MOBILITY, RESIDENTIAL LOCATION, AND THE AMERICAN DREAM

*THE INTRA-METROPOLITAN GEOGRAPHY OF MINORITY HOMEOWNERSHIP**

by

Stuart Gabriel and Gary Painter
Marshall School of Business and School of Policy, Planning and Development
Lusk Center for Real Estate
University of Southern California
331 Lewis Hall
Los Angeles, California 90089-0626
sgabriel@marshall.usc.edu and gpainter@usc.edu

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Abstract

This paper explicates the intra-metropolitan geography of minority homeownership. In so doing, the analysis applies individual level Census data from the Washington D.C., Chicago, and Los Angeles metropolitan areas to estimate three-level nested logit models (NMNL) of household mobility, residential location, and homeownership tenure choice. The approach is unique to the literature and recognizes that homeownership attainment among minority and white households may vary importantly owing to their differential mobility and residential location decisions. Model simulation indicates that shocks to income can significantly elevate the homeownership attainment of minority households. However, those same simulations reveal that even in the wake of substantial improvements to the economic status of minorities, their urban settlement and homeownership patterns remain substantially more concentrated than those of whites.

I. INTRODUCTION

Racial disparities in housing remain endemic to U.S. metropolitan areas. Those disparities derive from variability across groups in the preferences, endowments, and constraints that govern the household mobility, residential location, and homeownership decisions. Minority households evidence depressed rates of intra-metropolitan mobility and damped suburban location choice. Further, as is well appreciated, sizable gaps persist between whites and minorities in homeownership attainment. The differential intra-metropolitan mobility patterns of white and minority households give rise to concerns regarding minority access to and consumption of location-specific amenities including neighborhood safety, educational opportunity, and environmental quality.[1] Also, depressed levels of minority homeownership have adverse implications for wealth accrual and upward economic mobility among minority groups.

Despite widespread recognition of the linkages between household mobility, homeownership, and residential location, few studies have carefully explicated the structure, determinants, or racial variability associated with those outcomes. One strand of literature, for example, focuses exclusively on racial differentials in intra-metropolitan household location. That literature (see, for example, Kain (1968), Gabriel and Rosenthal (1989), Massey and Denton (1993), DeRango (1998)) speaks to the role of income and other socio-economic characteristics in an explanation of observed housing segregation.[2] While other authors, including Epple and Sieg (1999) and Bayer et al (2003), develop general equilibrium frameworks to test Tiebout sorting, those approaches largely focus on the assessment of household intra-metropolitan location choice. Not well explicated in this literature is the seemingly obvious connection between racial segregation and the geography and incidence of minority homeownership.

A related literature seeks to evaluate the determinants of sizable and persistent racial gaps in homeownership (see, for example, Gabriel and Rosenthal (2004), Painter, Gabriel, and Myers (2001),

[1] See, for example, Haurin, Parcel, and Haurin (2002).

[2] Gabriel, Mattey, and Wascher (1995) also point to the importance of neighborhood amenities in the determination of household intra-metropolitan moves.

Rosenthal (2001), Coulson (1999), Gyourko and Linneman (1996), and Wachter and Megbolugbe (1992)). While the U.S. homeownership rate rose to a record high of almost 68 percent in 2002, the longstanding white-minority homeownership gap of 27 percentage points was little changed. By 2002, about 74 percent of white households had achieved homeownership, compared with only about 48 percent of African-American and Hispanic households. Although recent research provides new insights regarding the determinants of minority homeownership, results fail to fully explicate the sizable and persistent black homeownership gaps.

From an empirical modeling perspective, prior studies do not allow for interactions among the mobility, housing tenure and residential location decisions.[3] Recently, a number of studies have demonstrated the importance of household mobility to models of housing tenure choice (e.g., Kan (2000), Painter, Gabriel, and Myers, (2001)).[4] Other studies have jointly modeled the homeownership and residential location decisions (See Deng, Ross, and Wachter, (2001); Gabriel and Painter (2003), and Gyourko, Linneman, and Wachter (1999)). These studies evaluate the role of household characteristics, neighborhood effects, and the like in assessing the factors that determine residential location and housing tenure choice.[5] While the above studies highlight the importance of residential location to homeownership attainment, none of the analyses fully endogenize or simulate by race the intra-metropolitan geography of household mobility, homeownership, and residential location choice.

[3] In assessing racial differentials in homeownership, most recent studies (see, for example, Bostic and Surette (2001), Coulson (1999), Rosenthal (2001), Gyourko and Linneman (1996), and Wachter and Megbolugbe (1992)), employ single-equation models to control for household income and wealth, human capital, demographic, local housing market, and other characteristics on household tenure status. Our prior analyses focus on tenure choice among a sample of recent movers (Painter, Gabriel, and Myers (2001) and Gabriel and Painter (2002)) and accordingly include a selection equation to control for the mobility characteristics of sampled households.

[4] Kan (2000), however, used panel data that was not well suited to estimating differences in mobility and homeownership choice across racial/ethnic groups and locations. Painter (2000) developed an approach to estimating models of tenure choice with sample selection that is appropriate to cross-sectional data.

[5] Gyourko, Linneman, and Wachter (1999) show that blacks are more likely to own in the central city. Deng et al (2001) jointly estimate the residential location and homeownership decisions of sampled households; however, their data do not contain information on the prior residential location of those households. Further, that analysis does not endogenize the household move decision.

These multiple decisions lead to urban settlement and homeownership patterns for white households and minorities that are markedly different from one other. Data from our sampled metropolitan areas, like those for other U.S. metropolitan areas, show relatively high levels of population racial segregation. Whereas black households comprised a full 64 percent of Washington, D.C. households in 1990, that same group accounted for only about 6 percent of the households in suburban Fairfax County, Virginia. The Chicago area evidenced similarly high levels of racial segregation; there black households comprised 33 percent of the 1990 population of the City of Chicago, but only 1-3 percent of households in DuPage County and the North Suburbs. In Los Angeles, black households accounted for 15 percent of the population of the City of L.A., but only a marginal 2 percent of the households of suburban Orange and Ventura Counties. Latino households, while still segregated, were more uniformly represented among the geographic subdivisions of our sampled metropolitan areas.

Census data similarly reveal striking racial homeownership disparities (Table 1).[6] At 33 percent, the 1990 black homeownership rate in the City of Los Angeles was 25 percentage points below that of the city's white population and a full 30 percentage points below the national average! Black homeownership rates in the mid-30 percent range were similarly recorded in the City of Chicago and in the District of Columbia; also, black-white homeownership deficits ranging to 30 percentage points were recorded in each of those areas. During that same period, the vast majority of metropolitan black homeowners resided in the central city and surrounding county of the Cities of Chicago and Los Angeles. In the Washington D.C. area, a substantial portion of black homeowners also resided in Prince George's County.[7] Strikingly, only about 5 percent of Los Angeles metropolitan black homeowners resided in the

[6] The 1990 homeownership rate in the City of Los Angeles (Table 1)—at about 49%--was far below the national average of 64%. In part, this was due to the city's high house prices and damped levels of housing affordability. While CMSA counties recorded homeownership rates well in excess of the City of Los Angeles, only in Ventura County and the Inland Empire (San Bernardino and Riverside Counties) did that rate approach the national average. In the more affordable Washington, D.C. and Chicago metropolitan areas, aggregate homeownership rates—at 67 and 68 percent, respectively, are close to the national average.

[7] At the time of the 1990 Census, over four-fifths of the Washington, D.C. metropolitan area black population resided in either the District of Columbia or Prince George's County.

outlying suburbs of Orange and Ventura Counties; in Chicago, some 8 percent of black homeowners resided in DuPage County, the North and West Suburbs, and the Joliet Area. In general, black-white homeownership deficits well exceeded those of other racial or ethnic groups.[8]

As discussed earlier, the homeownership literature has not explicitly modeled the household mobility and residential location decisions in assessment of the incidence or pattern of homeownership choice. In this analysis, we estimate a three-level nested multinomial logit model (NMNL) using household level Census data that explicitly accounts for the jointness and tiering of the household move, homeownership, and location choice decisions. In application of the NMNL, the value of specific residential locations depends on household mobility and tenure choices. A household's tenure choice is made in the context of a move decision while accounting simultaneously for the relative values of the locational options. Further, unlike prior literature, we model the jointness of those decisions in a manner that controls for the initial intra-metropolitan location of sampled households. Accordingly, given the initial location of the household, the methodology enables us to simulate the impact of changes in household economic, mobility, and locational characteristics on the likelihood that a household will move to a specific location and choose homeownership. In so doing, the methodology enables a unique simulation of the intra-metropolitan geography of minority and white homeownership choice.

Estimation findings indicate significant racial variability in mobility, residential location, and tenure choice and have important implications for the urban settlement and homeownership patterns of minority and non-minority households. For example, as evidenced in Chicago and the other sampled areas, the simulated equilibration of black economic status with that of area whites fails to result in large-scale suburbanization of blacks. However, that same endowment shock serves to elevate black homeownership, particularly in non-suburban parts of those metropolitan areas. For example,

[8] The intra-metropolitan settlement pattern of white homeowners was markedly more dispersed than that of minorities. Only about 7 percent of white homeowners in the Washington, D.C. metropolitan areas resided in the District of Columbia, further underscoring the widespread suburbanization of that group. Only about one-half of Los Angeles and Chicago metropolitan area white homeowners resided in the City and surrounding counties of those areas in 1990. While the intra-metropolitan dispersion of Latino homeowners was less than that of whites, it substantially exceeded levels recorded for black households.

homeownership rates among black movers to the District of Columbia and to the City of Chicago more than double to roughly the levels of white movers. In marked contrast, homeownership rates among black movers to the Chicago suburbs and to outlying areas of Cook and Los Angeles Counties lag far behind those of whites. Overall, our findings conform with other recent papers that show the importance of economic gains to minority homeownership attainment. However, this research takes those findings a step further, to reveal a marked urban bias to black homeownership choice in the wake of simulated improvements to black socio-economic status.

Other simulations quantitatively assessed the effects of changes in housing affordability and amenities on the intra-metropolitan location of black households. Results here show that black movers are quite sensitive to house prices and to the availability of public safety. In the wake of a hypothetical 20 percent increase in central city house prices and rents, black moves to the District of Columbia, for example, fall by an equal percentage. Similarly, results show substantial gains in the proportion of black mover households choosing to locate in central city areas in the wake of a 20 percent reduction in city crime rates. Among other things, that simulation points to potential minority contributions to central city revitalization as would emanate from enhancements to public safety.

In the following section, we describe the data and assess trends in household mobility, residential location, and homeownership among minority and white households. Section III presents the empirical model and Section IV reports on the estimation results. Section V presents findings of model simulation. The final section of the paper discusses conclusions and policy implications of the research.

II. DATA

The data utilized in this study are drawn from the public use micro-data sample (PUMS) file of the 1990 decennial census.[9] The data file is comprised of a 5% sample of all individuals living in Los Angeles, Chicago, and Washington, D.C. metropolitan areas. These relevant counties of metropolitan Los Angeles, Chicago, and Washington, D.C. together comprise close to 23 million residents and are

[9] These data have a distinct advantage over similar data for the 2000 decennial Census in that they allow identification of the City of Chicago and the City of Los Angeles.

dramatically diverse in both their residential composition and in their array of neighborhood living environments. The data are advantageous because they provide samples that are substantially larger than comparable data available from the American Housing Survey (AHS) or the Current Population Survey (CPS) for the study area. In addition, the Census data contain information on migration histories that are not available from either the AHS or CPS. The samples are comprised of households that reside in the central cities and the surrounding metropolitan counties comprising each of the Los Angeles, Chicago, and Washington, D.C. CMSAs during the 1985 – 1990 period.[10]

The data are sufficiently rich and numerous to identify differences between minority and white households in the economic, demographic, and neighborhood characteristics governing mobility, residential location, and tenure choice. They provide excellent information on demographic factors (race-ethnicity, age, marital status, persons per household, workers per household, migrant origin and history) and economic attributes (salary income, asset and other income, occupation and education level) of the householder. Locational characteristics for disaggregations of each metropolitan area, such as house prices, rents, and population racial composition, are also computed from the PUMS micro-date files, while crime rates are drawn from Department of Justice records. Specifically, for ease of cross-metropolitan area comparison, the metropolitan area samples are disaggregated as follows: Los Angeles is subdivided into the City of Los Angeles, remaining areas of L.A. County, and the counties of Orange, Ventura, San Bernardino, and Riverside. The Chicago CMSA is subdivided into the City of Chicago, other parts of Cook County, DuPage County, the North Suburbs (McHenry and Lake Counties), Joliet (Will and Grundy Counties), the West Suburbs (Kane, Kendall, and DeKalb Counties), and Gary, Indiana (Porter and Lake Counties). The Washington, D.C. CMSA is disaggregated into the District of Columbia and surrounding areas including the City of Alexandria, Prince George's County, Arlington County, Fairfax County, and Montgomery County. The geographic disaggregations of the data comprise primary

[10] Unlike data from later periods, the data utilized in this study have the distinct advantage of providing superior information on the intra-metropolitan origin location of sampled households.

identifiable sub-areas of Los Angeles, Chicago, and Washington D.C. metropolitan areas and are the focus of statistical analysis described below.

Our data provide new evidence on the intra-metropolitan mobility and residential location choices of minority and white households in the Los Angeles, Chicago, and Washington D.C. areas. In general, the data indicate relatively damped mobility rates among urban blacks and suburban whites.[11] Among blacks in the District of Columbia, Los Angeles County, and Cook County, the vast majority either did not move or moved within those areas during the 1985-1990 period. About 12 percent and 7 percent of D.C. and Los Angeles County black households, respectively, chose to move to surrounding suburban areas; in marked contrast, only about 3 percent of Cook County black households moved to surrounding counties during the 1985-1990 period. In marked contrast, suburbanization rates among whites residing in D.C., the County of Los Angeles, and Cook County, were a full 21, 12, and 10 percent, respectively. Further, the suburban populations of the three metropolitan areas were significantly more mobile than their central city or central county counterparts. In the L.A. and D.C. suburbs, some 40-50 percent of all households chose to move within those areas, with somewhat lower rates evidenced for white households. In contrast, damped mobility rates of about 20 percent were evidenced among suburban blacks in Chicago—those rates were about half the move rates of white and Latino suburban populations in Chicago. The data further indicate some movement to D.C. and Los Angeles County among blacks of surrounding metropolitan area counties. Overall, blacks often chose to remain in the central areas of D.C., L.A., or Chicago or returned thereto, whereas whites were much more likely to move to and remain in suburban counties.

Table 2 indicates substantial variation in the typical characteristics of sampled households by race and by geographic area.[12] For instance, significantly higher proportions of suburban households were married, relative to households living in the central cities and counties; also, marital rates among white

[11] One-half or more of all households in our sampled jurisdictions choose not to move during the 1985-1990 period.

[12] For parsimony of presentation and ease of cross-metropolitan area comparison, Table 2 aggregates data for suburban counties in each of the metropolitan areas (Chicago, Washington D.C. and Los Angeles).

households substantially exceeded those of black households in each location. The educational attainment levels of white households in general well exceeded those of blacks in all central city and suburb disaggregations of our metropolitan areas; however, those disparities were most glaring in the central cities. In the District of Columbia, for example, more than of 4/5^{ths} of white households possessed a college degree, compared with only 1/5th of blacks. Latino households evidenced relatively depressed levels of educational attainment throughout. White households similarly displayed substantially higher levels of permanent income than their minority counterparts in all locations; notably, permanent income levels among suburban blacks in the D.C. area substantially exceeded those of their counterparts in suburban areas of Chicago and L.A.[13] The occupational status indicator was computed according to Duncan's index whereby professional status workers achieve the highest score. As evidenced in Table 2, the occupational status of whites was relatively elevated and in all locations dominated that of blacks and Latinos.

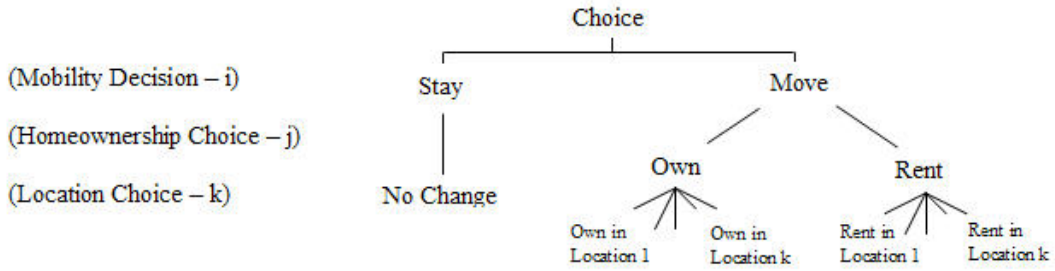
III. METHODS

Standard models of housing tenure choice (Henderson, J. V. and Y. M. Ioannides, 1983; Rosen and Rosen, 1980; Hendershott and Shilling, 1982) focus on the demographic factors and financial factors (the cost of owning relative to renting) that lead households to choose ownership over renting. This literature also discusses the role of transaction costs, but does not explicitly account for the decision to move. These models also typically ignore factors that are related to the quality of life (Gyourko and Tracy, 1991; Gabriel and Rosenthal, 2003) and other locational amenities that may influence a household tenure choice in a particular location. A separate strand of literature has analyzed intra-metropolitan household location choice (e.g., Gabriel and Rosenthal, 1989), but these models typically ignore housing tenure choice. Only recently has research begun to consider the jointness of household mobility and ownership (e.g., Painter, Gabriel, and Myers, 2001; Kan, 2000) or locational choice and ownership decisions (e.g., Deng et al, 2001; Gyourko et al, 1999).

[13] Permanent and transitory income are each calculated based on the method of Goodman and Kawai (1982).

Our methodological approach is to jointly model the household mobility, homeownership, and residential location decisions. This is done by way of a three-level nested multinomial logit model (Green, 1997). In the nested multinomial logit (NMNL), a hierarchy of choices is established, but at each level the household has full information on opportunities that are available at the lower decision levels. In our framework, a household first chooses whether or not to move. Having decided to move, the household is faced with two remaining dimensions of choice (i.e., housing tenure and household residential location). Each combination of move, tenure choice, and residential location is taken to represent a mutually exclusive alternative to the household. Together, these options comprise a finite set of alternatives from which the household must choose.[14] In this paper, the decision to move is specified as the upper level of the hierarchy. Given the choice to move, tenure choice is specified as the middle level of the hierarchy and residential location is the lower level of the hierarchy.

Graphically, we can represent the choice matrix in the following way:[15]



Formally, we maximize the following log likelihood function using full information maximum likelihood techniques,

$$L = \sum_{n} \log P(i \mid j,k) + \log P(j \mid k) + \log P(k)$$

[14] The Nested Logit Model is attributed to McFadden (1978). The model is sometimes misinterpreted as a sequential logit, however, whereby the decision-maker makes a sequence of choices, each described by a logit equation. Instead, however, as described by McFadden, the decision-maker is assumed to make one choice from all of the outcome combinations described by the nesting tree.

[15] Alternatively, the Nested Logit model could have been specified by assume households make the decision to locate prior to making the decision to own. Results were invariant to choice of model specification.

where the conditional probability of choosing a particular branch i in limb j, trunk k is $P(i|j,k) = (e^{\alpha' y_{i|j,k}})/e^{I_{j|k}}$, where $I_{j|k}$ is the inclusive value for limb j in trunk k and $I_{j|k} = \log \Sigma_{n|j,k} e^{\alpha' y_{n|j,k}}$. The inclusive value parameter associated with each nest provides a summary measure of the degree of similarity of the alternatives within the corresponding nest. The closer the inclusive value estimate is to 1, the more similar are the alternatives in the associated nest to the preference structure of the decision-makers.[16] The conditional probability of choosing limb j in trunk k is $P(j|k) = (e^{\gamma' z_{j|k} + \sigma_{j|k} I_{j|k}})/ e^{J_k}$, where $J_k = \log \Sigma_{n|k}(e^{\gamma' z_{n|k} + \sigma_{n|k} I_{n|k}})$. Finally, the probability of choosing trunk k is $P(k) = (e^{\beta' x_k + \phi_k J_k})/ \Sigma_n e^{\beta' x_n + \phi_n J_n}$. In the model, X represents the set of locational characteristics (house prices, rents, and neighborhood characteristics including racial composition, amenities, and access) that may influence a household's decision to locate in a particular county; Z represents the set of household characteristics that influence the tenure choice decision (income, wealth, education, age, marital status, family structure, etc.); and Y represents the set of household characteristics that influence a household's decision to move. The Y variables largely include the characteristics in Z plus an occupational identifier that may influence the decision to move, while not changing the preference a household may have to own a home.[17,18]

This framework allows for location characteristics to influence the decision to own and the decision to move, while controlling explicitly for the role of mobility in homeownership choice. The

[16] As discussed in McFadden (1978), the inclusive values from the lower level choices summarize the expected utility of residential location choice for each household in the sample. The inclusive values are included in the estimation of household tenure choice as additional explanatory variables; in that way, the expected utility offered by the residential location options is accounted for in the intermediate level of the decision tree. In a similar fashion, the inclusive value generated at the intermediate level summarizes the expected utility of housing tenure status among households in the sample; that inclusive value similarly is included in the move equation as an additional explanatory variable, so that the expected utility offered by the tenure options is included in the upper level mobility choice function.

[17] The model is identified based on the functional form assumptions in the nested logit and the inclusion of the occupation identifier.

[18] Restricting the estimated parameters of the inclusive value terms to 1 yields the non-nested multinomial logit model. The closer the correlation of any two alternatives in the same nest to zero, the closer is the inclusive value parameter to 1. If the correlation is precisely zero, then we have the special case of the MNL model in which the alternatives share no common utility component. The nested logit model arises if the estimated parameters of the inclusive values differ significantly
from 1.

integrated structure of the model also allows for homeownership choice to affect location choice. Finally, this methodology allows us to simulate the impact of changes in household demographic, economic, and other characteristics on the likelihood that a household will choose to own a home and will choose to locate in a particular area. In that context, we evaluate the intra-metropolitan locational dynamics of white and minority populations as well as the extent to which differentials between whites and minorities in household characteristics and locational choices affect the racial gap in homeownership.

This approach has the distinct advantage that it controls for the three household decisions that likely occur simultaneously in the choice of homeownership in a manner that further accounts for the initial intra-metropolitan location of sampled households. Unlike previous approaches in the homeownership literature (e.g., Deng et al, 2001; Gyourko et al, 1999), we are able to identify the initial intra-metropolitan location of the household and thereby proxy the pecuniary and non-pecuniary transactions costs associated with a move from that location. Although data constraints limit the extent of geographic disaggregations of those moves, we are able to evaluate household mobility across the primary intra-metropolitan city and county boundaries. While recent general equilibrium analyses of Tiebout sorting (see, for example, Epple and Sieg, 1999 and Bayer et. al, 2004) provide a richer set of household location choices, those approaches are limited to the modeling of household location choice alone, rather than the joint estimation of the intra-metropolitan household mobility, tenure choice, and residential location decisions as is reported on below.

IV. ESTIMATION RESULTS

Results of the estimation of the NMNL model are contained in Table 3A-3C for the Washington D.C., Chicago, and Los Angeles samples, respectively. The metro areas models are estimated separately by race because initial segregation patterns and subsequent intra-metropolitan moves differ by race.[19,20]

[19] For example, a sociological literature (see, for example, Farley and Rosenbaum, 1994) suggests variability across groups in preferences for neighborhood racial composition. As is evidenced in the location choice model, the neighborhood racial composition coefficients vary across the estimated models with white households in Washington D.C. and Chicago showing substantially reduced propensities to locate in areas with higher levels of minority population. Similarly, related mortgage lending literatures (see, for example, Berkovec et al (1998) speak to the role of redlining and related discriminatory practices in the determination of the intra-metropolitan spatial

The sample sizes for the racially stratified models generally are quite large.[21] All variables are included in each racial grouping except that immigrant status is added to the Latino model for both the decision to own and the decision to move.

Estimation findings (Tables 3A-3C) indicate the importance of household socio-economic and educational characteristics to intra-metropolitan mobility decisions. Overall, results are largely consistent across race and place. As expected, mobility is damped among married households; those results are evidenced in virtually all locations and among all racial and ethnic groups. However, in the Washington D.C. and Los Angeles areas, the estimated reduction in mobility among married white households is significantly larger than that of black and Latino households. Consistent with the mobility literature, lower human capital households (those without a high school diploma) are characterized by significantly elevated levels of intra-metropolitan mobility. Among wealth and occupational controls, higher levels of dividend income have a depressive effect on intra-metropolitan household mobility, and having a higher occupational status increases the likelihood of making a move after other controls are in the model. Finally, Latino immigrants are significantly more mobile than are Latino non-immigrants in Chicago and Los Angeles.

Other results of the mobility analysis were less consistent across either race or place. Among demographic characteristics, age exerts a positive and significant effect on household mobility among all household groups in Chicago; in contrast, in the Washington, D.C. and Los Angeles metropolitan areas, age exerts a negative and significant influence on the mobility of whites, but is positively associated with the move propensities of blacks. This could be due to historical segregation patterns and related constraints on black mobility, but additional research is needed to fully explicate this finding. Lastly, the

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distribution of mortgage lending). Like factors may indeed have important bearing on the estimated coefficients in the mobility, tenure, and location models.

[20] Statistical tests ($p<.001$) confirm that the coefficient vectors for each model are different from each other.

[21] In Washington D.C., the racially-stratified samples included 22,911 whites, 11,073 blacks, and 1698 Latinos. The Chicago samples included 63,755 whites, 13,372 blacks, and 9038 Latinos. In Los Angeles, the racially-stratified samples were comprised of 94,449 whites, 12,764 blacks and 22,439 Latinos.

number of children in the household, net of other factors, exerts a positive effect on the mobility of whites and blacks, but among Latinos, that factor is not a significant determinant of mobility.[22]

Tables 3A-3C also display the estimated coefficients for the housing tenure choice equation. As expected, controls for household socio-economic and demographic characteristics are largely significant in the determination of tenure choice. However, the estimated effects often vary significantly across locations and among the racially stratified samples. As evidenced in the table, among all households, higher levels of permanent and transitory income serve to boost homeownership choice throughout. Notably, the estimated income effects are uniformly significant and substantially larger for black households, underlining the importance of gains in economic status in the achievement of black homeownership.[23] In Los Angeles, household age, educational attainment, and status as a married household are shown to exert a significant positive effect on homeownership choice among all racial and ethnic groups. In marked contrast, household age is significantly and inversely related to homeownership attainment among all groups in Chicago and among blacks in Washington D.C. For the most part, the number of children in the household is shown to depress homeownership attainment. Finally, Latino immigrants are less likely to own a home than are Latino native-born households; that finding is significant in Chicago and Los Angeles. This result is consistent with recent studies of immigrant populations (see Painter et al (2001) and Coulson (1999)).

Results of the discrete choice analysis of residential location choice also are displayed in Tables 3A-3C. Here, for the Los Angeles sample, mover households originate from and choose among the City of Los Angeles, the remaining areas of the County of Los Angeles, and the Counties of San Bernardino, Riverside, Ventura, and Orange. In the case of Washington, D.C., mover households choose among the

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[22] These results stand in contrast to our findings that number of dependents typically exerts a negative influence on inter-metropolitan household mobility (Gabriel, Mattey, and Wascher (1995)). Those results, however, typically derive from aggregated models estimated over longer distance moves; further, those studies have not jointly considered the location, tenure choice, and mobility decisions.

[23] The importance of gains to black economic status in the achievement of black homeownership is further evidenced in our other recent papers (see, for example, Painter, Gabriel, and Myers (2001), Gabriel and Painter (2003), and Gabriel and Rosenthal (2003).

District of Columbia, the City of Alexandria, and the Counties of Arlington, Fairfax, Montgomery, and Prince George's. In the Chicago metropolitan area, movers choose among the City of Chicago, other parts of Cook County, DuPage County, the North Suburbs (McHenry and Lake Counties), Joliet (Will and Grundy Counties), the West Suburbs (Kane, Kendall, and DeKalb Counties), and Gary, Indiana (Porter and Lake Counties). Included among regressors are the differences in house prices, residential rents, minority population representation, crime rates, and distance between the household's location in 1985 and their potential location in each of the six locations in 1990. The regression conforms to the limited literature on intra-metropolitan household moves in specifying the house price and amenity determinants thereof (see, for example, Gabriel and Mattey (1997)).[24]

As expected, a greater distance between origin and destination areas, as a proxy for both information flows and pecuniary and non-pecuniary transactions costs associated with a move, is negative and highly significant for all racial sub-samples and areas.[25] Notably, the estimated effects are sizable for the Washington D.C. area, particularly among black households. The estimated coefficients of the house price difference terms are largely significant, but of conflicting signs.[26] Negative coefficients are estimated for black households in all areas, suggesting that black household location choice is more sensitive to affordability differences between origin and destination areas. In marked contrast,

[24] Whereas locational differences in labor market conditions are shown to bear importantly on *inter*-metropolitan moves, this factor is shown to be less important to *intra*-metropolitan moves (Gabriel and Mattey (1997)).

[25]This result is highly consistent with evidence from the migration literature that suggests the important role of distance between origin and destination in the determination of migration flows. As suggested above, distance is there interpreted as a proxy for transactions costs associated with the move as well as non-pecuniary migrant costs associated with information flows as well as family and other attachments. See, for example, Gabriel, Mattey, and Wascher (1995).

[26] A number of alternative models were specified so as to assess the robustness of estimation results. A parsimonious specification of the location choice equation included only the house price and rent terms. Assuming less than complete capitalization of locational amenities into house prices and rents, alternative specifications of the model included other location specific amenities. In addition to the specification displayed in Table 3A-3C, models including other locational indicators, such as school quality and temperature variations, were also estimated. The results of these specifications are available upon request. Research findings indicate that the estimated house price and rent coefficients are robust to the inclusion of other location specific indicators. Further, the locational indicators are significant and facilitate important model simulation. The estimated coefficients of the mobility and tenure choice equations also are robust to the specification of the location choice equation. Given that there are six locations to choose from, the equation for the location model, inclusive of locational controls, is necessarily parsimonious.

destination-origin house prices enter with positive and significant coefficients in the residential location choices of both white and Latino households in Washington D.C. and Chicago. These conflicting results are common to reduced form specifications of the house price term and are consistent with differing expectations about asset appreciation in different areas (see Myers et al, (2005) for more discussion). While the signs of the coefficients on the fraction of the population that is minority are different across place (likely due to the larger and more uniform Latino population in Los Angeles), larger minority populations are a significant attractor for minority households. In Washington D.C. and Chicago, higher levels of destination minority population serve as a significant impediment to white household location choice. Finally, the difference in destination-origin crime rates term is estimated with a negative coefficient and is statistically significant among white and black households in Washington D.C. and Los Angeles.

Finally, the NMNL model estimate inclusive values in both the tenure choice nest and in the location choice nest. Those values are generated for each household (in the racially stratified analyses) and summarize the expected utility of housing tenure status and residential location choice, respectively. As is evidenced in Tables 3A-3C, the estimated coefficients of the inclusive values on the decision to move, own, and rent are highly significant in among all locations and racially-stratified specifications of the NMNL model, further indicating the statistical appropriateness of the nested multinomial logit specification.

V. MODEL SIMULATION

While the estimates from the NMNL models give insight into the direction of the effects of the variables included in the model, simulations are useful to illustrate the magnitude of some of the effects.[27] Figures 1A and 2A display results of the simulation of the nested logit models for the Los Angeles CMSA. In Figures 1B-2B and 1C-2C, identical simulations are shown for the Chicago and Washington, D.C. CMSAs, respectively. The simulations indicate changes to minority residential location (Figure 1)

[27] These simulations are partial equilibrium in nature. Thus, they provide insight into the marginal effect of the simulated changes, but are not conclusive as to the overall effect.

and to the spatial distribution of homeownership (Figure 2) as derive from shocks to the minority endowment and neighborhood amenity vectors. While numerous simulations could be specified, these displayed are illustrative of the types of changes to the geography of minority homeownership that occur from such shocks.

Figures 1A-1C simulate the intra-metropolitan residential location of black and Latino mover households in the wake of changes to their economic status and to the housing market and amenity attributes of sampled metropolitan areas. In the initial simulation, the economic endowments of metropolitan area whites are attributed to area black and Latino households.[28] In the wake of the simulated minority income gains in Los Angeles (Figure 1A), incrementally more black households move to the City of Los Angeles and to Orange and Ventura Counties, while a modest reduction in black households occurs in San Bernardino and Riverside Counties. Overall, the simulated gains to black economic status result in a small locational shift to closer-in as well as more affluent parts of the metropolitan area. By contrast, Chicago simulation results (Figure 1B) indicate that incrementally fewer black households choose to locate in the City of Chicago, whereas a somewhat larger share of black households instead locates in the non-city areas of Cook County. As in Chicago and L.A., the simulated economic gains to D.C. area blacks results in a marked relocation of black households from Prince Georges County to the inner-ring and more affluent areas of Arlington and Alexandria.[29]

The next few exercises simulate the intra-metropolitan location effects as derive from changes in housing affordability and amenities in the central cities of our sampled metropolitan areas. These simulations are of two sorts, the first of which makes the central cities significantly less affordable by virtue of a 20 percent upward shock to house prices and rents. The subsequent simulation serves to

[28] The simulated effects on homeownership choice of changes to minority household's economic endowments are discussed below in the context of Figure 2.

[29] Among Latinos in the Los Angeles CMSA, that same shock to incomes results in some shift in residential location away from Orange County and to the City of Los Angeles. Elsewhere in Los Angeles, little Latino locational change is indicated.
In the Chicago area, that same simulated increase in the economic status of Latinos results in an incrementally larger share of Latino households choosing to locate in the non-city areas of Cook County.

enhance the attractiveness of the central cities by way of a 20 percent decrease in local crime rates.[30] As regards the former, black movers appear to be quite sensitive to house price hikes; in their wake, black location choice in the City of LA fall by about 20 percent. Other locations, especially the non-city areas of LA County, record a marked increase in black households.[31] A more limited out-movement of black households from the City of Chicago to other non-city areas of Cook County is evidenced in the wake of a similar city house price increase. Note further that little black or Latino household movement to suburban Chicago areas is evidenced in the wake of the increase in house prices in the City of Chicago. While some blacks leave the City of Chicago as a consequence of rising house prices, it is the non-city areas of Cook County that absorb the migrating black households. Similar to Los Angeles, black movers in Washington D.C. appear to be quite sensitive to house price hikes; in their wake, black location choice in the District of Columbia declines by about 20 percent.

A simulated 20 percent reduction in overall crime rates in the City of Los Angeles similarly had important implications for black household location choice. Results show black movers to be highly sensitive to issues of public safety; the proportion of mover households choosing to locate in the City of LA moves up dramatically from about 35 to 51 percent, whereas black location in suburban counties falls back significantly.[32] Results show black movers in D.C. also to be sensitive to issues of public safety; the proportion of mover households choosing to locate in the City moves up from about 44 to 47 percent, whereas black location in suburban counties falls back by a similar magnitude. Results here roughly conform to those of Cullen and Levitt (1999), who report that each new city crime is associated with a

[30] These simulations provide an indication of the impact versus general equilibrium effects of the indicated shock to crime rates. To the extent those shocks were subsequently and fully capitalized into property values, their magnitudes would be diminished.

[31] By contrast, the Latino population in Los Angeles appeared to be less sensitive to the upward movement in city house prices and rents.

[32] By contrast, the intra-metropolitan location choices of Latino households are relatively insensitive to improvements in public safety in the City of Los Angeles.

measurable reduction in city residents.[33] In contrast, the intra-metropolitan location choices of Latino and black households in Chicago are relatively insensitive to improvements in public safety in the City of Chicago. Among other things, this simulation points to significant residential location and development externalities as would derive in Los Angeles and Washington D.C. from city policies to enhance public safety.

A final exercise reported in Figure 1 seeks to quantitatively assess the effects on minority household location choice of a simulated change in the intra-geographic distribution of minority population. In the case of the Los Angeles CMSA, for example, we quantitatively assess the effects on minority residential location choice of a simulated increase in Inland Empire (San Bernardino and Riverside Counties) minority population. As is evidenced in the middle panels of Figure 1A, the simulated 10 percentage point increase in Inland Empire black population serves to approximately triple the proportion of black movers locating in San Bernardino and Riverside Counties to 30 and 17 percent, respectively. At the same time, the proportion of black movers choosing to locate in the City and County of LA falls by 30-40 percent. All things equal, black moves to these newer, more affordable, outlying, and high growth suburbs appears to be highly sensitive to the existence of a critical mass of like minority population. As suggested above, the Latino population was more evenly distributed among Los Angeles area counties at about 12-17 percent of total over the time frame of the analysis. In that context, the simulated population change had little bearing on Latino residential location choice.[34, 35]

[33] In contrast to prior literature, our results specify the intra-metropolitan geography of residential location choice to changes as derive from the simulated decline in city crime rates.

[34] The simulation results in a relatively large change in renters moving from the City of Los Angeles to San Bernardino and Riverside County. Among blacks and Latinos, the fraction of mover households who choose to rent in Inland Empire counties moves up appreciably (doubling in the case of blacks), while the fraction of homeowners in those counties moves up only marginally. While this simulation serves to perceptibly enhance the dispersion of black and Latino populations to suburban areas, it provides less immediate support as regards the minority homeownership goal.

[35] Similar simulated changes in the intra-metropolitan geographic distribution of minority population are undertaken as well for the Chicago and Washington, D.C. metropolitan areas. Results of those analyses are provided in Figures 1B and 1C, respectively. As is evidenced, results for Chicago indicate little sensitivity to changes in minority representation in Cook and DuPage Counties. In the D.C. area, Latino household location choice is notably sensitive to changes in the Latino population representation in Arlington and Montgomery Counties.

Not evidenced in Figure 1, but also apparent in the simulations, was the differential impact of these simulated changes in locational characteristics on renters, when compared to owners. We describe those effects in the context of household location choice in the Los Angeles area. Again, the simulated effects were largest for black households. When house prices and rents in the City of Los Angeles rose by 20 percent, the geographical distribution of owners changed very little, while the number of renter households fell in Los Angeles by nearly one-third. Similarly, when assessing the simulated increase in minority population in San Bernardino and Riverside Counties on minority residential location, the number of households moving to San Bernardino and Riverside Counties as owners rises by about 25 percent, but the number of renter households choosing to reside in those areas triples. It should be noted that while these are housing demand side simulations, they express the increased desire of renters to move to more attractive areas. In contrast, a 20 percent drop in overall crime rates, as described previously, caused a substantial increase in the number of black households choosing to live in the City of Los Angeles, but in this simulation two-thirds of the increase was attributed to households choosing to own in the city. Collectively, these simulations demonstrate the need to model tenure choice and location choice in a model that can account for the multi-faceted choice to reside and own or rent in different areas of a larger metropolitan area.

Figure 2 assesses the effects of changes in minority economic status on homeownership attainment. In undertaking this exercise, the income characteristics of sample white households were applied to the estimated minority coefficient vectors. Unlike prior research, our model structure enables assessment of the intra-metropolitan locations of the simulated homeownership changes specific to the estimated behaviors of black and Latino movers. Simulations pertaining to black households are contained in the top panels of the figure, whereas those relevant to Latino households are displayed in the bottom panels.

As is evidenced in the top right panels of Figures 2A-2C, the intra-metropolitan geography of black homeownership choice is highly sensitive to the endowment shock. For example, in the wake of the appreciable rise in minority incomes, homeownership rates among black movers to the District of

Columbia and to the City of Chicago more than double to 52 and 40 percent, respectively, approximately equal to levels recorded for white movers. Substantial increases in homeownership among movers are evidenced as well in the D.C. and Chicago suburbs and in all Los Angeles areas. As evidenced in the top left panels of Figures 2A-2C, the elevated housing tenure choice among black movers to Washington, D.C., the City of Chicago, and to all Los Angeles areas serves to perceptibly close the overall homeownership gap between black and white households in those areas. In the D.C. and Chicago suburbs, the simulated improvements in black economic status serves as well to elevate black homeownership rates to levels close to the national average. With the exception of Cook County, the simulated improvement in black economic status serves to substantially diminish white-black homeownership rate differentials throughout the sampled metropolitan areas.

For the Los Angeles metropolitan area as a whole, the simulated closure in the observed black-white homeownership gap is substantial. That gap stood at a full 29 percentage points among sampled Los Angeles households in 1990, given homeownership rates of 53 and 24 percent among whites and blacks, respectively. The attribution to blacks of the economic endowments of sample whites serves to raise black homeownership rates to 41 percent, thereby reducing the gap by a full 17 percentage points. In the Washington, D.C. and Chicago metropolitan areas, the simulated closure of the observed black-white homeownership also is sizable. In Washington, D.C., the gap stood at about 33 percentage points among sampled D.C. area households in 1990, given homeownership rates of 78 and 45 among whites and blacks, respectively. A similarly substantial 33 percentage point racial homeownership gap was evidenced in Chicago, given homeownership rates of 76 percent for whites and 43 percent for blacks. The attribution to blacks of the economic endowments of whites in Washington D.C. serves to raise black homeownership rates to 55 percent, thereby reducing the gap by about 11 percentage points. The simulated enhancement of black economic status in Chicago to levels equivalent to that of sample whites serves to raise black homeownership rates to about 50 percent, thereby reducing the gap by a more limited 7 percentage points.

Appreciable dispersed homeownership gains to Latino households similarly derive from this simulation. Homeownership rates jump significantly among Latino movers (bottom right panel of Figure 2) in the District of Columbia, the City of Chicago, and the suburbs of Los Angeles. In the Los Angeles suburbs, for example, the attribution of white household endowments to Latinos serves to elevate homeownership choice among movers from 42 to 58 percent, roughly equivalent to that of whites. As evidenced in the bottom left panel to Figure 2, the elevation of Latino economic status serves to appreciably narrow the Latino-white homeownership gap in the Los Angeles suburbs. The simulation further evidences some decline in homeownership disparities between whites and Latinos in the District of Columbia, the City of Chicago, and the City of Los Angeles. For the Los Angeles study area as a whole, the white-Latino gap in homeownership stood at 18 percentage points in 1990, given homeownership rates of 53 and 35 percent among whites and Latinos, respectively. In Los Angeles, the attribution to Latinos of the economic endowments of sample whites serves to raise Latino homeownership rates to 47 percent, thereby reducing the gap by 12 percentage points. Elsewhere, in the Washington D.C. and Chicago metropolitan areas, the attribution of metropolitan white economic endowments to Latinos had more limited impacts on homeownership attainment, raising rates by only about 4 percentage points in each area to about 60 percent in Washington D.C. and 54 percent in Chicago. In both those areas, white-Latino homeownership rate gaps remained substantial, given 1990 white homeownership rates of 78 and 76 in Washington D.C. and Chicago, respectively.

VI. SUMMARY AND CONCLUSIONS

This paper applies individual level data from the U.S. Census to estimate three-level nested logit models of household mobility, homeownership tenure, and residential location choice for the Los Angeles, Chicago, and Washington, D.C. metropolitan areas. The approach is the first to explicitly recognize that the housing tenure choices of minority and white households may vary importantly owing to their differential mobility and locational preferences and constraints. Accordingly, the model structure endogenizes and jointly estimates the household move, homeownership, and intra-metropolitan location decisions. The empirical model uniquely allows for assessment of the intra-metropolitan geography of

minority homeownership as derives from shocks to household endowment and neighborhood amenity vectors.

Research findings indicate significant variability in mobility, residential location, and tenure choice across metropolitan areas and among white and minority households. Those findings have important implications for the intra-metropolitan geography of minority residential location and homeownership choice. For example, as evidenced in Chicago and the other sampled areas, a simulated and appreciable improvement to black economic status fails to result in large-scale suburbanization of blacks. However, that same simulated endowment increase *does* elevate black homeownership, particularly in closer-in urban neighborhoods. In that regard, homeownership rates among black movers to the District of Columbia and to the City of Chicago more than double to roughly the levels of white movers. The substantially elevated homeownership choice among black movers to the District of Columbia, the City of Chicago, and Los Angeles serves to substantially reduce the overall homeownership gap between black and white households in those areas. Accordingly, our research is able to discern a marked urban bias to black homeownership choice in the wake of simulated improvements to black socio-economic status.

Other simulations quantitatively assessed the effects of changes in central city housing affordability and amenities on the intra-metropolitan location of black households. Results here show that black movers are quite sensitive to house price and rent hikes and to issues of public safety. In the wake of a 20 percent increase in central city house prices and rents, black moves to the District of Columbia, for example, fall by an equal percentage. Similarly, results show substantial gains in the proportion of black mover households choosing to locate in central city areas in the wake of a 20 percent reduction in city crime rates. Among other things, that simulation points to potential minority contributions to central city revitalization as would emanate from enhancements to public safety.

In sum, research findings underscore the sensitivity of household location and tenure choice to locational amenities, housing costs, and household demographic characteristics. As these characteristics change, the geography of housing tenure choice can change substantially over a large metropolitan area.

Further, as we have demonstrated, these effects can differ markedly by racial group and by metropolitan area, and are dependent on the prior location of households. The prior location of households in combination with the underlying mobility rates in the metropolitan area appear to bound the extent to which households move in response to shocks. At the same time, the simulations also show that even when there are substantial improvements to the economic status of minorities, their urban settlement patterns remain substantially more concentrated than those of whites. While black households in each of the sampled metropolitan areas record significant homeownership gains in the wake of marked improvements to their economic status, those gains are less evidenced in outlying suburban areas.

References

Bayer, P., R. MacMillian, and K. Rueben (2004), "What Drives Racial Segregation? New Evidence Using Census Microdata", *Journal of Urban Economics*, 56(3), 514-535.

Berkovec, J., G. Canner, S. Gabriel, and T. Hannon, "Discrimination, Competition, and Loan Performance in FHA Mortgage Lending" *The Review of Economics and Statistics*, 241-250, 1998.

Bostic, R. and B. Surette (2001), "Have the Doors Opened Wider? Trends in Homeownership Rates by Race and Income", *Journal of Real Estate Finance and Economics*, 23:3, 411-434.

Coulson, E. (1999). "Why are Hispanic- and Asian-American Homeownership Rates So Low? Immigration and Other Factors", *Journal of Urban Economics*, 45, 209-227.

Coulson, E, Seok-Joon Hwang and Susumu Imai (2003). "The Value of Owner-Occupation in Neighborhoods," *Journal of Housing Research*, forthcoming..

Cullen, J. and Steven Levitt (1999). "Crime, Urban Flight, and the Consequences for Cities," *The Review of Economics and Statistics*, 81(2): 159-169.

Deng, Y., S. Ross, and S. Wachter (2001), "Racial Differences in Homeownership: The Effect of Residential Location," Forthcoming, *Regional Science and Urban Economics*.

DeRango, Kelly (1998), *On the Determinants of U.S. Black-White Racial Segregation.* Ph.D. Dissertation, University of Wisconsin.

Farley, Reynolds, and E. Rosenbaum (1994), "The Constraints on Minority Housing Choices, New York City 1978-1987", *Social Forces* 03-01

Gabriel, S. and S. Rosenthal (1989), "Household Location and Race: Estimates of a Multinomial Logit Model", *The Review of Economics and Statistics*, 71(2), 240-249.

Gabriel, S. and S. Rosenthal (2004), "Quality of the Business Environment versus Quality of Life in a Dynamic Model of Urban Composition and Growth", *The Review of Economics and* Statistics, 86 (1), 438-444 .

Gabriel, S. and S. Rosenthal (2005), "Homeownership in the 1980s and 1990s: Aggregate Trends and Racial Gaps", forthcoming, *Journal of Urban Economics*.

Gabriel, S., J. Mattey, and W. Wascher (2003), "Compensating Differentials and Evolution in the Quality of Life Among U.S. States", *Regional Science and Urban Economic*, 33(5), 619-649.

Gabriel, S., and G. Painter, (2003), "Paths to Homeownership: An Analysis of the Residential Location and Homeownership Choices of Black Households in Los Angeles," *Journal of Real Estate Finance and Economics*, Vol. 27 (1).

Green, W. (1997). *Econometric Analysis*. 3rd ed. Upper Saddle River, NJ: Prentice-Hall.

Gyourko, J. and P. Linneman (1996), "An Analysis of the Changing Influences on Traditional Household Ownership Patterns", *Journal of Urban Economics*, 39, 318-341.

Gyourko, J., P. Linneman, and S. Wachter (1999). Analyzing the Relationships among Race, Wealth, and Home Ownership in America, *Journal of Housing Economics*, 8, 63-89.

Gyourko, J. and J. Tracy (1991), "The Structure of Local Public Finance and the Quality of Life," *Journal of Political Economy*, 99(4), 774-806.

Goodman, A. C. and M. Kawai (1982), Permanent Income, Hedonic Prices and Demand for Housing: New Evidence, *Journal of Urban Economics*, 12, 214-37.

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

Hendershott, P. H. and J. Shilling (1982), "The Economics of Tenure Choice, 1955-1979. In *Research in Real Estate* (C. F. Sirmans, ed.), Vol. I. JAI press Inc.

Henderson, J. V. and Y. M. Ioannides (1983), "Model of Housing Tenure Choice**,**" *American Economic Review*, 73(1): 98-113.

Kain, John F. (1968). Housing Segregation, Negro Employment, and Metropolitan Decentralization. *Quarterly Journal of Economics* 82, 157-197.

Kan, K. (2000), "Dynamic Modeling of Housing Tenure Choice." *Journal of Urban Economics* 48(1): 46-69.

Massey, Douglas S. and Nancy A. Denton (1993), *American apartheid: segregation and the making of the underclass*, Harvard University Press, Cambridge, MA.

McFadden, Daniel (1978), "Modeling the Choice of Residential Location", in *Spatial Interaction Theory and Planning Models*, A. Karquist, et al (eds), Amsterdam: North Holland.

Myers, D., G. Painter, Z. Yu, S. Rho, and L. Wei. Regional Disparities in Homeownership Trajectories: Impacts of Affordability, New Construction, and Immigration, *Housing Policy Debate*, Forthcoming.

Painter, G., S. Gabriel, and D. Myers (2001). Race, Immigrant Status, and Housing Tenure Choice, *Journal of Urban Economics*, 49, 150-167.

Rosen, H. S. and K. T. Rosen (1980), "Federal Taxes and Home Ownership: Evidence from the Time Series." *Journal of Political Economy*, 88(1), 59-75.

Rosenthal, Stuart (2001), "Eliminating Credit Barriers to Increase Homeownership: How Far Can We Go?" Working Paper No. 01-01, Research Institute for Housing America.

Sieg, H., V. Kerry Smith, H. Banzhaf, R Walsh "Estimating the General Equilibrium Benefits of Large Policy Changes: The Clean Air Act Revisited", NBER Working Paper w7744: 2000

Train, Kenneth (1986), *Qualitative Choice Analysis*. The MIT Press, Cambridge, MA.

Wachter, S. and I. Megbolugbe (1992), "Racial and Ethnic Disparities in Homeownership", *Housing Policy Debate*, 3, 333-370.

Appendix 1
Variable Definitions

Throughout, the unit of observation is the head of household. Those aged less than 18 years, or greater than 65 years, have been excluded. In all the regressions, only those people who lived in Los Angeles County in 1985, and then lived in either Los Angeles or San Bernardino in 1990 are included.

AGE	Continuous Variable 18-64.
MARRIED	Head of household is married, and is not separated
OMITTED CATEGORY: Single	Head of household is not married, or is separated.
NO HIGH SCHOOL DIPLOMA	High school not completed, or not yet.
OMITTED CATEGORY: HS DIP/NO COL DEGREE	High school completed, but not four years of post-high school education.
COLLEGE DEGREE OR BETTER	Minimum of four years of post-high school education is completed.
NUMBER OF PEOPLE IN HOUSEHOLD	This number includes people of all ages, including those aged less than 18 years and 65 or older.
PERMANENT INCOME	Predicted Household Income according to the method of Goodman and Kawai (1982).
TRANISTORY INCOME	Residual Household Income according to the method of Goodman and Kawai (1982).
DIVIDEND INCOME	Dividend and Interest Income
HAS SOME DIVIDEND INCOME	Categorical variable for whether the household has positive dividend income.
OCCUPATIONAL STATUS	This is based on Duncan's occupation index with Professional jobs achieving the highest scores
ETHNICITY: AFRICAN-AMERICAN	African-American, non-Hispanic.
ETHNICITY: WHITE	White, non-Hispanic.
MEDIAN HOUSE PRICE IN THE AREA	Self explanatory
MEDIAN RENT IN THE AREA	Self-explanatory
TOTAL VIOLENT AND PROPERTY BY COUNTY	As compiled by the Department of Justice.

DISTANCE	Distance from the population center in each area to the population center in the potential destination area.

Table 1
Percentage of Homeowners by Racial Category

District of Columbia

	All Households N=7466	Sample of Movers Only N=2908
White	60.2%	54.0%
Black	35.3%	20.6%
Latino	35.6%	32.3%
All Households	42.7%	32.8%

DC Suburbs

	All Households N=28216	Sample of Movers Only N=12582
White	80.0%	69.5%
Black	53.5%	39.1%
Latino	61.3%	48.1%
All Households	73.3%	60.8%

Chicago City

	All Households N=25888	Sample of Movers Only N=11727
White	56.3%	40.0%
Black	37.3%	19.0%
Latino	37.8%	30.5%
All Households	46.1%	31.3%

Cook County

	All Households N=26747	Sample of Movers Only N=11664
White	80.6%	66.5%
Black	59.3%	44.2%
Latino	62.5%	50.5%
All Households	77.5%	62.8%

Chicago Suburbs

	All Households N=33530	Sample of Movers Only N=15376
White	81.4%	70.1%
Black	50.5%	28.5%
Latino	64.9%	50.6%
All Households	78.4%	66.2%

Los Angeles City

	All Households N=13848	Sample of Movers Only N=4746
White	58.1%	44.4%
Black	32.6%	16.7%
Latino	29.1%	19.3%
All Households	47.9%	34.6%

Los Angeles County

	All Households N=27818	Sample of Movers Only N=9698
White	64.9%	50.2%
Black	44.7%	24.8%
Latino	51.7%	36.6%
All Households	59.8%	44.2%

Los Angeles Suburbs

	All Households N=36642	Sample of Movers Only N=16142
White	70.7%	57.7%
Black	45.9%	34.1%
Latino	55.0%	42.9%
All Households	67.6%	54.5%

Table 2
Average Household Characteristics of Households

	District of Columbia			*DC Suburbs*		
Ethnicity	**white**	**black**	**latino**	**white**	**black**	**latino**
Number of Households	2215	4866	385	20696	6207	1313
Ownership Rate	60.2%	35.3%	35.6%	80.0%	53.5%	61.3%
Age	42.4	43.7	43.9	43.7	41.1	42.4
Married	35.0%	29.4%	22.9%	63.7%	47.7%	52.6%
No High School Diploma	2.1%	32.0%	27.3%	5.6%	15.1%	19.2%
High School Diploma	14.7%	47.7%	36.6%	33.1%	54.6%	41.9%
College Degree or Better	83.2%	20.3%	36.1%	61.4%	30.4%	38.9%
Number of People in the Household	2.0	2.8	2.2	2.7	3.0	3.0
Permanent Income	68.3	36.6	39.7	73.7	47.0	51.9
Transitory Income	10.6	-1.9	-3.3	-1.1	1.5	1.0
Dividend Income	6.6	0.4	2.0	3.8	0.5	1.8
Has some Dividend Income	67.7%	14.4%	29.1%	63.7%	19.9%	36.6%
Occupational Status	58.6	38.6	39.4	53.7	44.9	43.8
Violent & Property Crimes per 100		17.2			9.1	
% minority		61%			18%	
median rent		$442			$687	
median house		$178,074			$226,027	

	Chicago City			*Cook County*		
Ethnicity	**white**	**black**	**latino**	**white**	**black**	**latino**
Number of Households	11836	8960	5092	22662	2365	1720
Ownership Rate	56.3%	37.3%	37.8%	80.6%	58.3%	62.5%
Age	42.6	42.9	39.9	43.7	41.4	40.9
Married	49.2%	32.6%	56.9%	68.0%	46.9%	60.7%
No High School Diploma	13.5%	32.4%	54.3%	10.1%	19.4%	36.5%
High School Diploma	45.3%	50.2%	33.4%	50.1%	54.8%	43.1%
College Degree or Better	38.3%	17.4%	12.2%	39.8%	25.8%	20.3%
Number of People in the Household	2.5	3.3	3.9	2.9	3.3	3.4
Permanent Income	49.5	29.0	33.1	57.4	36.3	39.0
Transitory Income	-1.9	-0.9	-2.8	0.1	2.7	3.4
Dividend Income	2.5	0.3	0.6	3.1	0.6	1.1
Has some Dividend Income	47.2%	11.7%	18.5%	55.0%	15.9%	27.9%
Occupational Status	42.5	31.6	28.1	44.9	37.4	34.1
Violent & Property Crimes per 100		10.0			4.8	
% minority		44%			15%	
median rent		$361			$488	
median house		$84,965			$112,420	

	Chicago Suburbs			*Los Angeles City*		
Ethnicity	**white**	**black**	**latino**	**white**	**black**	**latino**
Number of Households	29257	2047	2226	18126	5089	5711
Ownership Rate	81.4%	50.5%	64.9%	58.1%	32.6%	29.1%
Age	42.2	41.8	41.0	43.2	42.6	39.9
Married	73.0%	42.6%	62.3%	48.4%	30.0%	53.9%
No High School Diploma	10.1%	26.3%	39.2%	7.9%	23.9%	54.2%
High School Diploma	51.9%	55.3%	44.2%	41.8%	51.0%	30.4%
College Degree or Better	38.0%	18.4%	16.7%	50.4%	25.1%	15.4%
Number of People in the Household	3.0	3.2	3.4	2.4	2.8	3.9
Permanent Income	57.1	31.8	37.4	59.4	33.2	36.5
Transitory Income	0.1	0.6	3.8	5.1	-0.9	-2.6
Dividend Income	2.5	0.3	1.1	4.2	0.5	0.8
Has some Dividend Income	51.3%	13.3%	27.6%	48.9%	12.3%	15.0%
Occupational Status	43.0	31.8	31.5	49.7	35.4	29.9
Violent & Property Crimes per 100		4.3			5.5	
% minority		13%			33%	
median rent		$444			$587	
median house		$108,316			$305,541	

	Los Angeles County			*Los Angeles Suburbs*		
Ethnicity	**white**	**black**	**latino**	**white**	**black**	**latino**
Number of Households	31612	5535	9345	44711	2140	7383
Ownership Rate	64.9%	44.7%	51.7%	70.7%	45.9%	55.0%
Age	43.5	41.7	41.2	42.6	40.0	40.1
Married	57.1%	42.1%	63.9%	63.3%	50.0%	66.4%
No High School Diploma	9.4%	16.9%	44.4%	9.4%	14.9%	41.7%
High School Diploma	46.8%	53.7%	39.0%	50.3%	54.5%	40.4%
College Degree or Better	43.8%	29.4%	16.6%	40.3%	30.6%	17.9%
Number of People in the Household	2.6	3.1	4.0	2.8	3.2	4.0
Permanent Income	59.9	38.8	40.0	60.3	40.1	41.6
Transitory Income	0.6	1.1	0.9	-2.5	-0.7	0.9
Dividend Income	3.2	0.5	0.9	2.6	0.5	1.0
Has some Dividend Income	46.2%	14.6%	18.9%	42.7%	15.8%	20.4%
Occupational Status	46.5	38.7	32.1	44.8	38.4	33.0
Violent & Property Crimes per 100		4.59				
% minority		28%				
median rent		$624				
median house		$261,904				

Table 3A
Determinants of Housing Tenure Choice: Los Angeles
Nested Logit Models

Race/Ethnicity	**White Households**		**Black Households**		**Latino Households**	
VARIABLE	Coef.	Std. Error	Coef.	Std. Error	Coef.	Std. Error
Location Choice						
Distance required for move	**-0.076**	**0.000**	**-0.075**	**0.002**	**-0.091**	**0.001**
Difference in House Prices (100,000s)	**-1.124**	**0.056**	**-2.361**	**0.183**	**-0.887**	**0.132**
Difference in Rents	**0.005**	**0.000**	**0.009**	**0.001**	**0.003**	**0.001**
Difference in percentage minority status	**6.961**	**0.594**	**23.095**	**2.010**	**4.352**	**1.456**
Difference in crime rates	**-0.257**	**0.026**	**-0.596**	**0.092**	0.001	0.068
Tenure Choice						
Permanent Income (1000s)	**0.004**	**0.000**	**0.015**	**0.002**	**0.003**	**0.001**
Transitory Income (1000s)	**0.001**	**0.000**	**0.027**	**0.004**	**0.003**	**0.000**
Age	**0.007**	**0.001**	**0.006**	**0.002**	**0.014**	**0.002**
Married	**1.220**	**0.024**	**0.945**	**0.072**	**0.945**	**0.051**
No High School Diploma	**-0.355**	**0.032**	**-0.390**	**0.094**	**-0.678**	**0.055**
(Omitted: High School Diploma, but no college degree)						
College Degree or Better	**0.372**	**0.023**	**0.269**	**0.072**	**0.298**	**0.061**
Number of Kids in the Household	**-0.079**	**0.006**	**-0.170**	**0.018**	**-0.025**	**0.010**
Immigrant status					**-0.250**	**0.048**
Mobility Choice						
Has some Dividend Income	**-0.070**	**0.010**	**-0.968**	**0.217**	**-0.305**	**0.079**
Age	**-0.062**	**0.018**	0.056	0.062	0.221	0.116
Married	**-27.440**	**1.504**	**-10.767**	**1.866**	**-12.633**	**2.806**
No High School Diploma	**7.528**	**0.879**	**2.438**	**1.149**	**8.580**	**1.673**
(Omitted: High School Diploma, but no college degree)						
College Degree or Better	**-7.529**	**0.685**	**-6.213**	**1.826**	**-4.616**	**1.831**
Number of Kids in the Household	**1.357**	**0.140**	**0.796**	**0.156**	0.173	0.129
Occupational Status	0.011	0.008	-0.005	0.021	**0.050**	**0.019**
Immigrant status					**5.091**	**1.361**
Inclusive Values						
Own	**-1.355**	**0.032**	**-2.294**	**0.120**	**-2.181**	**0.083**
Rent	**-0.195**	**0.012**	**-0.069**	**0.016**	**-0.244**	**0.033**
Move	**60.298**	**2.708**	**136.904**	**16.636**	**80.976**	**13.832**
Sample Size	94449		12764		22439	

Note: Coefficients which are statistically significant at 5% level or greater are in bold.

Table 3B
Determinants of Housing Tenure Choice: Chicago
Nested Logit Models

Race/Ethnicity	**White Households**		**Black Households**		**Latino Households**	
VARIABLE	Coef.	Std. Error	Coef.	Std. Error	Coef.	Std. Error
Location Choice						
Distance required for move	**-0.072**	**0.000**	**-0.082**	**0.002**	**-0.077**	**0.001**
Difference in House Prices (100,000s)	**1.477**	**0.118**	-1.130	0.588	**1.307**	**0.455**
Difference in Rents	**-0.188**	**0.034**	0.166	0.164	**-0.330**	**0.130**
Difference in percentage minority status	**-2.166**	**0.418**	0.311	1.453	2.530	1.433
Difference in crime rates	**0.014**	**0.003**	0.013	0.008	0.002	0.008
Tenure Choice						
Permanent Income (1000s)	**0.018**	**0.001**	**0.013**	**0.001**	0.001	0.001
Dividend Income (1000s)	**0.058**	**0.004**	**0.023**	**0.002**	**0.021**	**0.003**
Age	**-0.007**	**0.001**	**-0.024**	**0.002**	**-0.009**	**0.002**
Married	**1.083**	**0.043**	**1.029**	**0.067**	**0.884**	**0.066**
No High School Diploma	**-0.597**	**0.049**	**-0.363**	**0.076**	**-0.564**	**0.064**
College Degree or Better (omitted: high school diploma, but no college degree)	**-0.206**	**0.040**	0.071	0.063	-0.054	0.067
Number of children in household	0.020	0.002	**-0.100**	**0.014**	-0.013	0.010
Immigrant Status					**-0.135**	**0.046**
Mobility Choice						
Has some dividend income	**-0.041**	**0.003**	**-1.994**	**0.551**	**-0.728**	**0.166**
Age	**0.195**	**0.003**	**0.671**	**0.181**	**0.150**	**0.045**
Married	**0.110**	**0.055**	**-35.393**	**7.973**	**-21.626**	**3.948**
No High School Diploma (omitted: high school diploma, but no college degree)	**0.848**	**0.076**	**10.348**	**3.321**	**9.120**	**2.053**
College Degree or Better	**0.488**	**0.052**	**-8.751**	**3.244**	0.901	2.039
Number of children in household	**0.763**	**0.017**	**1.239**	**0.384**	0.192	0.237
Occupational status	**0.054**	**0.001**	-0.020	0.032	-0.002	0.011
Immigrant status					**2.675**	**1.113**
Inclusive values						
Own	**86.727**	**0.042**	**-0.925**	**0.081**	**-0.518**	**0.062**
Rent	**87.629**	**0.043**	**-0.191**	**0.024**	**-0.285**	**0.044**
Move	**-0.112**	**0.001**	**192.879**	**39.131**	**63.420**	**11.052**
Sample size	63755		13372		9038	

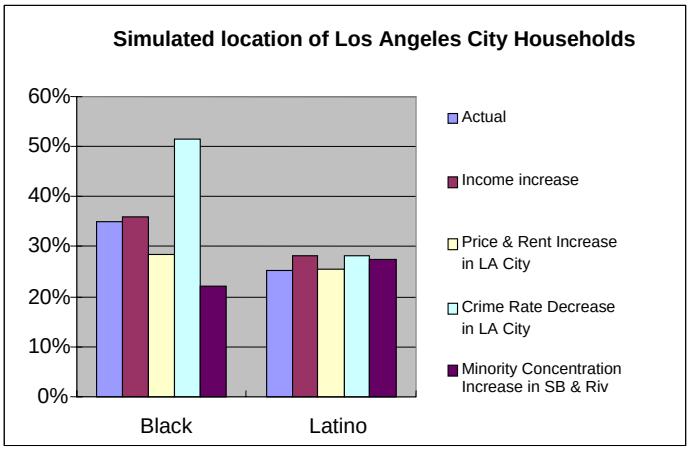
Note: Coefficients which are statistically significant at 5% level or greater are in bold.

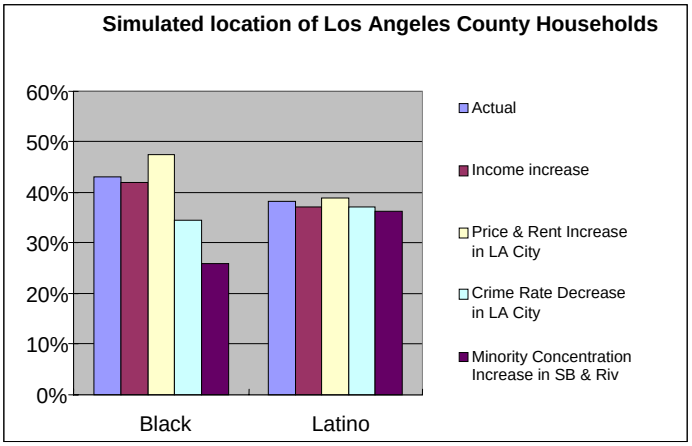
Table 3C
Determinants of Housing Tenure Choice: Washington D.C.
Nested Logit Models

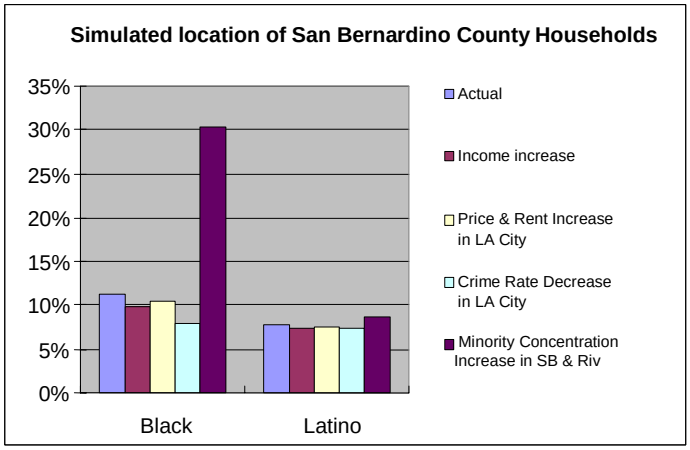
Race/Ethnicity	**White Households**		**Black Households**		**Latino Households**	
VARIABLE	Coef.	Std. Error	Coef.	Std. Error	Coef.	Std. Error
Location Choice						
Distance required for move	**-0.144**	**0.002**	**-0.249**	**0.003**	**-0.144**	**0.006**
Difference in House Prices (100,000s)	**0.859**	**0.061**	**-0.452**	**0.128**	**1.212**	**0.426**
Difference in Rents	**-1.742**	**0.059**	**-0.661**	**0.122**	**-1.356**	**0.363**
Difference in percentage minority status	**-1.032**	**0.287**	-0.860	0.547	1.949	2.091
Difference in crime rates	**-0.487**	**0.010**	**-0.123**	**0.025**	**-0.446**	**0.038**
Tenure Choice						
Permanent Income (1000s)	0.000	0.003	**0.018**	**0.003**	0.001	0.001
Transitory Income (1000s)	**0.000**	**0.000**	**0.033**	**0.003**	0.000	0.000
Age	**0.005**	**0.001**	**-0.007**	**0.003**	0.003	0.004
Married	**1.185**	**0.056**	**1.132**	**0.096**	**0.503**	**0.147**
No High School Diploma	**-0.154**	**0.041**	**-0.554**	**0.112**	-0.286	0.194
College Degree or Better (omitted: high school diploma, but no college degree)	**0.495**	**0.049**	**0.535**	**0.093**	**0.590**	**0.171**
Number of children in household	**-0.016**	**0.008**	**-0.158**	**0.027**	-0.039	0.024
Immigrant Status					-0.122	0.125
Mobility Choice						
Has some dividend income	-0.038	0.024	**-0.225**	**0.048**	-0.164	0.162
Age	**-0.332**	**0.072**	**0.608**	**0.057**	-0.168	0.181
Married	**-85.864**	**7.602**	**-0.779**	**0.394**	**-22.165**	**9.073**
No High School Diploma (omitted: high school diploma, but no college degree)	**10.425**	**2.877**	**1.444**	**0.391**	11.369	8.784
College Degree or Better	**-34.025**	**4.479**	-0.332	0.474	**-31.747**	**12.549**
Number of children in household	**1.161**	**0.562**	**0.679**	**0.076**	1.382	0.987
Occupational status	0.017	0.013	**0.098**	**0.010**	0.017	0.050
Immigrant status					6.656	7.307
Inclusive values						
Own	**-0.606**	**0.026**	**-13.300**	**2.609**	**-0.820**	**0.110**
Rent	**-0.261**	**0.018**	**-11.026**	**2.619**	**-0.202**	**0.047**
Move	**122.382**	**8.569**	**2.491**	**0.593**	**136.080**	**35.781**
Sample size	22911		11073		1698	

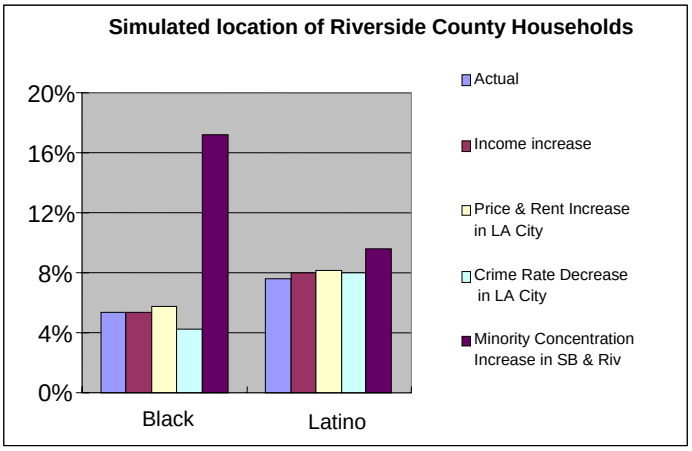
Note: Coefficients which are statistically significant at 5% level or greater are in bold.

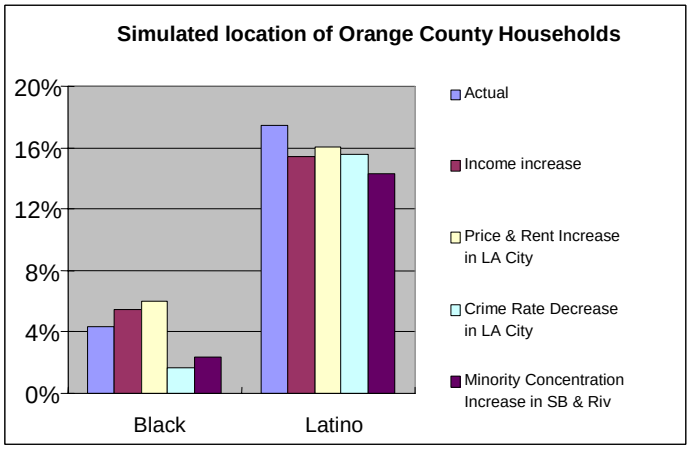
Figure 1A
Simulated Changes in the Intra-Metropolitan Location Choices of Minority Households
Los Angeles CMSA











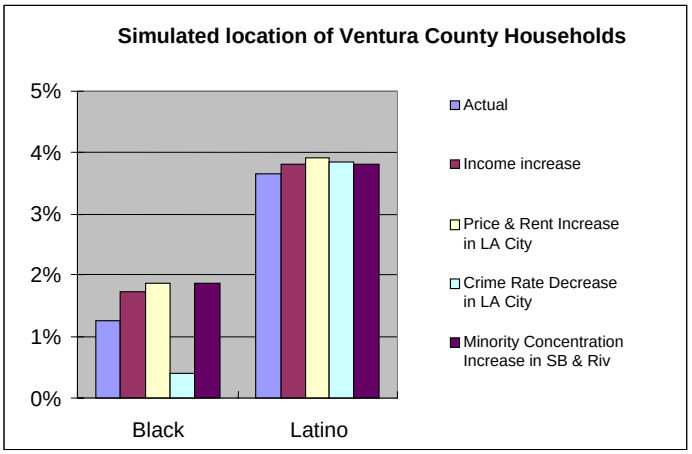
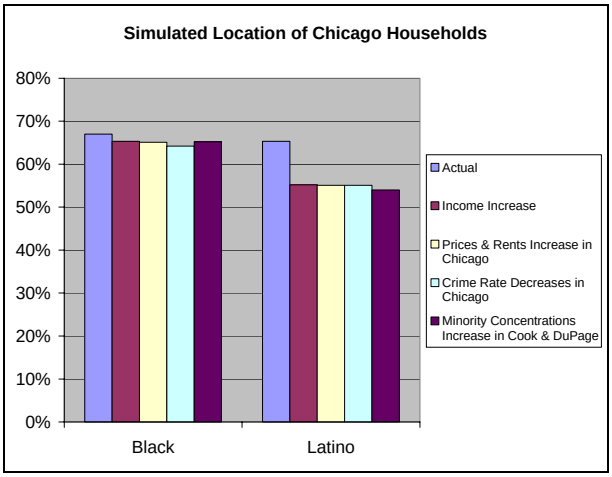
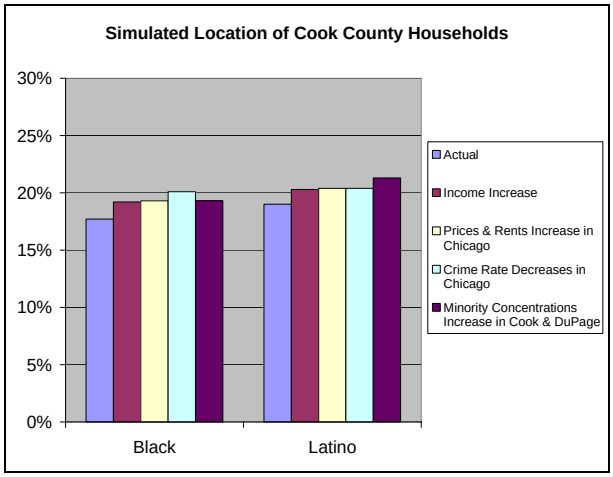
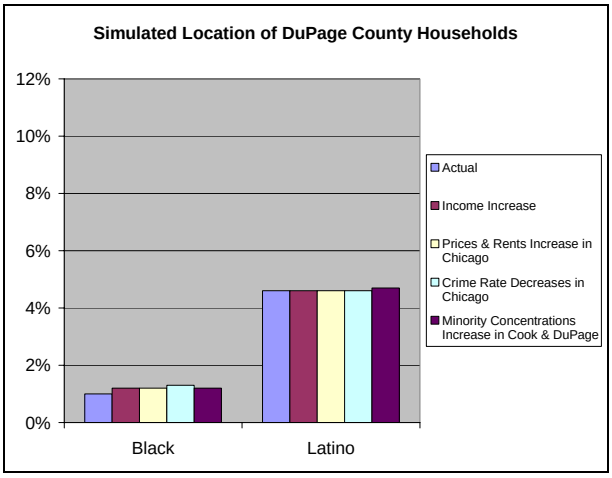
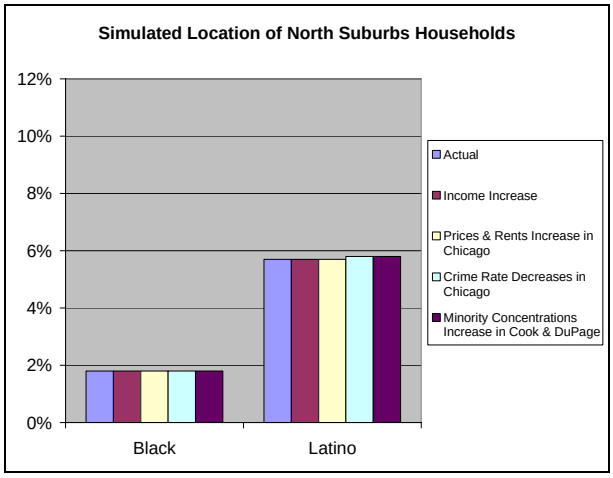


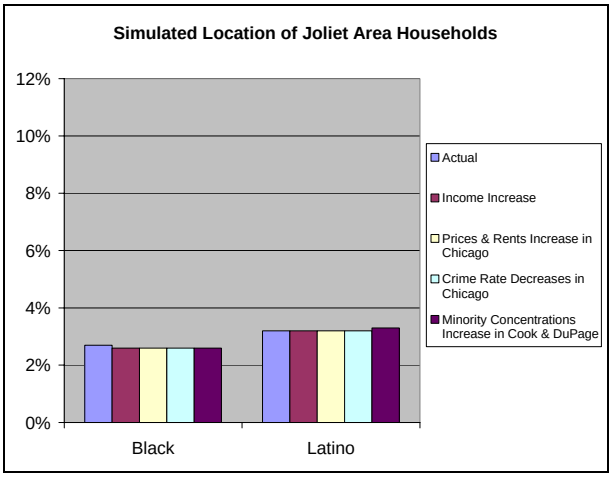
Figure 1B
Simulated Changes in the Intra-Metropolitan Location Choices of Minority Households
Chicago CMSA

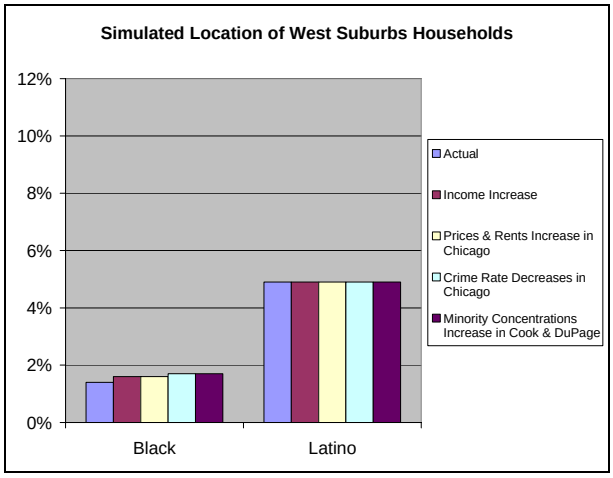












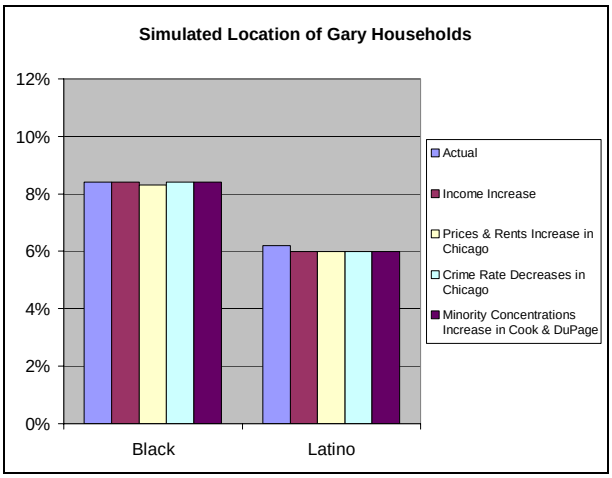
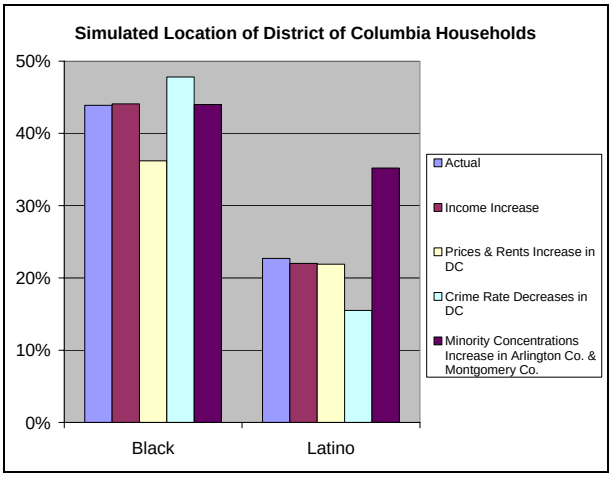
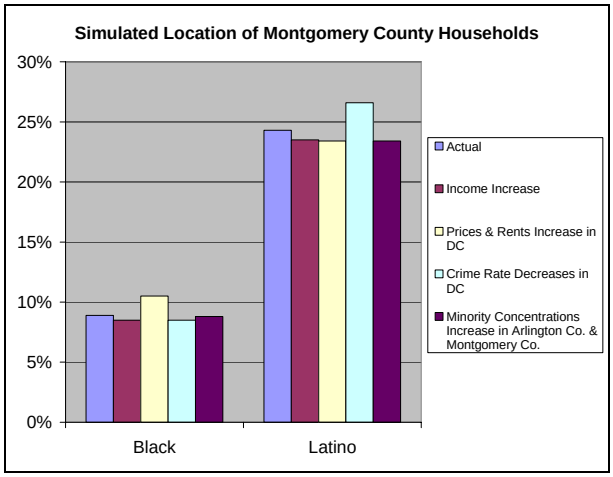
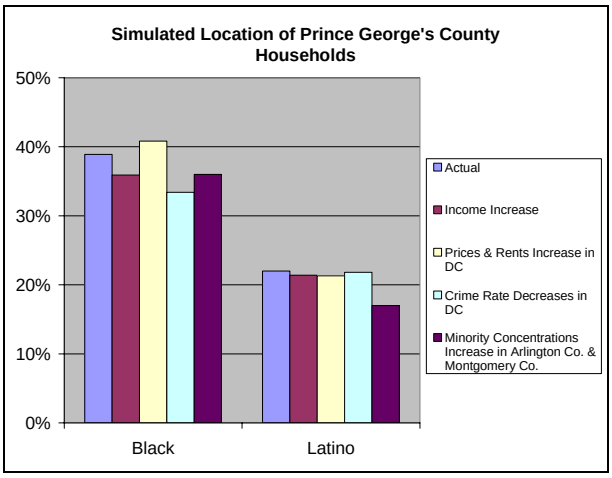
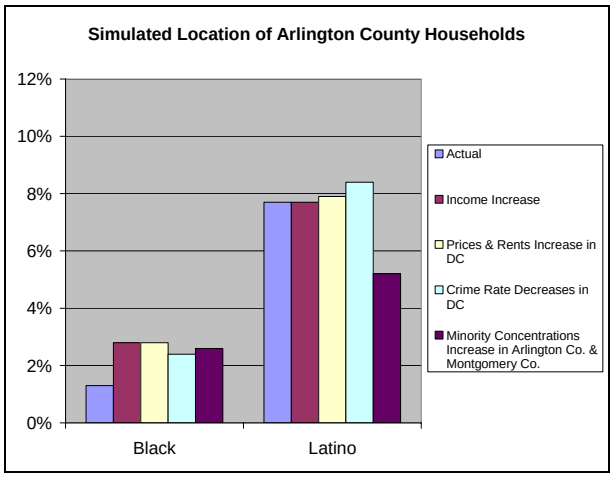

Simulated Location of Gary Households
12%
10%
8%
6%
4%
2%
0%
Black
Latino
Actual
Income Increase
Prices & Rents Increase in Chicago
Crime Rate Decreases in Chicago
Minority Concentrations Increase in Cook & DuPage

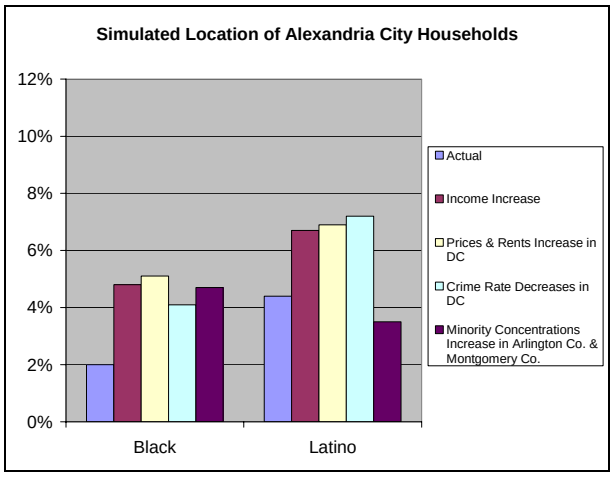
Figure 1C
Simulated Changes in the Intra-Metropolitan Location Choices of Minority Households Washington D.C. CMSA











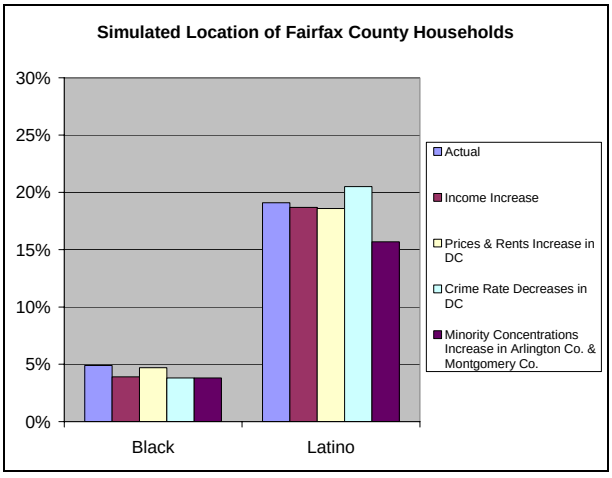
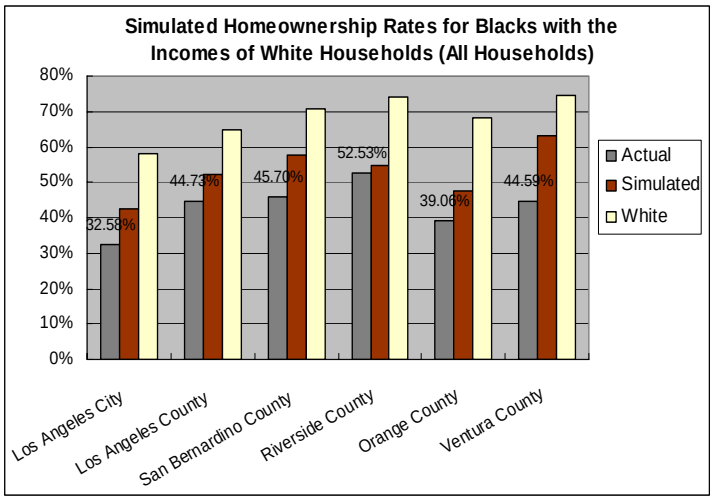
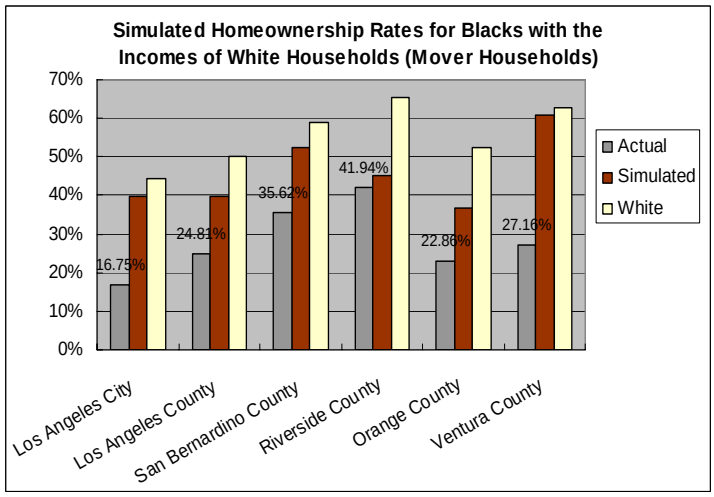
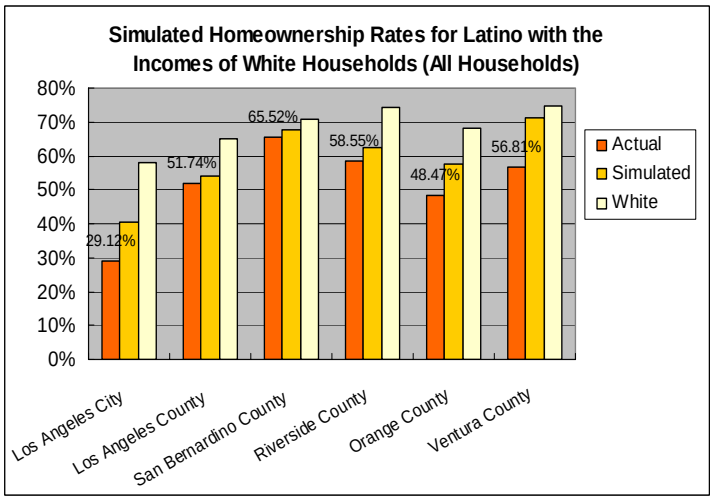
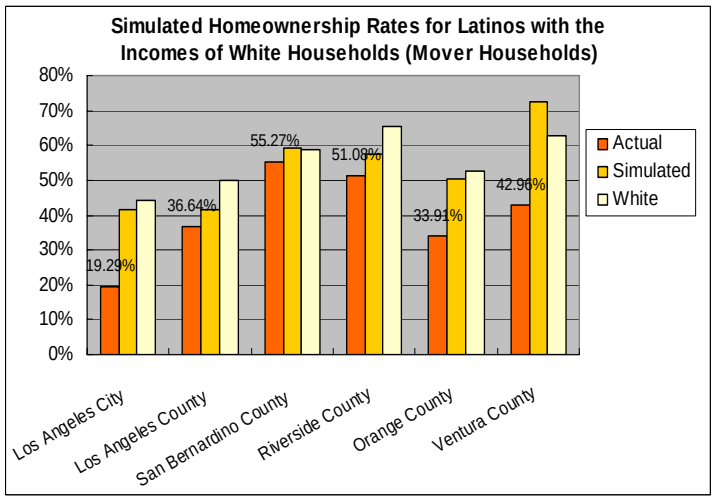


Figure 2A
Simulated Changes in the Intra-Metropolitan Distribution of Minority Homeownership
Los Angeles CMSA



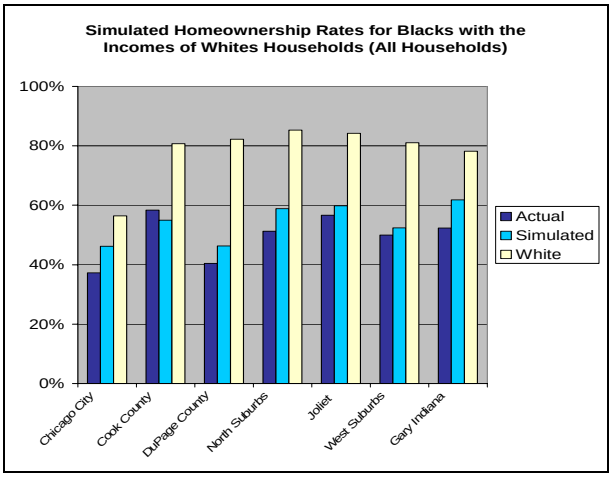


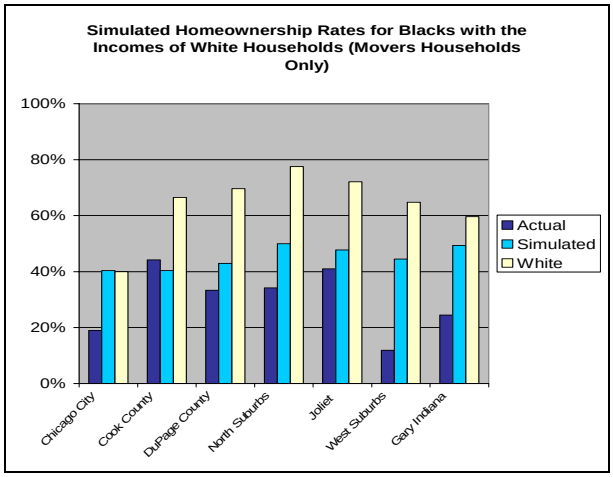


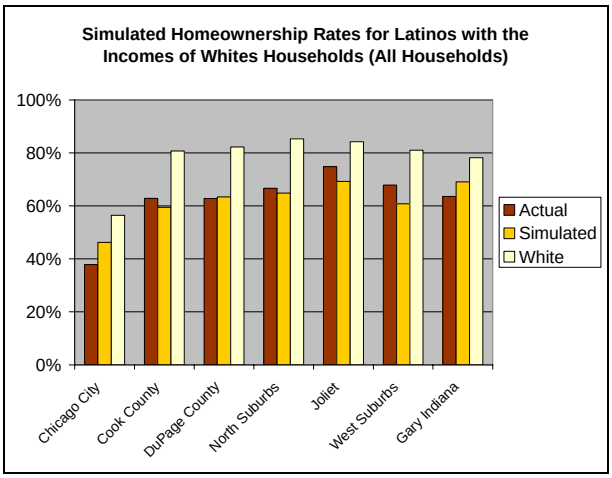


Note: Percentages shown for the actual homeownership rate of minority households

Figure 2B
Simulated Changes in the Intra-Metropolitan Distribution of Minority Homeownership
Chicago CMSA







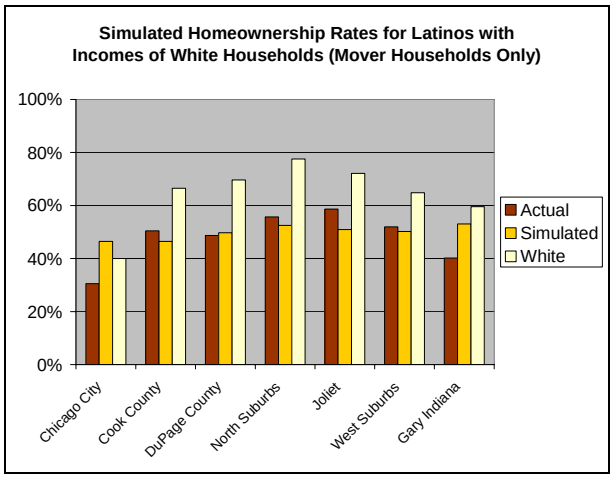


Figure 2C
Simulated Changes in the Intra-Metropolitan Distribution of Minority Homeownership
Washington D.C. CMSA