle-income * minority area[d, e]	0.2824	0.7495	– 0.1308	0.8365	1.4157	1.4796	1.4686	1.0999
Low-income * White area[d, e]	– 0.3168	1.4843	—	—	—	—	1.0130	1.4932
Both auditors meet same agent	0.3998	0.3701	– 0.2951	0.4156	1.9557	0.9118	0.3648	0.4959
Similar unit is available	0.2439	0.4223	0.8035	0.4652	0.9479	0.8326	0.0065	0.4797

[a] *Bold coefficients are statistically significant at the 5-percent level (two-tailed test).*

[b] *The changes computed as the value for 2000 minus the value for 1989.*

[c] *Agent's age is coded as 1 = 18–30, 2 = 31–45, 3 = 46–65, and 4 = older than 65.*

[d] *High income: monthly income greater than $7,500; middle income: monthly income $2,500-$7,500; low income: monthly income less than $2,500.*

[e] *White area: percentage of minority neighbors less than 20 percent; minority area: percentage of minority neighbors at least 20 percent.*

Section 7. Conclusions and Policy Implications

Using HDS 2000 data, we analyze the incidence and the causes of rental housing discrimination against Blacks and Hispanics. As did previous studies, we find evidence of discrimination against Blacks in HDS 2000 for a wide range of behaviors by rental agents and evidence that the level of this discrimination has decreased significantly between 1989 and 2000. Since 1989, discrimination against Hispanics has declined for some types of behaviors by agents but increased for others. Also, as did previous studies, we find that discrimination in rental housing has several causes and that these causes vary across types of agents' behaviors.

In the Black-White audits, several changes in the causes of discrimination have emerged between 1989 and 2000. We find strong evidence that discrimination against Black customers by larger agencies has increased since 1989. We also find evidence that discrimination by Hispanic agents against Black customers increased over this period. In the Hispanic-White audits, we find evidence of decreased discrimination by female agents and against Hispanic customers with children.

The evidence presented in this study shows that Black and Hispanic households continue to face discrimination in rental housing markets. This evidence indicates that antidiscrimination enforcement efforts by HUD, such as support for the Fair Housing Assistance Program and the Fair Housing Initiatives Program, are still needed. The evidence in this article also shows that discrimination against Blacks and Hispanics is supported by systematic factors that influence rental agents' incentives. Most importantly, this study uncovers an increase in discriminatory behavior toward Blacks by both Hispanic agents and larger agencies. Possible policy responses to these findings include an antidiscrimination education campaign directed toward Hispanic rental agents and a rental testing program that focuses on relatively large rental agencies.

Acknowledgments

The authors benefited from suggestions from two anonymous referees and participants in a workshop conducted by the U.S. Department of Housing and Urban Development.

Authors

Seok Joon Choi is an assistant professor at the University of Seoul.

Jan Ondrich is a professor of economics at the Maxwell School, Syracuse University.

John Yinger is a professor of economics and public administration at the Maxwell School, Syracuse University.

References

Anderson, Soren T., and Richard G. Newell. 2004. "Information Programs for Technology Adoption: The Case of Energy-Efficiency Audits," *Resource and Energy Economics* 26: 27–50.

Chamberlain, Gary. 1980. "Analysis of Covariance with Qualitative Data," *Review of Economic Studies* 47 (1): 225–238.

Choi, Seok Joon, Jan Ondrich, and John Yinger. 2005. "Do Rental Agents Discriminate against Minority Customers? Evidence from the 2000 Housing Discrimination Study," *Journal of Housing Economics* 14: 1–26.

Christian, Charles W., Sanjay Gupta, and Suming Lin. 1993. "Determinants of Tax Preparer Usage: Evidence from Panel Data," ***National Tax Journal*** 46: 487–503.

Fisman, Raymond, and Mayank Raturi. 2003. Does Competition Encourage Credit Provision? Evidence from African Trade Credit Relationships. Working paper 9659. Cambridge, MA: National Bureau of Economic Research.

Heckman, James J., and James R. Walker. 1990. "The Relationship between Wages and Income and the Timing and Spacing of Births: Evidence from the Swedish Longitudinal Data," *Econometrica* 58(6) (November): 1411–1441.

Korenman, Sanders, and Christopher Winship. 1995. A Reanalysis of *The Bell Curve*. Working paper 5230. Cambridge, MA: National Bureau of Economic Research.

Ondrich, Jan, Stephen Ross, and John Yinger. 2003. "Now You See It, Now You Don't: Why Do Real Estate Agents Withhold Available Houses from Black Customers?" *Review of Economics and Statistics* 85: 854–873.

———. 2000. "How Common is Housing Discrimination? Improving on Traditional Measures," *Journal of Urban Economics* 47: 470–500.

Ondrich, Jan, Alex Stricker, and John Yinger. 1999. "Do Landlords Discriminate? Evidence from the 1989 Housing Discrimination Study," *Journal of Housing Economics* 8 (3): 185–204.

———. 1998. "Do Real Estate Brokers Choose to Discriminate? Evidence from the 1989 Housing Discrimination Study," *Southern Economic Journal* 64: 880–901.

Page, Marianne. 1995. "Racial and Ethnic Discrimination in Urban Housing Markets," *Journal of Urban Economics* 38: 183–206.

Schuman, Howard, Charlotte Steeh, and Lawrence Bobo. 1985. *Racial Attitudes in America*. Cambridge, MA: Harvard University Press.

Turner, Margery, Stephen Ross, George Galster, and John Yinger. 2002. *Discrimination in Metropolitan Housing Markets: National Results from Phase 1 HDS 2000*. Washington, DC: U.S. Department of Housing and Urban Development.

Whittington, Leslie A. 1992. "Taxes and the Family: The Impact of the Tax Exemption for Dependents on Marital Fertility," *Demography* 29: 215–226.

Yinger, John. 1995. *Closed Doors, Opportunities Lost: The Continuing Cost of Housing Discrimination.* New York: Russell Sage Foundation.

———. 1986. "Measuring Discrimination with Fair Housing Tests: Caught in the Act," *American Economic Review* 76: 881–893.

Data Shop

Data Shop, a department of Cityscape, presents short papers or notes on the uses of data in housing and urban research. Through this department, PD&R introduces readers to new and overlooked data sources and to improved techniques in using well-known data. The emphasis is on sources and methods that analysts can use in their own work. Researchers often run into knotty data problems involving data interpretation or manipulation that must be solved before a project can proceed, but they seldom get to focus in detail on the solutions to such problems. If you have an idea for an applied, data-centric note of no more than 3,000 words, please send a one-paragraph abstract to David.A.Vandenbroucke@hud.gov for consideration.

Fully Utilizing Housing Cost Data in the American Community Survey PUMS Data: Identifying Issues and Proposing Solutions

Keith E. Wardrip
Danilo Pelletiere
National Low Income Housing Coalition

Abstract

The American Community Survey (ACS) is emerging as a valuable tool for analyzing annual trends and patterns in housing in the United States. Researchers often use the housing cost-to-income ratios (HCIRs) provided in the ACS Public Use Microdata Sample housing file to evaluate the level of housing cost burden for renters and owners and to estimate the proportion of households spending more than a specified level of income, often 30 percent or 50 percent, on shelter. In this article, we show that these variables should be used with caution, identifying 3.2 million households in the 2006 ACS for which the Census Bureau does not calculate an HCIR, even though useful housing cost and income data are available for these households. We also identify 2.8 million owner households for which the HCIR is underestimated because monthly costs do not

Abstract (continued)

include mobile home fees. This article explores these issues, explains how researchers can develop an alternative HCIR, and describes the resulting distribution of households by housing cost burden.

Introduction

Administered to roughly 3 million households annually by the Census Bureau, the American Community Survey (ACS) has estimated the demographic and socioeconomic characteristics of the U.S. population since 2000 and is slated to replace the long form in the 2010 Census. ACS data are available in a variety of formats, including two Public Use Microdata Sample (PUMS) files. The file analyzed in this article contains more than 1.3 million housing unit records describing the housing stock in 2006, and a second, larger file contains information on the individuals living in those units; the records in both files are weighted, allowing users to estimate national or state-level characteristics from the available survey data.[1]

The ACS questionnaire gathers data on a variety of housing cost components, including rent and mortgage payments, utilities, taxes, insurance, and mobile home and condominium fees.[2] To produce estimates of aggregate renter housing costs in the ACS, the Census Bureau adds contract rent to the cost of utilities and fuels into a variable called gross rent. (GRNTP is the variable name for gross rent used in the PUMS housing file.) For owners, the comparable housing cost variable is referred to as selected monthly owner costs (SMOCP).[3]

The Census Bureau also calculates two variables to quantify the extent to which a household is burdened by its housing costs: gross rent as a percentage of household income (GRPIP) and selected monthly owner costs as a percentage of household income (OCPIP). This article refers to these types of housing cost burden variables as housing cost-to-income ratios, or HCIRs.

As researchers increasingly tap the ACS for the housing cost data that it provides, it is significant that the 2006 PUMS housing file does not include an HCIR for roughly 3.2 million households, 2.8 million of which are renters.[4] The Census-calculated HCIR underestimates the housing cost burden for an additional 2.8 million owner households because it is predicated on an aggregation

[1] Data can also be tabulated for substate areas called Public Use Microdata Areas. For more information on the ACS, visit www.census.gov/acs/www/.

[2] The 2005-06 ACS questionnaire is available at www.census.gov/acs/www/Downloads/SQuest05.pdf.

[3] U.S. Census Bureau, American FactFinder glossary (www.factfinder.census.gov/home/en/epss/glossary_a.html).

[4] Household counts provided in this article are from tabulations of the 2006 ACS PUMS housing file and use the housing weight variable (WGTP) provided therein. Excluding the unweighted records representing those living in group quarters, each record in the file represents roughly 100 households.

of monthly owner costs that does not include mobile home fees. The remainder of this article describes how to calculate alternative HCIR variables with data provided in the ACS PUMS file and explores why, in some cases, user-calculated gross housing costs are not consistent with the summary values provided in the ACS. We conclude with a look at the level of housing cost burden indicated by the alternative HCIR for the roughly 6.0 million affected households.

Calculating Alternative HCIRs for Renters and Owners in the ACS

Because housing costs are rarely as simple or as straightforward as a monthly rent or mortgage payment, the Census Bureau aggregates several secondary components of housing costs with these primary housing expenditures in an effort to develop estimates of shelter costs that are more universally comparable. For renters, this calculation is important because monthly rent payments can include all, some, or no utilities, depending on the terms of the lease or the arrangement with the property owner. Similarly, for owners, this practice recognizes that a mortgage payment does not represent a consistent proportion of total housing costs, because some homeowners have no mortgage and because insurance, taxes, and fees can vary considerably from home to home.

To calculate HCIRs from scratch, we need to accurately calculate both total household income and total housing costs, as defined by the Census Bureau, from the variables provided in the PUMS file. We find that the aggregate household income variable (HINCP) is provided for all households and does not appear to pose any difficulties. To be consistent with the majority of housing costs, we suggest dividing household income by 12 to reflect a monthly income figure.

Developing a gross housing cost variable from its individual components requires a little more manipulation of the PUMS data and varies somewhat by tenure. For renter households, the value provided for contract rent (RNTP)—the basis of the calculation—can be used as is.[5] To calculate an alternative gross rent value, however, the following components must be manipulated as described in the following paragraphs and added to the contract rent.[6]

Electricity (monthly cost) (ELEP). Values of 1 and 2, which indicate that the cost of electricity was included in other fees, there was no charge, or electricity was not used, must be recoded to 0.

Gas (monthly cost) (GASP). Values of 1 through 3, which indicate that the cost of gas was included in other fees, there was no charge, or gas was not used, must be recoded to 0.

Water (yearly cost) (WATP). Values of 1 and 2, which indicate that water/sewer costs were included in other fees or there was no charge, must be recoded to 0. Values over 2 must be divided by 12 to arrive at a monthly cost.

[5] Because contract rent—but not gross rent—values are provided for vacant rental units in the PUMS housing file, calculating an alternative gross housing cost variable predicated on contract rent allows researchers the flexibility to consider the affordability of vacant units in their analyses.

[6] The authors will provide the Statistical Package for Social Sciences—SPSS—syntax used to perform these tabulations upon request.

House heating fuel (yearly cost) (FULP). Values of 1 and 2, which indicate that the costs for fuels, such as oil, coal, and kerosene, were included in other fees, there was no charge, or these fuels were not used, must be recoded to 0. Values over 2 must be divided by 12 to arrive at a monthly cost.

For owners, first and second mortgage payments (MRGP and SMP, respectively) replace contract rent in the calculation of housing costs. In addition to mortgage payments and the utilities listed above, owner costs as defined by the Census Bureau should include condo fees (CONP),[7] fire/hazard/flood insurance (INSP), property taxes (TAXP), and mobile home costs (MHP). Insurance, property taxes, and mobile home costs are annual and must be divided by 12 to reflect monthly costs.

A user-calculated HCIR is simply the ratio of aggregate monthly renter/owner housing costs to one-twelfth of a household's annual income, and, consistent with ACS protocol, HCIRs are topcoded at 101 in this exercise. Although the Census Bureau ignores households with zero or negative income when calculating HCIRs, we assign these households an HCIR of 101, providing housing costs are greater than zero;[8] regardless of income, households for which housing cost components sum to zero are assigned an HCIR of 0. Because Census-calculated HCIRs are integers ranging from 1 to 101, we round the user-calculated HCIRs to the nearest whole number.

Owner Cost Complications

One issue that complicates the development of an alternative HCIR for owner households is the treatment of TAXP in the PUMS file. The ACS questionnaire includes an item to record a household's actual annual property taxes, but in the PUMS file, the variable TAXP is categorical, with each coded response representing a range of actual responses (for example, a value of 30 represents the range $1,800–$1,899). This treatment complicates calculating owner costs from scratch because we would have to approximate the actual taxes paid by using the midpoint of the indicated tax range (for example, $1,850 in the example above).

Given this complication and our analyses indicating that SMOCP accurately summarizes the components of monthly costs for most owner households, we recommend using it in the calculation of an alternative HCIR in most cases.

The PUMS file does not accurately aggregate housing costs for owner households of all types, however. Through the course of our analyses, we discovered that it does not include mobile home costs for the roughly 3.5 million owner households living in mobile homes and paying annual

[7] The 2005-06 ACS questionnaire indicates that renters who pay condominium fees in addition to their contract rent should list these fees separately; however, this value is missing for all 36.5 million renter households.

[8] Income can be negative for only two components of total earnings: self-employment (SEMP) and interest, dividends, and net rental income (INTP). In its *Affordable Housing Needs 2005: Report to Congress*, HUD does not calculate a level of cost burden for renter households with zero or negative income and actually imputes a higher income for those paying more than the Fair Market Rent because their lack of income is assumed to be temporary. Because ACS data are intended to capture income earned in a 12-month period and not "typical" income levels, this analysis differs from HUD's methodology and assumes that households reporting housing costs and zero or negative income should be considered burdened by these costs. The HUD study is available at www.huduser.org/publications/affhsg/affhsgneeds.html.

site rent and related fees.[9] For these households, an alternative owner cost variable that includes these fees and the additional components described in the previous section should be calculated. Of necessity, this alternative housing cost value must incorporate the midpoint of the property tax range rather than the actual property taxes reported by the household; however, our analyses show that, although not perfect, in the vast majority of cases this methodology is very effective at approximating monthly owner costs.[10]

HCIR Discrepancies

As exhibit 1 shows, a comparison of user- and Census-calculated HCIRs reveals a significant number of discrepancies worth investigating.

The user-calculated HCIR differs from the housing cost burden value provided in the PUMS file for roughly 2.8 million owner households. With few exceptions, these higher alternative HCIRs can be traced to the exclusion of mobile home costs from aggregate owner costs and the resulting underestimation of housing costs and cost burden.[11, 12] These households reported $1,400 in annual mobile home costs, on average, and the user-calculated HCIR indicates that the median household in this group spent a significantly higher proportion of income on housing (21 percent) than is implied by the Census-calculated HCIR (13 percent).

Exhibit 1

Comparison of ACS-Provided and User-Calculated HCIRs From the 2006 PUMS Housing File

	Renter-Occupied	Owner-Occupied	Total
Total households	36,542,589	75,074,799	111,617,388
HCIRs equal	33,747,467	71,818,807	105,566,274
HCIRs unequal	2,438	2,840,260	2,842,698
HCIR missing in PUMS	2,792,684	415,732	3,208,416

ACS = American Community Survey. HCIR = housing cost-to-income ratio. PUMS = Public Use Microdata Sample.

[9] Census Bureau staff confirmed our conclusion that mobile home costs are erroneously excluded from the SMOCP in the PUMS housing file and, during their investigation, found this exclusion to be the case dating back to 2000.

[10] Most TAXP categories represent a range of $100 or less, so the midpoint is never more than $50 above or below the actual property taxes paid by the homeowner. Because the figure reported is annual, using this midpoint produces an estimate of taxes that is never more than $4.17 from the actual taxes on a monthly basis ($50/12). This methodology is not as effective for households paying annual property taxes in excess of $5,000 because the ranges are too broad for the midpoint to closely approximate the actual taxes paid, but only 0.3 percent of the 3.5 million households with mobile home costs fall into one of these higher property tax brackets.

[11] Although approximately 3.5 million owner households reported costs associated with mobile homes, these costs on a monthly basis were significant enough to affect the calculated HCIR for only 2.8 million households.

[12] Exceptions include 42,883 households with a Census-calculated HCIR of 1, but for which the alternative HCIR rounds to 0, and 1,557 households for which the alternative HCIR is lower than the Census value as a result of approximating property taxes using the midpoint of the appropriate tax range.

For 2,438 renter households, gross rent accurately reflects the sum of housing cost components and totals as much as $150 for some households, although more than half reported costs of $4 per month (13 records representing 1,370 households). In all cases, the HCIR in the PUMS file equals 1, but the user-calculated HCIR rounds to 0.

Missing HCIRs

Census-calculated HCIR values are missing for 3.2 million households (exhibit 1). The omission of these values is significant because tabulations of these cost burden variables would therefore suppress the housing affordability experiences of nearly 3 percent of all U.S. households—and almost 8 percent of all renters. As stated previously, the problem can be traced largely to the aggregation of gross housing cost measures in the ACS.

First, focusing specifically on renters, exhibit 2 separates the 2.8 million households without a Census-calculated HCIR value into those classified as paying cash rent, which have valid values for the contract and gross rent variables, and those paying no cash rent, which are missing these values. The vast majority of the latter—1.8 million out of 2.2 million—reported monthly expenditures for at least one of the four component utility variables. The Census Bureau makes clear in published tables and in the PUMS Data Dictionary that gross rent and HCIR values are calculated only for households that pay cash rent, but these results illustrate that "no cash rent" is not synonymous with "no housing costs." Using these PUMS variables "out-of-the-box" excludes not only 0.4 million households with no obvious housing costs but also 1.8 million that did, in fact, pay at least one of the components of gross rent as defined by the Census Bureau.

HCIR values are also missing in the PUMS file for nearly 0.6 million renter households classified as paying cash rent, presumably because, with the exception of 158 households (2 records),[13] they

Exhibit 2

Renter Households With No HCIR Value in the ACS PUMS Housing File

	Tenure Classification in ACS	
	No Cash Rent	**Cash Rent**
Total	2,212,501	580,183
User-calculated gross rent		
Zero	401,963	0
Greater than $0	1,810,538	580,183
Household income		
Zero or negative	82,264	580,025
Greater than $0	2,130,237	158

ACS = American Community Survey. HCIR = housing cost-to-income ratio. PUMS = Public Use Microdata Sample.

[13] These households reported an annual income of $1 in 2006. According to the PUMS Data Dictionary, $1 can represent monetary income or it can be a code for "break-even" status for two components of income (interest, dividends, or rental income [INTP] and self-employment [SEMP]). Therefore, it is unclear whether these households reported $1 of income or reported breaking even on one of these components.

reported zero or negative household income. Each household incurred a monthly housing expense and, given the lack of household income, should therefore be assigned an HCIR of 101 if they are to be included in any housing affordability analysis.

The issue of owner households lacking HCIR values in the PUMS file can also be traced to household income rather than housing costs. As shown in exhibit 3, for the vast majority of these households, the components of selected monthly owner costs sum to a value greater than 0, but none reported an annual household income greater than $1 (see footnote 13). Researchers who wish to include these records in their analyses should assign them an HCIR value of 101. The remaining 1,533 households with no housing costs can reasonably be assigned an HCIR value of 0.

The next section briefly looks at the effect of the user-calculated HCIRs on the level of cost burden associated with these 3.2 million households and the 2.8 million owner households discussed in the preceding section.

Exhibit 3

Owner Households With No HCIR Value in the ACS PUMS Housing File

	Owner Households
Total	415,732
User-calculated owner costs	
Zero	1,533
Greater than $0	414,199
Household income	
Zero or negative	414,909
$1	823

ACS = American Community Survey. HCIR = housing cost-to-income ratio. PUMS = Public Use Microdata Sample.

Impacts on Estimates of Housing Cost Burden

The user-calculated HCIR values described in this article can clearly affect the housing cost burden statistics derived from PUMS housing data.

For example, Census-calculated HCIR values are lower than user-calculated values for nearly all of the 2.8 million owner households for which the Census Bureau excludes mobile home fees in its estimate of monthly owner costs. As a result and as exhibit 4 shows, 29 percent of these owner households were either moderately or severely burdened by total housing expenses, whereas the values provided in the PUMS file indicate that only 15 percent fall into these categories.

For the 3.2 million households for which the PUMS file does not calculate HCIR values, exhibit 5 summarizes their cost burden distribution according to the user-calculated values. Because most such renter households did not pay cash rent, the vast majority (68 percent) were not unduly burdened by their housing costs, even when other costs are considered.

Most of the remaining renter households and nearly all of the owner households in exhibit 5 are considered severely burdened by their housing costs because they reported zero or negative income but some level of housing expenditures over the previous 12 months.

Exhibit 4

Varying Levels of Cost Burden for Owner Households for Which Census- and User-Calculated HCIRs Are Unequal

Percent of Income Spent on Housing	Based on Census-Calculated HCIR		Based on User-Calculated HCIR	
	(number)	(%)	(number)	(%)
Total households	2,840,260	100	2,840,260	100
0-30%—not burdened	2,404,140	85	2,014,972	71
31-50%—moderately burdened	287,497	10	509,064	18
51%+ —severely burdened	148,623	5	316,224	11

HCIR = housing cost-to-income ratio.

Exhibit 5

Actual Level of Housing Cost Burden for Households Lacking HCIR Value in the PUMS Housing File

Percent of Income Spent on Housing	Renter		Owner	
	(number)	(%)	(number)	(%)
Total households	2,792,684	100	415,732	100
0-30%—not burdened	1,907,698	68	1,533	0
31-50%—moderately burdened	113,347	4	0	0
51%+ —severely burdened	771,639	28	414,199	100

HCIR = housing cost-to-income ratio. PUMS = Public Use Microdata Sample.

Viewed in the context of all U.S. households, the effect of calculating alternative HCIRs for only 6 million households does not significantly affect national housing cost burden statistics. Whether using Census- or user-calculated values, the median HCIR is 21 for the 75 million owner households; for the 36 million households who rent, the median user-calculated HCIR is one point lower (29) than the median Census value (30) because the former includes a large number of households paying no cash rent. Even though their impact on national statistics may be negligible, these user-calculated HCIRs may influence housing research that focuses on specific, largely lower-income segments of the population.

Conclusion

The primary intent of this article is to focus the attention of researchers on the peculiarities of the housing cost fields in the ACS PUMS housing file and to sound a cautionary note: Researchers should be aware that using gross housing cost and housing cost burden variables may lead them to unnecessarily exclude roughly 3.2 million households from their analysis, either because they did not pay cash rent (2.2 million) or because they reported housing costs but zero or negative income (1.0 million). Adding to our concerns, fields in the PUMS file exclude certain costs associated with mobile homes, thus materially affecting the HCIR for an additional 2.8 million owner households.

Accepting the Census aggregate housing cost and housing cost burden variables at face value may result in the loss or misinterpretation of housing cost information for a significant number of U.S. households. Because this information is systematically missing or incorrect for specific subsets of the population—households paying no cash rent, reporting zero or negative income, or living in mobile homes—the use of these variables may unintentionally exclude these households from tabulations of the PUMS housing file and bias research findings. Armed with this knowledge, researchers can make informed decisions regarding the appropriateness of the out-of-the-box PUMS file and weigh the advantages and disadvantages of calculating their own housing cost variables.

Acknowledgments

The authors thank Arthur Cresce and Nicholas Spanos at the U.S. Census Bureau for reviewing our findings related to mobile home costs reported in the American Community Survey.

Authors

Keith E. Wardrip is a research analyst at the National Low Income Housing Coalition.

Danilo Pelletiere is a research director at the National Low Income Housing Coalition.

Referees 2007–08

The Office of Policy Development and Research gratefully acknowledges the contributions of the referees listed below and their efforts toward making Cityscape *worth reading.*

Gary Anders
Luis Borray
David Brownstone
Martha Burt
Robert Czerniak
Denise DiPasquale
Anthony Downs
Lance Freeman
Genevieve Giuliano
Stephen Golant
Keith Harries
Donald Haurin
Chris Herbert
Behjat Hojjati
Rich Hynes
Judson James
Mark Joseph
Matthew Kahn
Jed Kolko
Michael Lacour-Little
Marie Lihn
Jeffrey Lubell
Jens Ludwig
Peter Marcuse
Terry Moore
Dowell Myers
Marina Myhre
Douglas Noonan
Frances Randolph
Todd Richardson
David Rodda
Larry Rosenthal
Raven Saks
Randall Scheessele
Jon Sperling
Gregory Squires
Fahui Wang
Michelle White
Carol Wilkins
Susan Woodward
Anthony Yezer