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Cohort Insights into the Influence of Education, Race and Family Structure on Homeownership Trends by Age: 1985 to 1995

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Abstract

This paper attempts to further clarify the findings of Joseph Gyourko and Peter Linneman in “The Changing Influences of Education, Income, Family Structure, and Race on Homeownership by Age over Time” that appeared in the *Journal of Housing Research*. We have confirmed the findings of Gyourko and Linneman that those with less than high school education are seriously disadvantaged with respect to homeownership attainment over their life-course. This is true for both blacks and whites, and for all household types. Furthermore, it appears that successively younger cohorts of the least educated are falling even further behind in homeownership progress when compared to high school graduates in the same cohort. There is some evidence that successively younger cohorts of high school graduates are also slipping in the progress they are making in attaining homeownership as they age. However, this slippage for high school graduates is either greatly reduced or eliminated when different household types are examined, suggesting that it has been the shift away from higher ownership married couple households that has been causing the slowdown in ownership progress for all household types combined. This shift has been especially pronounced for black households. A college degree makes a huge difference in homeownership attainment for blacks, eventually resulting in homeownership levels that are 20 percent higher than that of black high school graduates. A college degree for whites only raises homeownership rates five percentage points above whites with a high school degree, but this is not so surprising since homeownership rates for white high school graduates already are approaching 85 percent for the older cohorts. There is also evidence that the positive effects on homeownership progress of college attendance, both for those with some college and for those with a degree, might be weakening for the younger cohorts. This is especially true for blacks, but also evident for whites. The high costs of today’s college education might increase debt and be a factor in delaying the transition to homeownership by reducing the ability of younger cohorts of college graduates to afford a down payment on a home or qualify for a mortgage. Blacks would be most affected by rising college costs because of lower black parental income and wealth that might be drawn upon to pay for college expenses. The advantage conferred by having some college education short of a degree is also very significant for blacks. For whites, some college makes no difference compared to high school graduation, but again, the high level of homeownership attained by white high school graduates must be considered.

Cohort Insights into the Influence of Education, Race and Family Structure on Homeownerships Trends by Age: 1985 to 1995

by

George S. Masnick and Zhu Xiao Di

Introduction

In a recent article, Gyourko and Linneman (1997) identified a growing gap in the levels of homeownership between the most and the least educated households. Household heads with less education have historically moved more slowly into homeownership compared to those with more education. But in the three decades following WW II, this early in the life-course homeownership gap tended to close substantially as households with different educational endowments progressed into middle and old age. Between 1980 and 1990, however, this convergence following cohort aging slowed dramatically, and may have reversed. Today, the less educated continue to lag well behind in homeownership progress over the life-course. While Gyourko and Linneman were reluctant to predict the ultimate levels of cohort homeownership that would be attained by the different education groups, they concluded that the “absolute and relative decline in ownership for the least educated represents one of the largest asset shifts in the postwar era.”(Gyourko 1997, p.1)

In addition to life-course ownership trajectories by education, Gyourko and Linneman also examined homeownership differences by family structure and race, and concluded that the independent impacts of these variables have also changed over time. Family structure appears to have become less of a predictor of ownership, with the delayed marriage and late childbearing characteristics of today’s young adults no longer the impediments to ownership they once were. Racial differences in ownership, like those with education of head, appear to have reversed the pattern of post-WW II convergence, with the homeownership gap between whites and non-whites trending apart between 1970 and 1990.

In the following paper we extend the analyses of Gyourko and Linneman in several ways. First, we focus on trends in ownership between 1985 and 1995 in an effort to determine whether the divergence among education groups has indeed persisted into the 1990s. Second, we focus specifically on white versus black differences instead of white versus non-white trends, because lumping all non-white races together can distort the results,

particularly given the recent influence of Asian immigrants on non-white homeownership levels.¹ Third, we examine ownership trends using a synthetic cohort approach, by linking ownership levels of household heads in one ten-year age group in 1985 with the levels achieved by the next oldest ten-year age group in 1995. Fourth, we present our main findings graphically to better describe the different paths that various groups follow in attaining homeownership as they age over time. Fifth, we give more attention to evaluating the interrelationships between education, race and family structure as determinants of homeownership progress over the life-course.

Our intent here is to be descriptive. We want to quantify the differences in homeownership attainment between cohorts having different educational capital. We want to examine whether systematic differences in homeownership attainment over the life-course can be found for whites and blacks within the same educational categories. The cohort approach we employ corrects for a fundamental weakness in the Gyourko and Linneman methodology, which is based on cross-sectional modeling. Cohort models correct for certain distortions that can arise when it is assumed that cohorts will follow over time an age pattern of homeownership measured at one point in time. Problems arise when successive cohorts follow different “tracks”, and as in the case of homeownership, when rates are very different for successive cohorts as they pass through the same age group.²

Cohort models of homeownership trends were first used by Pitkin and Masnick (1980), and have been used extensively since (Myers 1982, Masnick, Pitkin, and Brennan 1990, McArdle and Masnick 1995). Recently, Dowell Myers and his collaborators (Myers and Lee 1996 and 1998, Myers, Megbolugbe and Lee 1998) have extended the cohort approach and integrated it with logistic statistical regression analyses. An excellent overview of this approach can be found in Myers 1999.

¹ Immigrant homeownership rates are well below those of native born residents in the younger ages, but converge rapidly and for some Asian groups may even surpass native born white rates as duration of residence increases (McArdle 1997). Ownership levels among older Asians, many of whom are recent immigrants, are well below both younger Asian and older white levels (Masnick 1998).

² For a discussion of the need to model cohort effects on homeownership see Pitkin (1990) and Pitkin and Myers (1994). Our approach is not a “pure cohort” analysis, as might be achieved in a panel study that follows the same individuals over time. Rather, it assumes that the two age groups ten years apart are broadly representative of results that would be obtained for the pure cohort, if the data allowed us to follow the same individuals over time.

The cohort approach lends itself nicely to graphical presentation of results. Homeownership levels are not static, but for any defined group change over time as the individuals in the group age. In our analysis we examine this change in ownership for birth cohorts as they age ten years between 1985 and 1995. The ownership “trajectories” are like the path of a comet, with the comet only visible from one vantage-point for a portion of the comet’s entire path. The trajectories, once established however, have a great deal of “inertia”, and allow us to visualize the differences between cohorts, not only for the time period under scrutiny, but for the near-term past and future as well.

Sources of Data and Variables Included

The data used in our analysis comes from the 1985 and 1995 public use samples of the American Housing Survey (AHS). Variables included in the descriptive portion of our research include birth cohort of household head, tenure, education of household head, family type, and race.

Variables Included:

Data Year – 1985 and 1995

Birth Cohort – Born 1920-29, Born 1930-39, Born 1940-49, Born 1950-59,
Born 1960-69

Education – Less Than High School Diploma, High School Diploma Only,
Some College, College Degree or Higher

Race – White, Black, All Other Races

Family Type – Married Couples, Other Families, Non-Family Households

Tenure – Owner, Renter

The variables included in this simple model allow us to replicate the actual cohort trends in ownership almost exactly. These data are first examined combining all family types and races in an effort to describe broad differences in ownership trends by education. Next, the cohort homeownership trajectories by education are plotted separately for whites and for blacks, and then separately for three different family types. Finally, the model is re-

configured to incorporate all variables and their interactions simultaneously to allow us to test for the persistence of racial differences in homeownership attainment by education within similar household types.

A difficulty in using either American Housing Survey data (as in our analysis), or census data (as used by Gyourko and Linneman), is the inconsistency over time in the way education is measured. In 1990, the Census Bureau fundamentally changed the way in which education was recorded, from years of school attended in censuses and surveys before 1990 to highest degree attained in 1990 and later (Mare 1995). This change in the way education is measured can particularly impact how those with some post-high school training, but no degree, are categorized. In 1990 and afterward, those with any post-high school “certificate” training - in such things as auto-repair, computer technology, cooking or hair styling – can be more easily identified, whereas prior to 1990 they would be more likely to be grouped with either high school graduates or high school dropouts. The effect of this change in definition on homeownership trends would be to potentially raise homeownership rates prior to 1990 for high school graduates and those with less than a high school education by including individuals with additional education but no degree. The result of inflating ownership levels in the first time period would be to exaggerate any decline in cohort homeownership that might be observed between 1980 and 1990 within these educational categories. Myers and Lee (1996) attempt to minimize this inconsistency problem by lumping those with some college together with high school graduates. This strategy affords only a partial fix because those with less-than high school education remain contaminated prior to 1990, and the potential significance for homeownership attainment of some college training is obscured. Our own strategy has been to preserve the four levels of education employed by Gyourko and Linneman (less than high school, high school graduate, some college, and college graduate and higher), and simply acknowledge that some percentage of our observed differences might be spurious. If the observed differences are very large, it is unlikely that the marginal misclassification of individuals because of the shift in the definition of educational attainment is what is responsible. If the observed differences are small, more caution is justified.

We measure the change in homeownership levels attained by household heads in successive ten-year age groups between 1985 and 1995. Instead of simply tabulating the homeownership rate for each sub-group for each survey year, we approximate the observed

homeownership rates using a simple logit model. This strategy is followed in anticipation of adding explanatory variables in the next round of analyses, and at that time using the model to further explore the dimensions of unexplained differences between black and white homeownership. For this paper, we have set a more limited goal of describing the differences between black and white homeownership controlling for education and household type, how the differences break down by cohort, and how the cohort differences have been changing.

We pool together both the 1985 and 1995 American Housing Survey data available from the public use data files. We create a dummy variable (DATA95) to identify the data year. Homeownership is measured by a dichotomous variable (TENURE), derived from either the 1985 or 1995 AHS records. Also based on data year, we take the information on the education level of the head of each household, and then create a series of mutually exclusive dummy variables to reflect the education level of the household. The four dummy variables for 1995 data are: HSLESS (didn't graduate from high school), HS (only graduated from high school, with no further formal education), SOMECOL (attended some years of college or professional schools but did not receive a BA or higher degree), and COLGRAD (received a BA or advanced degree). For 1985 data we estimated these categories by less than 12 years of schooling, exactly 12 years of schooling, 13-15 years of schooling and 16 or more years.

The synthetic cohort method requires a two-step approach to construct the birth cohort variables. We first identify the age cohort in each year of data. We group cases in the 1985 AHS data into 15-24-year-old, 25-34-year-old, 35-44-year-old, 45-54-year-old, and 55-64-year-old, and group cases in the 1995 AHS data into 25-34-year-old, 35-44-year-old, 45-54-year-old, 55-64-year-old, and 65-74-year-old. Then we link together the 15-24-year-old in 1985 AHS and the 25-34-year-old in the 1995 AHS data as the first cohort (COHORT1=1), make COHORT1 a dummy, all the other cases not belonging to this group are coded 0. With the same principle, we create COHORT2, COHORT3, COHORT4, and COHORT5. This way, COHORT1 identifies cases where the respondent was aged 15-24 in 1985 and 25-34 in 1995. In other words, they were born in 1960-69. Similarly, COHORT2 identifies those born in 1950-59, and COHORT3 identifies those born in 1940-49, etc. Noticeably, we have to exclude the youngest cases in the 1995 AHS data and the oldest cases in the 1985 AHS data, because we can't observe them in both years.

To capture interactions between variables, we create the following interactive terms: between education levels and birth cohorts, e.g. HSLESS2 is the result of HSLESS times COHORT2, and HSLESS3 is the result of HSLESS times COHORT3, and SOMECOL5 is the result of SOMECOL times COHORT5, etc. Between data year and birth cohorts, we create YCOHORT2, YCOHORT3, etc. Between data year and education, we create YHSLESS, YSOMCOL, etc.

Based on all these variables mentioned above, we build our simple logistic model estimating the expected ownership rates for different cohorts representing different data years, education level, and age. TENURE is our dependent variable. COHORT1, HS, YCOHORT1, and YHS are the omitted reference groups from the equation. All the remaining interaction variables are kept in the model.

To gauge the influence of race and family type on homeownership, we run this simple model separately for different race groups and family types. To further analyze the impact of race and family type, we extend our simple model to include BLACK, OTHRACE, OFAM (family households other than married couples), and NFAM (non-family households), as well as the interactive terms between these variables and the birth cohorts. In this extended model, WHITE and MFAM (married couple families) and their interactions with the defined cohorts are the omitted reference groups. The complete set of logistic coefficients and their standard errors are given in the Appendix.

Results of the Simple Logit Model

Homeownership by Education (Combining all Races and Family Types)

Our first step in the analysis was to calculate predicted cohort ownership trajectories between 1985 and 1995 using the simple logit model incorporating year, cohort, education, and all interactions of these variables. A feature of the logit model used in this analysis (STATA), is that each case can be assigned a predicted value on the dependent variable (in this case the probability of being a homeowner). When all interactions are included in the model, the mean of these individual probabilities exactly replicates the overall ownership rate of households included in the total sample. Another way of stating this is that without including the interactions in the model, the differences between the observed and predicted

values are attributable to the interactions among the variables. Including all the interactions fully defines the model, and the observed and predicted ownership rate for the total sample are expected to be identical.

We were then able to average the assigned individual homeownership probabilities for subgroups to calculate predicted ownership rates for that subgroup, and for sub-samples of the subgroup, for example high school graduates who were in the cohort born 1950-1959. The predicted cohort sub-sample average probability no longer exactly replicates the observed cohort sub-sample homeownership rate, but the prediction is very close. The model will tend to smooth out cohort variations that tend to be present because of sampling variability. This is shown in Figures 1a-1d, which plots the directly tabulated cohort trajectories of homeownership against the predicted values from the simple logit model controlling for education. For our purposes we judge the predicted ownership rate to be a satisfactory substitute for the tabulated ownership rate, and it is the predicted values that we ultimately need to explain.

The tails of the arrows in Figure 1 (and in subsequent figures) represent the levels of homeownership attained by cohorts within an education category when they were age x in 1985, while the heads of the arrows trace the changes in homeownership between 1985 and 1995 when the cohort is age $x+10$. The smaller the subgroups the more you would expect that the average probability of homeownership (based on individual probabilities derived from the entire sub-sample) would deviate from the actual homeownership rate measured by the raw data in the sample. To alleviate this problem, we run the simple model separately for different groups defined by race and family type. Then, while we are controlling for race and family type, we average these new individual probabilities when calculating predicted subgroup homeownership for cohorts with different educational attainment.

Figures 2a-2c re-plot these estimated cohort ownership trajectories for household heads with less than high school education, some college, and college degree or higher against the cohort trajectories for the high school graduate reference group. The strong disadvantage in attaining homeownership of household heads with less than high school education can be clearly seen in Figure 2a. Figure 2a confirms the conclusion of Gyourko and Linneman that the disadvantage of the least educated appears to have worsened for

successively younger cohorts, except that further deterioration in homeownership appears to have been halted by the youngest cohort born in the 1960s.

Even the oldest cohort in our analysis (heads born in the decade of the 1920s) shows a significant disadvantage in homeownership attained for those with less than high school education. This finding contradicts that of Gyourko and Linneman who found greater convergence in homeownership by education among these older cohorts. While Figure 2a only measures the segment of the lifetime trajectories of homeownership “visible” between 1985 and 1995, these differences in cohort trajectories for older cohorts were undoubtedly well established before 1985. While it is clear that the older cohorts of the least educated may have fared slightly better in their homeownership progress than baby boom cohorts, “convergence” is much too strong a word to characterize these ownership trends. But, as we shall see below, there has been convergence in ownership progress late in life among certain subgroups of the population.

Also revealed in the plots in Figure 2a is a deterioration of relative homeownership progress for successively younger cohorts of high school graduates, although not as severely as for those with less than a high school diploma. This finding is important, and was not reported by Gyourko and Linneman. We recognize that some of this cohort slippage for high school graduates might be due to the definitional problems discussed above. The analysis below will help us better understand this slippage in ownership trajectories of high school graduates.

Figure 2b shows that taking some college courses without attaining a degree offers only a slight boost to homeownership for all cohorts. A college degree, on the other hand, is much more significant in its effects on homeownership, raising homeownership rates by 5-10 points for all cohorts (Figure 2c). The largest effect of a college education was realized by the baby boomers born in the 1940s and 1950s.

Homeownership by Education and Race

When the simple model is run separately for whites and blacks, several significant modifications must be made to the generalizations just stated. The white pattern of cohort homeownership attainment fairly well mirrors the findings for all racial groups combined, which is not surprising given the fact that whites in 1995 headed over 85 percent of all owner

households (higher for the older cohorts, lower for the younger cohorts). The disadvantage of not completing high school for whites, and the advantage of getting a college degree, are both slightly smaller than in the general population (Figures 3a and 3c).

For blacks, the value of education for homeownership is markedly different than for whites. First, the levels of homeownership attainment by cohorts of high school graduates are much lower for blacks compared to whites. Also, as for whites, the baby boom cohorts of blacks without a high school diploma show much lower levels of homeownership compared to those in the same cohort who graduated high school (Figure 4a). For the two oldest black cohorts however, not having a high school diploma did not depress ultimate homeownership levels compared to high school graduates (the “convergence” noted by Gyourko and Linnemnan).

College education – even some college, but certainly college graduation – has a more profound impact on homeownership attainment for blacks (Figures 4b and 4c). Blacks with some college have cohort ownership trajectories that are 5-10 points higher than the high school graduate reference group. Black college graduates in the three oldest cohorts achieve levels of homeownership that are about 20 points higher than high school graduates. Significantly perhaps, the effect of college graduation on homeownership attainment seems to have been seriously weakened for the youngest cohort of black household heads. This finding, added to the declining rates of college attendance and graduation for cohorts born since 1960 (Mare 1995), bodes ill for future levels of homeownership attainment of younger blacks.³

Homeownership by Education and Family Type

The highest levels of homeownership are achieved by married couples, and the lowest levels by non-family households. Other family households (mostly female-headed families) are intermediate. Within each of these three family types, the effects of education on homeownership attainment are broadly similar to the effects in the general population.

³ College attainment and graduation rates have fallen for whites as well, but the rates of decline have been more rapid for blacks (Farley 1996). The primary reason for this strong decline in black college enrollment appears to have been the rapid rise in college costs since 1980 and the decision on the part of colleges to divert more financial aid to middle-income students and away from students with impoverished backgrounds (Hauser 1989). College attendance for most students now almost requires that student loans be taken out, such debt being an

Married couples with high school degrees move rapidly into homeownership, achieving a rate of almost 90 percent by the time the head is in his or her early 50s (Figure 5a).

Successively younger cohorts of married couple householders with only a high school education have not seen cohort slippage in their homeownership attainment. That is, each cohort of married high school graduates is closely following on the heels of the cohort that preceded them in the age structure (Figure 5a). This indicates that the slippage in ownership trajectories of those with only a high school diploma when all marital status is combined (Figure 2a) is being caused by a shift away from the married couple household type among younger cohorts of heads with a high school degree.

Younger married couples with the head having dropped out of high school are increasingly at a disadvantage in their homeownership progress. The oldest cohort of married high school dropouts fell only five percentage points behind the high school graduates in ultimate homeownership (85 compared to 90 percent). Younger cohorts of dropouts born since 1950 are fully 20 points behind their peers who graduated high school and 30 points behind those who graduated college (Figures 5a and 5c).

Roughly similar conclusions as for married couples apply to other family households as well. For all education groups of other families, there is a steady upward movement in homeownership attainment, such that ultimate homeownership levels fall only about five percentage points short of those attained by married couples (Figures 6a-6c). The initial pace of homeownership attainment is slower for other family households, resulting in significantly lower levels of homeownership in the middle age groups when compared to married couples. Higher homeownership progress in the older age groups reduces the disparity between the two household types. Whereas ownership rates for older other family household heads with a high school degree converges to the levels achieved by those with a college education for the cohort born in the 1920s, ownership rates are 10 to 15 points higher for other family college graduates for cohorts born since 1940.

Part of the steady upward trend for other family households is undoubtedly due to the fact that older other families were once (perhaps even recently) married couples before

added burden that later might discourage some potential first-time homebuyers from applying or qualifying for a mortgage until the debt is paid.

becoming divorced or widowed, and they carried their homeownership status with them into their new family type. Exactly how much of the ownership progress for other families is due to individual other family households making the transition from renting to owning, and how much is due to owner households making the transition from married couple to other family or non-family types, can not be determined without panel data that follows households over time.

The slow start at attaining homeownership for those with less than high school education in the other family category places such households at a disadvantage throughout their life-course. Once again, the baby boom cohorts of the less educated other families have the largest homeownership deficits compared to high school graduates, and the degree of convergence between high school and college graduates seen in the older cohorts is not attained by the younger cohorts. Juxtaposing the ownership trajectories of those with less than high school education (Figure 6a) against those with college education or more (Figure 6c) shows how truly important higher education is for homeownership attainment for the non-traditional families that are more common among baby boomers.

Among non-family households, which are mostly one-person households, but also include two or more persons not related by blood or marriage sharing living quarters, ownership trajectories are the lowest of the three household types (Figures 7a-7c). Those non-family heads with less than high school education have significantly lower ownership rates than high school graduates. Both some college or college graduation and beyond adds only marginally to non-family ownership above what a high school diploma provides.

Understanding White/Black Homeownership Differences

Persistent ownership gaps exist between white and black household heads at all levels of education (Figure 8). Ownership levels for black high school graduates are fully 20 points lower than observed white values for the oldest cohorts (Figure 8b). This difference increases to 30 points for the youngest cohorts. For those with some college or a college degree, black values also fall well below white trends, but the higher the education the less the differential (Figures 8c and 8d). Among the college educated, the differential is reduced to only 5 points for cohorts born in the 1920s and 1930s, but significantly, the differential increases steadily

for younger cohorts of college educated to reach more than 30 points for the cohort born in the 1960s (Figure 8d).

To further understand these differences between white and black cohort homeownership trajectories by education, we need to recognize the importance of racial differences in family structure. Overall, both blacks and whites have almost exactly the same share of all households that are non-family (slightly less than 30 percent), but the remaining 70 percent family households are divided very differently among married couple and other family types (Table 1). According to the 1995 AHS, whites had 54 percent of all households in the married couple category (16 percent other family), while the black proportion married couple was 30 percent of the total with other family amounting to 39 percent. Given the higher ownership rates of married couples, the low proportion married accounts for some of the divergence in rates among younger cohorts of blacks, and presents an increasing obstacle to achieving cohort homeownership progress parallel to that of whites.

To partly test the importance of family structure in explaining the lower homeownership trajectories of blacks, we have calculated black and white homeownership trends by education for married couples, and have compared the trajectories in Figures 9a-9d. White homeownership exceeds black homeownership levels for all cohorts of married couples for all education categories. Black/white differences are larger for those with a high school diploma or less (Figures 9a and 9b), and are generally largest among the youngest cohorts in all four educational groups. Among married couples with the head having a high school diploma, the ownership gap consistently grows from about ten points for the oldest cohorts to over 30 points for the cohort born in the 1960s. Similar graphs for other family and non-family households show broadly similar results (data not shown). These gaps between white and black ownership trajectories within family types are generally less than the differences in Figure 8 for all family types combined, attesting to the importance of differences in family type in explaining part of the black/white homeownership differential. But the persistence of large black/white ownership gaps within each family structure and education category provides evidence that the differences between whites and blacks in family structure and education do not fully explain the black/white cohort homeownership gaps.

A Postscript on White Trends

The black/white differences in homeownership attainment we have described in this analysis is somewhat clouded by the influence of Hispanic immigration on the racial mix of the American population. Immigrants are more likely to be young adults, and because of their immigration status, in addition to their youth, they are less likely to be homeowners. The racial identity of Hispanic immigrants is not always easy to determine. In the 1990 census, only 57 percent of respondents who said their origin was Hispanic selected one of the 14 racial categories listed on the census form (Farley 1996, p. 211). Most often this selection was white. Because we expect lower homeownership attainment by recent immigrants, we should therefore expect an even greater disparity between white and black cohort homeownership trajectories, especially for the younger cohorts, if the Hispanic numbers were purged from the white totals. To test this proposition, we compare non-Hispanic white ownership trends with that of all whites (including Hispanics). Figure 10a shows that only those with less than a high school diploma are significantly affected by the inclusion of Hispanics in the white totals. High school graduates (Figure 10b) are affected to only a minor degree, and those with some college (Figure 10c) or a college degree (Figure 10d), not at all. We therefore conclude that a small amount of the deteriorating homeownership progress we observed for whites with less than a high school diploma is likely due to the growing influence of recent Hispanic immigration on the composition of younger cohorts. Note, however, that even within the non-Hispanic white cohorts of those with less than a high school degree, the younger cohorts are following ever-lower ownership trajectories, especially those born since 1950 (Figure 10a).

Discussion

We have confirmed the findings of Gyourko and Linneman that those with less than high school education are seriously disadvantaged with respect to homeownership attainment over their life-course. This is true for both blacks and whites, and for all household types. Furthermore, it appears that successively younger cohorts of the least educated are falling even further behind in homeownership progress when compared to high school graduates in the same cohort. Gyourko and Linneman couched their findings in terms that suggested that historically, lifetime homeownership rates eventually converged between the least educated

and high school graduates because employment opportunities still eventually rewarded hard work by the less educated. We found this to be true only for blacks born before 1940. For less educated whites born before 1940, the cohort gaps established by age 45, although smaller than the gaps for cohorts born after 1940, showed no signs of ultimate convergence with homeownership levels achieved by high school graduates as the cohorts reached old age.

There is some evidence that successively younger cohorts of high school graduates are also slipping in the progress they are making to attain homeownership as they age. However, this slippage for high school graduates is either greatly reduced or eliminated when different household types are examined, suggesting that it has been the shift away from higher ownership married couple households that has been causing the slowdown in ownership progress for all household types combined. This shift has been especially pronounced for black households.

A college degree makes a huge difference in homeownership attainment for blacks, eventually resulting in homeownership levels that are 20 percent higher than that of black high school graduates. A college degree for whites only raises homeownership rates 5 percentage points above whites with a high school degree, but this is not so surprising since homeownership rates for white high school graduates already are approaching 85 percent for the older cohorts.

There is also evidence that the positive effects on homeownership progress of college attendance, both for those with some college and for those with a degree, might be weakening for the younger cohorts. This is especially true for blacks, but also evident for whites. The high costs of today's college education might increase debt and be a factor in delaying the transition to homeownership by reducing the ability of younger cohorts of college graduates to afford a down payment on a home or qualify for a mortgage. Blacks would be most affected by rising college costs because of lower black parental income and wealth that might be drawn upon to pay for college expenses (Oliver and Shapiro, 1995).

The advantage conferred by having some college education short of a degree is also very significant for blacks. For whites, some college makes no difference compared to high school graduation, but again, the high level of homeownership attained by white high school graduates must be considered.

Explaining Black/White Cohort Homeownership Differences – the Next Steps

Our analysis has revealed persistent differences in cohort trajectories of homeownership attainment between blacks and whites, even when controlling for educational attainment and family structure. Three broad areas of further inquiry suggest themselves to explain these differences. The first we have just alluded to, namely black/white differences in income and wealth. The second recognizes the fact of geographic separation of whites and blacks – regionally, by city/suburb, and within these metropolitan area zones by neighborhood. Geographic segregation of the races is expected to be an important factor in accounting for homeownership differences since some places simply provide better homeownership opportunities because of the larger stock of owner occupied housing that is available. The third set of factors relates to the continuing effects of racial discrimination on access to this owner housing stock because of deficient and discriminatory mortgage lending, real estate steering, and lack of local community support for integration at all levels of civil society.

The next step in our analysis is to systematically introduce variables covering these three broad areas into models that will “explain” the educational, cohort and racial differences that we have observed in our graphs. This next step, however is not an easy one to take. First, there is no single data set that will allow us to derive satisfactory measures of all the variables we would like to include. For example, while household income is available in the AHS data used in our analysis, parental wealth information is not.

Second, researchers often include seriously flawed measures of explanatory variables. A good example are housing prices that may be specific to a broad geographic region but do not reflect the effects of racial segregation within a metropolitan housing market. Housing market discrimination not only restricts access, but affects prices for those units that are accessible. This theme was first developed by Kain and Quigley (1972), and has remained a consistent focus in research on racial differences in homeownership over the past 30 years. Recently, researchers have begun to give more emphasis to the importance of differences between black and white neighborhoods in equity build-up through appreciation of owner housing assets. (See Long and Caudill (1992), Immergluck (1998) and Reidel (2000). If the investment motive is a powerful reason for homeownership, black/white differences in return to investment should help explain some of the observed differences in homeownership rates.

To our knowledge, no research has included explanatory variables that satisfactorily measure either real price differentials faced by prospective homebuyers or expected returns to investment that exist in segregated housing markets.

Other variables generally not included in most analyses are measures of housing market discrimination. These are usually inferred to operate as variables that account for (most?) of the unexplained black/white variance in homeownership once the effects of other explanatory variables are “taken into account.” We need not dwell on the difficulty in reaching such conclusions when basic explanatory variables such as parental wealth are not included in the analysis, or others such as house price and value are poorly measured.

The third pitfall in adding explanatory variables is not including or understanding interaction effects among them. For example, we would like to include the effects of segregation on education and income, of education on income and on the degree of discrimination, of education and income on family type, of family type on income and on discrimination, and so on. A very strong argument can be made about the difficulty of conceptually separating these variables, let alone statistically separating them. A fuller understanding of the cohort differences we have observed in homeownership progress by education, race and family structure will require a well thought-out effort to define the relevant additional explanatory variables, to measure them accurately, and to model their interactions correctly.

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Appendix A

A Simple Logit Model Predicting Home Ownership by Cohorts, Incorporating Data Year, Birth Cohort, Education Level, and Their Interactions

```
. logistic tenure data95 cohort2 cohort3 cohort4 cohort5 hsless somecol colgrad
> hsless2 hsless3 hsless4 hsless5 somecol2 somecol3 somecol4 somecol5 colgrad2
> colgrad3 colgrad4 colgrad5 ycohort2 ycohort3 ycohort4 ycohort5 yhsless ysome
> col ycolgrad
```

```
Logit Estimates                                     Number of obs = 72702
                                                    chi2(27)         =9988.49
                                                    Prob > chi2      = 0.0000
Log Likelihood = -42576.495                       Pseudo R2        = 0.1050
```

tenure	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
data95	3.44717	.2102112	20.294	0.000	3.058833	3.884809
cohort2	3.71335	.2378806	20.479	0.000	3.275195	4.210121
cohort3	9.355824	.6219927	33.633	0.000	8.212825	10.6579
cohort4	14.63348	1.037141	37.860	0.000	12.73559	16.8142
cohort5	20.49359	1.505327	41.116	0.000	17.74574	23.66692
hsless	.5304704	.0425547	-7.903	0.000	.4532911	.6207904
somecol	.9358356	.0607705	-1.021	0.307	.8239957	1.062855
colgrad	.9303398	.0629139	-1.068	0.286	.8148532	1.062194
hsless2	.8214201	.0705472	-2.291	0.022	.6941613	.9720089
hsless3	.9061273	.0792869	-1.127	0.260	.763323	1.075648
hsless4	1.057637	.0950031	0.624	0.533	.8869044	1.261236
hsless5	1.151053	.1028689	1.574	0.115	.9661046	1.371408
somecol2	1.090256	.0716524	1.315	0.189	.958488	1.240138
somecol3	1.089106	.0771974	1.204	0.229	.9478412	1.251424
somecol4	1.076351	.0902946	0.877	0.380	.9131605	1.268706
somecol5	1.16772	.1070782	1.691	0.091	.9756288	1.397631
colgrad2	1.332524	.0904707	4.228	0.000	1.166496	1.522182
colgrad3	1.545358	.113167	5.944	0.000	1.338737	1.783868
colgrad4	1.29867	.1108083	3.063	0.002	1.098678	1.535066
colgrad5	1.337842	.126512	3.078	0.002	1.111505	1.610267
ycohort2	.5948895	.0384976	-8.026	0.000	.5240247	.6753375
ycohort3	.3666109	.0246381	-14.931	0.000	.3213664	.4182254
ycohort4	.342844	.0249583	-14.705	0.000	.2972561	.3954233
ycohort5	.2781567	.0208146	-17.100	0.000	.2402114	.3220961
yhsless	.974712	.0485727	-0.514	0.607	.8840127	1.074717
ysomecol	1.065019	.0504924	1.329	0.184	.9705142	1.168726
ycolgrad	1.245159	.0593305	4.602	0.000	1.134138	1.367048

Appendix B

The Same Simple Logit Model, White Households Only

```
. logistic tenure data95 cohort2 cohort3 cohort4 cohort5 hsless somecol colgrad
> hsless2 hsless3 hsless4 hsless5 somecol2 somecol3 somecol4 somecol5 colgrad2
> colgrad3 colgrad4 colgrad5 ycohort2 ycohort3 ycohort4 ycohort5 yhsless ysome
> col ycolgrad if white==1
```

```
Logit Estimates                                     Number of obs = 51127
                                                    chi2(27)       =7511.64
                                                    Prob > chi2    = 0.0000
                                                    Pseudo R2      = 0.1163

Log Likelihood = -28549.116
```

tenure	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
data95	3.296405	.2250035	17.476	0.000	2.883633	3.768263
cohort2	3.924551	.2754003	19.484	0.000	3.420251	4.503207
cohort3	10.02127	.7372175	31.329	0.000	8.67569	11.57555
cohort4	15.62305	1.237763	34.695	0.000	13.37605	18.24752
cohort5	20.29051	1.641764	37.202	0.000	17.3149	23.7775
hsless	.6365977	.064151	-4.482	0.000	.5225022	.7756075
somecol	.8712681	.0694352	-1.729	0.084	.7452737	1.018563
colgrad	.854932	.0732869	-1.828	0.067	.7227107	1.011343
hsless2	.7369161	.081563	-2.758	0.006	.5932064	.9154409
hsless3	.8271166	.0927355	-1.693	0.090	.663943	1.030392
hsless4	.9315207	.1078085	-0.613	0.540	.7424712	1.168706
hsless5	1.122431	.1273005	1.018	0.309	.898712	1.401841
somecol2	1.128281	.0944358	1.442	0.149	.9575749	1.329419
somecol3	1.12492	.1010966	1.310	0.190	.9432442	1.341588
somecol4	.9984293	.1045457	-0.015	0.988	.8131821	1.225877
somecol5	1.164548	.1298116	1.367	0.172	.9359968	1.448907
colgrad2	1.300289	.1151297	2.966	0.003	1.093133	1.546702
colgrad3	1.478369	.1389909	4.158	0.000	1.229578	1.777501
colgrad4	1.282277	.1388246	2.297	0.022	1.037116	1.585391
colgrad5	1.419333	.1654243	3.005	0.003	1.129473	1.783579
ycohort2	.6148655	.0450871	-6.633	0.000	.532553	.7099004
ycohort3	.4151486	.0320028	-11.404	0.000	.3569328	.4828594
ycohort4	.4329785	.0370369	-9.786	0.000	.3661463	.5120094
ycohort5	.3277999	.0283699	-12.887	0.000	.2766561	.3883983
yhsless	.8758887	.0547518	-2.120	0.034	.7748905	.990051
y一些col	1.071928	.0619124	1.203	0.229	.9571988	1.20041
ycolgrad	1.278834	.0760163	4.138	0.000	1.138196	1.436849

Appendix C

The Same Simple Logit Model, Black Households Only

```
. logistic tenure data95 cohort2 cohort3 cohort4 cohort5 hsless somecol colgrad
> hsless2 hsless3 hsless4 hsless5 somecol2 somecol3 somecol4 somecol5 colgrad2
> colgrad3 colgrad4 colgrad5 ycohort2 ycohort3 ycohort4 ycohort5 yhsless ysome
> col ycolgrad if black==1
```

```
Logit Estimates                                     Number of obs =   6182
                                                    chi2(27)         =1120.55
                                                    Prob > chi2      = 0.0000
Log Likelihood = -3676.4299                       Pseudo R2        = 0.1322
```

tenure	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
data95	2.354017	.6505189	3.098	0.002	1.369572 4.046077
cohort2	3.710249	1.025554	4.743	0.000	2.158348 6.378002
cohort3	9.847755	2.721332	8.277	0.000	5.729489 16.92617
cohort4	15.44509	4.371931	9.670	0.000	8.868431 26.89886
cohort5	18.69524	5.557336	9.851	0.000	10.44007 33.47794
hsless	.4396608	.1540612	-2.345	0.019	.2212325 .873749
somecol	1.22011	.3644123	0.666	0.505	.6794687 2.190932
colgrad	.8277737	.3298222	-0.474	0.635	.3791008 1.807459
hsless2	.9179879	.3456336	-0.227	0.820	.4388834 1.920104
hsless3	.8466831	.3101583	-0.454	0.650	.4129595 1.735939
hsless4	1.670235	.6090647	1.407	0.160	.8172968 3.413305
hsless5	1.745262	.6507757	1.494	0.135	.8403566 3.624582
somecol2	.918164	.2816594	-0.278	0.781	.5032717 1.67509
somecol3	.9615635	.2988474	-0.126	0.900	.5229141 1.768176
somecol4	1.101627	.3769456	0.283	0.777	.563349 2.154228
somecol5	1.028708	.4059424	0.072	0.943	.4746748 2.2294
colgrad2	2.124331	.8614771	1.858	0.063	.9594791 4.703366
colgrad3	2.593882	1.069616	2.311	0.021	1.155974 5.820395
colgrad4	3.373032	1.512936	2.711	0.007	1.400307 8.12489
colgrad5	3.154118	1.515192	2.391	0.017	1.230193 8.086911
ycohort2	.7629978	.2217108	-0.931	0.352	.4317003 1.348541
ycohort3	.6499717	.1892659	-1.480	0.139	.3673096 1.150156
ycohort4	.5498647	.1649445	-1.994	0.046	.3054348 .9899042
ycohort5	.4845106	.1493161	-2.351	0.019	.2648382 .8863922
yhsless	1.278574	.1942767	1.617	0.106	.9492655 1.722123
y一些col	1.076599	.1771709	0.448	0.654	.7797865 1.486388
ycolgrad	1.142356	.2320931	0.655	0.512	.7671183 1.701142

Appendix D

The Same Simple Logit Model, Households of Married Families Only

```
. logistic tenure data95 cohort2 cohort3 cohort4 cohort5 hsless somecol colgrad
> hsless2 hsless3 hsless4 hsless5 somecol2 somecol3 somecol4 somecol5 colgrad2
> colgrad3 colgrad4 colgrad5 ycohort2 ycohort3 ycohort4 ycohort5 yhsless ysome
> col ycolgrad if mfam==1
```

```
Logit Estimates                                     Number of obs = 42752
                                                    chi2(27)       =5192.95
                                                    Prob > chi2    = 0.0000
Log Likelihood = -20342.106                       Pseudo R2      = 0.1132
```

tenure	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
data95	3.189648	.2647245	13.976	0.000	2.710799	3.753082
cohort2	3.062501	.2597665	13.195	0.000	2.593438	3.616401
cohort3	8.668989	.7826227	23.923	0.000	7.263122	10.34698
cohort4	15.72593	1.578823	27.444	0.000	12.91692	19.14581
cohort5	19.62925	2.098065	27.853	0.000	15.91928	24.20383
hsless	.4842851	.0525226	-6.686	0.000	.3915481	.5989867
somecol	1.130459	.1063894	1.303	0.193	.9400414	1.359449
colgrad	1.140996	.1138006	1.322	0.186	.9383983	1.387335
hsless2	.9479351	.1080701	-0.469	0.639	.7581178	1.185279
hsless3	.9812066	.1185506	-0.157	0.875	.7743142	1.243379
hsless4	1.065492	.1372725	0.492	0.622	.8277241	1.371559
hsless5	1.341853	.1782758	2.213	0.027	1.034228	1.740981
somecol2	1.108096	.105488	1.078	0.281	.9194858	1.335394
somecol3	.9270247	.0973896	-0.721	0.471	.7545142	1.138978
somecol4	.8217355	.1064476	-1.516	0.130	.6374812	1.059246
somecol5	1.255387	.2001021	1.427	0.154	.9185448	1.715752
colgrad2	1.334653	.1325234	2.907	0.004	1.098624	1.621392
colgrad3	1.380566	.1517924	2.933	0.003	1.112931	1.712562
colgrad4	.9533952	.1234779	-0.368	0.713	.7396574	1.228897
colgrad5	1.235872	.1871158	1.399	0.162	.9185409	1.662834
ycohort2	.7745363	.0693018	-2.855	0.004	.6499505	.9230033
ycohort3	.501584	.0478117	-7.238	0.000	.4161078	.6046185
ycohort4	.4121004	.0437891	-8.343	0.000	.3346229	.5075167
ycohort5	.3595196	.0412235	-8.922	0.000	.2871584	.4501152
yhsless	.9016254	.0666059	-1.402	0.161	.7800909	1.042094
y一些col	.9887641	.0716017	-0.156	0.876	.8579316	1.139548
ycolgrad	1.143117	.0835213	1.831	0.067	.9905994	1.319117

Appendix E

The Same Simple Logit Model, Households of Other Families Only

```
. logistic tenure data95 cohort2 cohort3 cohort4 cohort5 hsless somecol colgrad
> hsless2 hsless3 hsless4 hsless5 somecol2 somecol3 somecol4 somecol5 colgrad2
> colgrad3 colgrad4 colgrad5 ycohort2 ycohort3 ycohort4 ycohort5 yhsless ysome
> col ycolgrad if ofam==1
```

```
Logit Estimates                                     Number of obs = 12338
                                                    chi2(27)         =2321.48
                                                    Prob > chi2      = 0.0000
Log Likelihood = -7385.6428                       Pseudo R2        = 0.1358
```

tenure	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
data95	3.090909	.5306323	6.573	0.000	2.207782 4.327294
cohort2	3.42615	.6149685	6.861	0.000	2.410027 4.870692
cohort3	8.612499	1.5446	12.006	0.000	6.059981 12.24016
cohort4	14.6333	2.748087	14.288	0.000	10.1272 21.14439
cohort5	29.40194	6.026442	16.496	0.000	19.67466 43.93844
hsless	.5858485	.1013251	-3.092	0.002	.4174132 .8222509
somecol	1.011493	.1660649	0.070	0.945	.7331864 1.395441
colgrad	2.604689	.5354343	4.657	0.000	1.740917 3.897028
hsless2	.6041081	.1101123	-2.765	0.006	.4226336 .8635059
hsless3	.6870509	.1265713	-2.037	0.042	.4788253 .9858272
hsless4	.8299985	.1593883	-0.970	0.332	.569662 1.209309
hsless5	.7750803	.1628791	-1.212	0.225	.513418 1.170098
somecol2	1.143729	.1788178	0.859	0.390	.8418622 1.553837
somecol3	1.26251	.2126967	1.384	0.166	.9074688 1.756458
somecol4	1.099366	.2253952	0.462	0.644	.7355737 1.643077
somecol5	.9718291	.2465818	-0.113	0.910	.5910373 1.597956
colgrad2	.7801218	.1558305	-1.243	0.214	.5273922 1.153961
colgrad3	.7484343	.1548268	-1.401	0.161	.4989622 1.122638
colgrad4	.7263653	.1809192	-1.284	0.199	.4458023 1.183499
colgrad5	.4851651	.1471867	-2.384	0.017	.2677051 .8792703
ycohort2	.7168836	.1302954	-1.831	0.067	.5020427 1.023662
ycohort3	.4919691	.0898111	-3.886	0.000	.3439911 .7036042
ycohort4	.5508274	.1072766	-3.062	0.002	.3760447 .8068477
ycohort5	.5754862	.1209729	-2.629	0.009	.381157 .8688923
yhsless	1.112672	.1260812	0.942	0.346	.8910749 1.389377
y一些col	.9528066	.1081627	-0.426	0.670	.7627396 1.190236
ycolgrad	.9009413	.1211108	-0.776	0.438	.6922644 1.172522

Appendix F

The Same Simple Logit Model, Households of Non-Families Only

```
. logistic tenure data95 cohort2 cohort3 cohort4 cohort5 hsless somecol colgrad
> hsless2 hsless3 hsless4 hsless5 somecol2 somecol3 somecol4 somecol5 colgrad2
> colgrad3 colgrad4 colgrad5 ycohort2 ycohort3 ycohort4 ycohort5 yhsless ysome
> col ycolgrad if nfam==1
```

Logit Estimates Number of obs = 17612
chi2 (27) = 2417.59
Prob > chi2 = 0.0000
Pseudo R2 = 0.1008
Log Likelihood = -10778.904

tenure	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
data95	3.143022	.3916625	9.190	0.000	2.461933 4.012531
cohort2	3.191299	.4400056	8.416	0.000	2.435604 4.181464
cohort3	5.552577	.8012188	11.880	0.000	4.184744 7.367501
cohort4	8.338025	1.210254	14.611	0.000	6.273535 11.0819
cohort5	17.0762	2.393844	20.242	0.000	12.97372 22.47593
hsless	.7283248	.1544851	-1.495	0.135	.4805921 1.103757
somecol	.9222417	.1235017	-0.604	0.546	.7093431 1.199038
colgrad	.8005443	.1066892	-1.669	0.095	.616517 1.039503
hsless2	.5282087	.1324296	-2.546	0.011	.3231446 .8634043
hsless3	.8840009	.2045568	-0.533	0.594	.5616757 1.391297
hsless4	1.010729	.2251166	0.048	0.962	.6532044 1.563941
hsless5	.8790451	.1869644	-0.606	0.544	.5793871 1.333686
somecol2	.98682	.1399738	-0.094	0.925	.7473098 1.303092
somecol3	1.009612	.150416	0.064	0.949	.7539444 1.351979
somecol4	1.232391	.1958007	1.315	0.188	.9026318 1.682621
somecol5	1.049247	.1618195	0.312	0.755	.7755354 1.41956
colgrad2	1.211805	.1674799	1.390	0.165	.9242523 1.58882
colgrad3	1.493071	.2177304	2.749	0.006	1.121895 1.98705
colgrad4	1.273162	.2013261	1.527	0.127	.9338615 1.735741
colgrad5	1.087313	.1740268	0.523	0.601	.7945436 1.48796
ycohort2	.6054132	.0799957	-3.798	0.000	.4672822 .7843766
ycohort3	.4738959	.064975	-5.447	0.000	.3622231 .6199971
ycohort4	.5220611	.0742176	-4.572	0.000	.3951048 .6898113
ycohort5	.3774699	.0521384	-7.053	0.000	.2879448 .4948294
yhsless	.8576377	.0909293	-1.448	0.147	.6967178 1.055725
y一些col	1.174599	.1104239	1.712	0.087	.9769412 1.412248
ycolgrad	1.294288	.11723	2.848	0.004	1.083761 1.545712