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Homeownership Boom and Bust 2000 to 2009: Where Will the Homeownership Rate Go from Here?

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EXECUTIVE SUMMARY

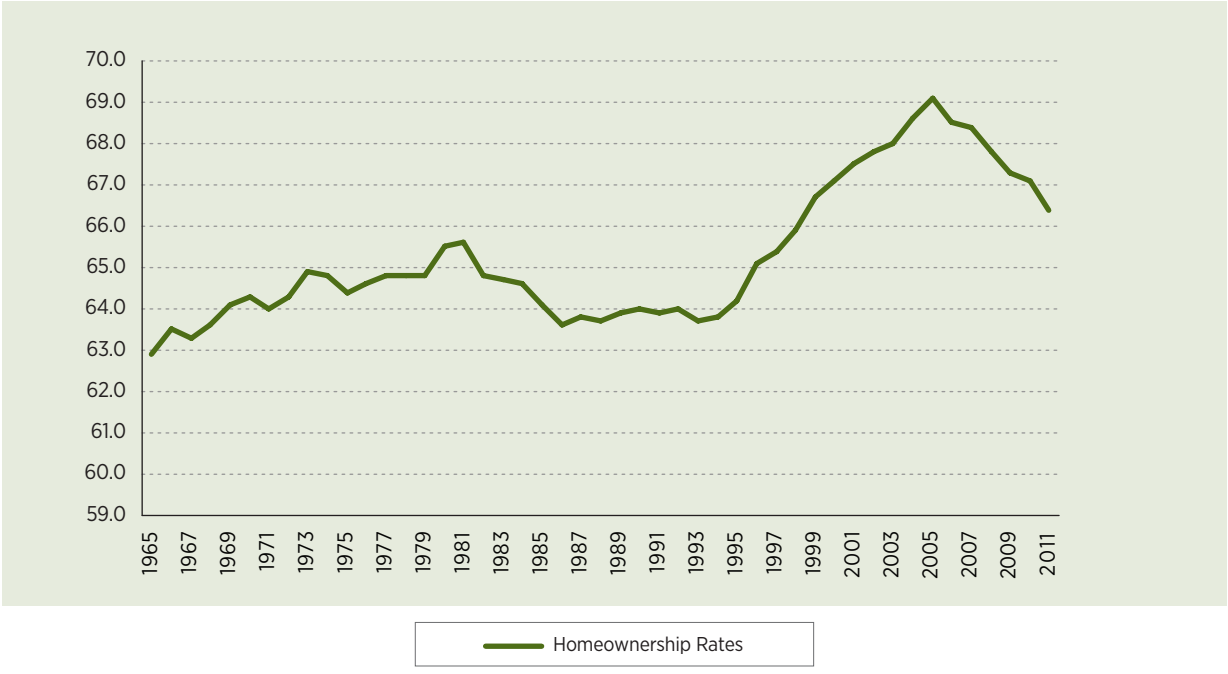
The boom and bust in housing markets defined the opening decade of the 21st century. Sharp declines in house prices served as a catalyst for the 2007 meltdown in mortgage and capital markets and the downturn in the global economy. The past decade also witnessed a dramatic boom and bust in homeownership. In 2000, U.S. homeownership rates stood at roughly 67 percent, the highest level recorded to that point in time. That rate jumped to a new all-time high of 69.2 percent in the fourth quarter of 2004 and remained at roughly that level through the middle of 2006. With the onset of the 2007 financial crisis, homeownership rates have dropped, falling to 66.4 percent in the first quarter of 2011.

This paper employs individual-level data from the 2000 census and the 2005 and 2009 American Community Surveys (ACS) to assess housing tenure post-crisis and the future of homeownership. The empirical work is divided into three parts: (i) assessment of the underlying drivers of homeownership, (ii) ex-post analysis of the boom and bust in homeownership during the 2000s and (iii) discussion of what may lie ahead for U.S. homeownership rates. Research findings suggest that a combination of changes in mortgage credit standards and attitudes towards investment in homeownership likely contributed to much of the boom and bust in homeownership over the decade. Changes in socio-demographic composition and economic attributes also served to lower homeownership rates over time. Based on these and other estimates, our most optimistic scenario suggests that homeownership rates may have bottomed out by early 2011 after falling nearly three percentage points from their peak in 2006. A less optimistic scenario based on our model estimates, however, suggests that homeownership rates will decline further — by as much as one to two percentage points — over the course of the next few years.

1. INTRODUCTION

The boom and bust in housing markets defined the opening decade of the 21st century. Sharp declines in house prices served as a catalyst for the 2007 meltdown in mortgage and capital markets and the downturn in the global economy. Less well known is that the decade of the 2000s experienced a dramatic boom and bust in homeownership. As seen in Figure 1, from the late 1960s to 1997, U.S. homeownership rates fluctuated between roughly 64 and 65 percent. By 2000, however, U.S. homeownership rates had moved up to roughly 67 percent, the highest level recorded to that point in time. That rate jumped to a new all-time high of 69.2 percent in the fourth quarter of 2004 and remained at roughly that level through the middle of 2006. With the onset of the 2007 financial crisis, homeownership rates have dropped, falling to 66.4 percent in the first quarter of 2011.

Figure 1
U.S. Homownership Rate



The recent sharp decline in homeownership is alarming and has symbolic as well as tangible adverse effects on the economy. Homeownership is deeply embedded in American culture and has long been a symbol of economic achievement in the United States.[1] Partly for that reason, homeownership is encouraged through a multiplicity of federal and state policies and programs. At the household level, homeownership traditionally has been viewed as an important mechanism for the accumulation of wealth. Homeownership also contributes directly to the economic health of communities and the nation. At the local level, homeowners are invested in their communities and have incentives to behave in ways that enhance the appeal of their neighborhoods. Studies by DiPasquale and Glaeser (1999) and Rosenthal (2008) find evidence consistent with such behavior.[2]

There is also a tight link between homeownership and the macro-economy. Previous studies have emphasized that the desire to invest in real estate and homeownership increases housing demand and likely contributes to new home construction (e.g., Henderson and Ioannides (1983) and Ioannides and Rosenthal (1994)).[3] Other research has emphasized the propensity of households to consume out of home equity and the related effects on the macro-economy (Canner et al (2002), Case, Quigley, and Shiller (2005) and Bostic, Gabriel, and Painter (2009)). Federal Reserve Chairman Alan Greenspan argued that such spending helped to bolster economic activity during the 2001 recession, softening the downturn at that time.[4] For all of these reasons, federal and state governments have long promoted homeownership through a range of policy mechanisms.[5]

Given the critical role of housing and homeownership in the economy, the rapidly declining homeownership rate points to the following question: will homeownership rates fall further? Recent history suggests that this is not an idle question. As noted above, from the late 1960s to the mid-1990s, for example, U.S. homeownership rates were relatively stable between roughly 64 and 65 percent, well below levels recorded in late 2010 (see Figure 1).[6] Could rates return to those lower levels, with corresponding adverse implications for the local and national economies?

With the above as backdrop, this paper seeks to address a set of interrelated questions about homeownership in the United States, the experience of the 2000s and what may lie ahead. We begin by sketching out a simple model of the consumption (or "shelter") and investment demands for housing that helps to highlight the underlying drivers of homeownership. This approach embodies the same information included in measures that characterize the cost of owning a home for one year relative to renting (i.e., user-cost measures of homeownership). However, our approach permits a more behavioral interpretation of what drives demand for homeownership, including tastes and preferences for taking on risk.[7] The empirical work then is divided into three parts: (i) an assessment of the underlying drivers of homeownership, (ii) an ex-post analysis of what drove the boom and bust in homeownership during the 2000s and (iii) some projections of what may lie ahead for U.S. homeownership rates, bearing in mind that any such projections are subject to uncertainty.

Our analysis is conducted using household-level data from the 2000 U.S. Census and the 2005 and 2009 American Community Surveys (ACS). For each sample year, separate regressions of household homeownership status are run for 60 groups of individuals stratified by age for ages 20, 21, 22 and so on, all the way up to 80. Stratifying the sample in this manner greatly enriches the analysis as it provides a clear indication of how the drivers of homeownership vary over the life cycle. That stratification is feasible because of the very large sample sizes in the 2000 Census and the ACS, details of which are provided later in the paper.

A further feature of the analysis is motivated by the fact that homeownership rates depend on past decisions, since a family's housing tenure status is determined only at the time of a move. For that reason we estimate all of our models twice, once for all families including those who may have been in their homes for many years, and then again for a subset of households that only recently moved into their homes. Findings from the two samples complement and enrich our assessment of the drivers of homeownership and future possible trends.

All of the homeownership regressions include 34 control variables designed to highlight the underlying drivers of homeownership. These include a wide range of socio-economic attributes of the families. Other drivers of homeownership are more difficult to observe, including mortgage underwriting standards and the intrinsic taste for housing investment. The former includes significant easing of credit standards in the first half of the 2000s along with the much tighter mortgage underwriting seen since 2007. The latter includes the possibility that households in the first half of the 2000s may have harbored unrealistically optimistic expectations of housing capital gains only to be followed by a shifting back to a more conservative posture following the crash in house prices in 2007. Although we do not directly measure lending standards and tastes for homeownership, we offer indirect support suggesting that these factors likely played an important role in the boom and bust of homeownership during the 2000s.

On this latter point, two of our control measures warrant special attention and are highlighted here (the other controls are described later in the paper). The first of these is the median owner-assessed value of owner-occupied homes in the public use micro area (PUMA) in which the individual lives, an area about 50 percent larger than a typical county.[8] Higher house prices force families to seek larger mortgages with higher monthly payments or require larger down payments to qualify for the larger loans. For these reasons, higher house prices act as a deterrent to homeownership after controlling for other factors such as household income.

A second control of special note is the level of local house price volatility. Conditional on the other model controls, it seems unlikely that the consumption demand for housing, as driven by the need for shelter, is particularly sensitive to house price volatility. Investment demand, however, is surely sensitive to house price volatility since it has a direct effect on the potential for capital gains and

losses.[9] If households are risk-averse, volatility should discourage homeownership. Moreover, changes in the sensitivity of homeownership decisions to house price volatility would indicate changes in attitudes towards housing as an investment. We draw on this idea to offer indirect evidence of whether underlying preferences for homeownership have declined since the boom years of the mid-2000s.

It is worth emphasizing that our modeling strategy yields a set of panels of coefficients that characterize drivers of homeownership over the decade and across the life cycle from age 20 to 80. Drawing on those panels of estimated model coefficients, we conduct a shift-share analysis that decomposes changes in aggregate homeownership rates over time into the contributions from changes in model controls (e.g., household socio-economic traits, house prices and volatility) versus changes in model coefficients. We first perform this analysis based on the entire sample of households and then again using just those households that moved in the prior 12 months. As suggested above, although inertia associated with non-movers affects the full-sample shift-share results, that influence is largely absent in the recent-mover sample. Together, findings from the two samples provide a more complete picture than if only one of the samples were used.

Bearing the above points in mind, for the full sample of 20- to 80-year-olds, findings from the shift-share analysis indicate that the sharp increase in homeownership between 2000 and 2005 was driven *entirely* by changes in the model coefficients. Indeed, were it not for easier access to homeownership, shifts in household socio-economic attributes and the other model controls would have caused homeownership rates to *decline* between 2000 and 2005. Between 2005 and 2009, the pattern was largely reversed: all things equal, changes in household socio-economic traits and house prices would have boosted homeownership rates. However, that effect was more than offset by deteriorating credit conditions as reflected in the model coefficients. Over the entire 2000 to 2009 period, changes in the model coefficients boosted homeownership by an amount sufficient to offset adverse shifts in the model controls, resulting in a 1 percentage-point net increase in homeownership.

Analogous shift-share decompositions for the recent-mover sample are qualitatively similar to those just noted, but considerably more dramatic. As an example, from 2000 to 2005, changes in the estimated model coefficients are estimated to have increased the share of movers choosing to own by five percentage points. From 2005 to 2009 the effect is even larger but of opposite sign: over this period, changes in market conditions are estimated to have reduced the share of movers choosing to own by 10.5 percentage points, indicative of the credit market implosion and onset of the financial crisis.

Taking our various estimates into account, a possible scenario going forward is that homeownership rates may have bottomed out by early 2011. A more likely scenario, however, is that homeownership rates may decline further — by as much as one to two percentage points — over the course of the next few years.

These patterns are discussed in greater detail later in the paper. In the following section, we first describe a simple model that makes clear the sense in which there is a well-defined demand for homeownership, and how that demand is linked to the divergence between consumption and investment motives for owning real estate. Section 3 describes the data while Section 4 discusses our regression results. Section 5 examines the drivers of aggregate homeownership rates and develops projections of future possible trends. Section 6 concludes.

2. THE DEMAND FOR HOMEOWNERSHIP AND ACCESS TO MORTGAGE CREDIT

This section outlines a simple model that describes the demand for homeownership. We end the section by commenting briefly on the role of access to mortgage credit as a driver of homeownership. As will become apparent, both considerations have direct implications for interpretation of our empirical results to follow. We begin with demand.

It is not uncommon to see references to the demand for homeownership in the popular press, academic articles and policy discussions. Nevertheless, the sense in which there is a demand for homeownership is potentially ambiguous, in part because households consume housing services, not homeownership, and, at least in principle, investment in housing does not require the owner to occupy the property. This section offers an explicit definition of the demand for homeownership that helps to interpret the empirical work to follow. The discussion draws closely on previous work by Henderson and Ioannides (1983) and Ioannides and Rosenthal (1994).[10]

There are two sources of housing demand: the need for shelter and the desire to invest in real estate as part of a diversified portfolio. Consumption (shelter) demand for housing is sensitive to socio-economic attributes of the family, including household size, income and related attributes that affect the willingness to pay for housing services. By itself, shelter demand need not imply purchase of a home since families could rent a home to satisfy their shelter needs. Investment demand, in contrast, is driven by the family's taste for risk and market conditions that affect the anticipated risk-adjusted expected return from real estate and alternative investments.

Henderson and Ioannides (1983) emphasize that if a family's consumption demand for real estate exceeds its investment demand, then that family is likely to rent. To do otherwise would require the family to either occupy less housing than family size and income might warrant or purchase an excessive amount of housing from the perspective of investment portfolio allocation. As investment demand surpasses consumption demand, however, the family becomes increasingly likely to own their primary home. This is because the family could purchase a level of housing equal to investment

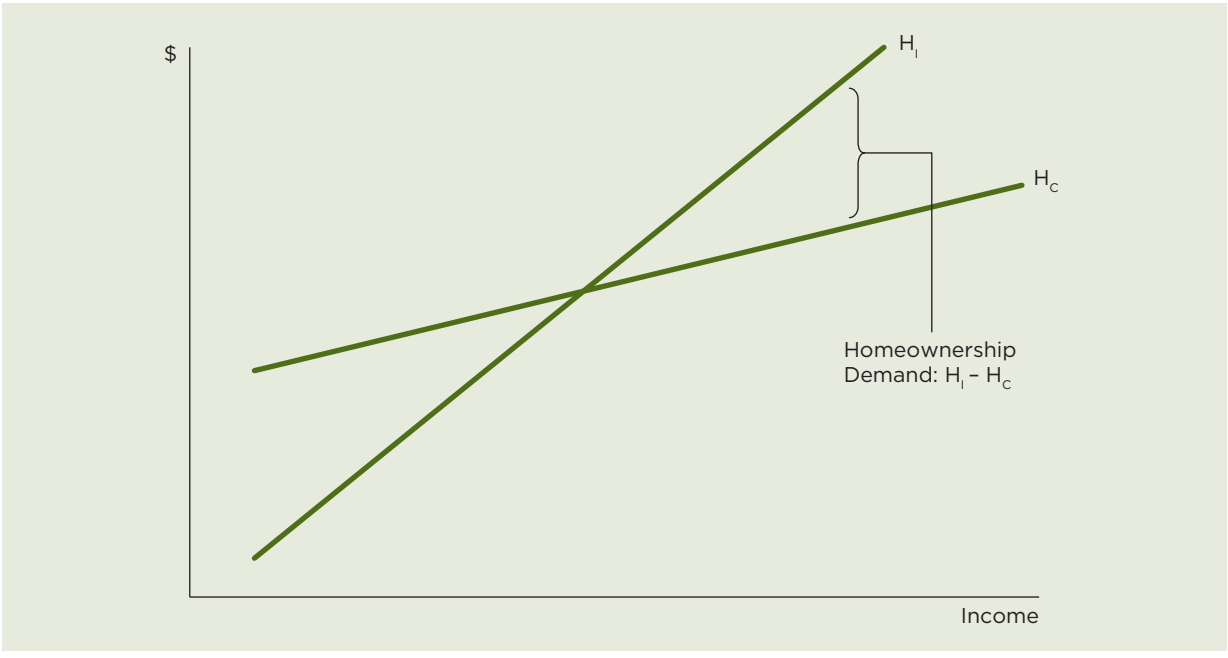
demand and then either occupy more housing than needed for consumption purposes — which seems likely to impose relatively modest costs on the family — or rent out the extra space (as with a basement suite or a second home, for example). Figure 2 illustrates.

In Figure 2, H_C and H_I are the consumption and investment demands for housing and increase along the vertical axis. For purposes of illustration, household income is on the horizontal axis and is assumed to have a more positive impact on H_I than on H_C. The slope of the investment demand function therefore exceeds that of the slope of the consumption demand function, with the two lines crossing. Given the discussion above, families are increasingly likely to own their primary residence as $H_I - H_C$ increases. This would be consistent with the widely documented tendency for homeownership to increase with income. This also suggests that the demand for homeownership is well measured by $H_I - H_C$.

The model in Figure 2 is important for interpretation of estimates from the empirical work to follow. It suggests, for example, that the coefficient on household income in a homeownership regression is reduced form in nature, reflecting the combined influence of the consumption and investment demands for housing (e.g. Ioannides and Rosenthal (1994)). On the surface, this also suggests that it would be difficult to infer evidence of shifts in the investment demand for housing and homeownership over the decade of the 2000s. Nevertheless, we can make progress in that direction for several reasons.

The first reason has to do with dynamics. The discussion in the Introduction suggests that households may have been more risk-loving in the early part of the 2000s and more risk-averse following the financial crash. All things equal, such changes would imply an initial upward shift in the investment demand function in Figure 2, followed by a subsequent downward shift of the function beginning in 2007. Such changes would be consistent with corresponding shifts in the demand for homeownership.

Figure 2
Demand for Homeownership



If this were all that changed in the 2000s, we would be able to infer shifts in the investment demand function and the demand for homeownership by examining changes in the coefficients from a series of homeownership regression models estimated at different points across the decade. Two factors, however, complicate such efforts. The first, as discussed above, is that the homeownership model coefficients are sensitive to the unobserved parameters (slopes) of both the housing shelter and housing investment demand functions. Although there is no particular reason to expect that the underlying parameters of the housing consumption function would have changed much over the 2000 to 2009 period, we cannot rule out that possibility. Bearing that in mind, as an approximation, we feel it is plausible that changes in the underlying parameters of the housing investment demand function would have dominated any changes in the underlying demand for shelter over the 2000 to 2009 period.

A more serious complication is that mortgage lending policies also changed in the 2000s, with easier credit standards in the first half of the decade followed by tightening of credit policies in the later years. Such shifts would contribute to changes in access to mortgage credit and, therefore, changes in the homeownership model coefficients across survey years. Nevertheless, despite these complications, as will become apparent, shifts in the homeownership model coefficients between 2000 and 2009 are often quite revealing and strongly suggest that both changes in household attitudes about investing in real estate and changes in mortgage underwriting standards contributed to the boom and bust in homeownership over the decade.

3. DATA

The primary data for the study include individual-level records from the public use micro samples (PUMS) of the 2000 census and the 2005 and 2009 ACS.[11] It is worth noting that the 2000 data are based on a five percent sample of the U.S. population while the ACS is a one percent sample. Each of the surveys provides an extensive array of variables that are common across sample years. Each of the surveys is also a cross-section of the population in a given sample year and does not follow households over time.[12] The samples were limited to non-institutional, civilian household heads not living in group quarters. Further excluded were observations in which the unit was unoccupied, individuals for which ownership status was non-applicable and renters for which there was no cash rent.

The data contain information on the family's housing tenure status, the primary variable of interest. Also reported in the surveys is the number of years the family has been in the home; this variable is used to identify families that moved into their homes in the previous year for the recent-mover sample. Control variables taken from the surveys include a wide range of information on individual and family socio-economic attributes, a complete listing of which is provided in the appendix. The control measures include marital status, race, income (in 2009 dollars), educational attainment, disability status, years in United States and veteran status. Also included are labor-related measures such as occupation type (professionals, managers and others), current employment status, self-employment status and hours worked. Further controls are included for urban versus suburban locations and region of the country. In all cases, there is one observation per family in the survey, and socio-economic attributes are those of the household head.

Two additional control measures were highlighted earlier and require further comment. The first of these is the median value of owner-occupied homes in the family's PUMA of residence (measured in 2009 dollars). As noted in the Introduction, higher house values require larger down payments and mortgages. Contingent on the other model controls including income, higher house prices serve to reduce housing affordability and hence reduce access to owner-occupied housing.

The second control of special interest is the historic level of nominal quality-adjusted house price volatility for the area in which the household resides. As suggested above, changes in the sensitivity of homeownership decisions to house price volatility would be indicative of changes in household risk aversion and attitudes towards housing as an investment. That would be consistent with prior studies by Davidoff (2006) and Sinai and Souleles (2005), both of which suggest that cross-sectional variation in exposure to house price risk has a notable impact on household housing decisions.[13] Local house price volatility also increases mortgage default risk and is, therefore, likely to cause lenders to tighten access to credit.[14]

The volatility measure is calculated using quality-adjusted repeat-transactions price indexes obtained from the Federal Housing Finance Agency (FHFA) and then merged into the census and ACS data. For most observations in the census and ACS data, volatility is measured at the Metropolitan Statistical Area (MSA) level. For those observations for which an MSA match to the FHFA data could not be obtained, state-level measures of the indexes were used.

A multi-step procedure is used to create the volatility measures. In the first step, we calculate the percentage change in the house price index over the previous twenty quarters for the MSA/state in question. This is done for each quarter from 1985 to 2007. In the second step, for each location we calculate the variance of the five-year percentage change in the price index across 13 years of quarterly values or 52 quarters.[15] For the 2000 census data, variance is calculated over the 1985 to 1998 period; for the 2005 ACS data, variance is calculated over the 1990 to 2003 period; for the 2009 ACS data, variance is calculated over the 1994 to 2007 period. This ensures that our measure of local house price volatility is based on historic levels of volatility up to two years prior to the census/ACS sample year.

4. REGRESSION RESULTS

Homeownership Regressions

As described earlier, our empirical analysis begins with 60 age-stratified regressions for individuals aged 20 to 80 for each sample year, 2000, 2005 and 2009. The regressions are of the following form,

$$Own_{i,a,y} = x_i b_{a,y} + e_i$$

where *i* indexes the individual observation for a given age group a (20, 21...80) in a given sample year (2000, 2005 and 2009). *Own* equals 1 if family *i* owns their home and zero otherwise. *x* is a vector of model controls as described earlier while *b* are the corresponding coefficients. To facilitate estimation and presentation, the model is estimated by ordinary least squares (OLS). Accordingly, the model coefficients should be interpreted as follows: for a one-unit change in the value of a given control variable (e.g. income), the corresponding coefficient indicates the percentage point change in the probability of homeownership holding all other control variables in the model constant.[16]

It should be emphasized that (4.1) is estimated twice for each age group and sample year: first using the full sample as described earlier, and then again using only those households that moved into their homes in the previous twelve months. With 34 control variables in *x* this produces 12,240 regression coefficients: 34 coefficients per regression for 60 age groups for three survey years for both the full sample and the sample of recent movers.

Coefficient Plots

To facilitate presentation of this vast amount of information, we plot the coefficients by age of the household head for each variable for each survey year, and for both the full sample and the sample of recent movers. This information is summarized in 34 different figures for the full-sample estimates and another thirty-four figures for the recent-mover sample estimates. Each figure corresponds to a single control variable (e.g. family income, employment, etc.) and each contains plots from all three survey years (2000, 2005 and 2009). We emphasize that each coefficient in a given plot is taken from

a regression that includes all 34 control variables for that particular age group and survey. Organizing the coefficients in this fashion facilitates comparisons across the survey years but still produces a very large number of figures. For that reason, we discuss only a small subset of the coefficient plots here that are especially instructive of what may have driven the boom and bust in homeownership over the 2000s. Plots for all of the model coefficients for both the full sample and recent-mover sample are provided in the appendix. To increase precision, both for the coefficient plots and for all related plots to follow, the plots report five-year moving averages of the coefficient or related measure in question based on estimates drawn from adjacent age groups.[17]

A reminder is also in order as to how to interpret the coefficient plots presented below. Recall that the estimated coefficients reflect the combined influence of demand for shelter, demand for housing as an investment and lender willingness to extend credit as may be either directly or indirectly tied to the variable in question. An increase in consumption (shelter) demand reduces the propensity for homeownership for reasons outlined in Figure 2, while an increase in investment demand or a relaxation of mortgage underwriting standards results in the opposite. Full sample model estimates are also sensitive to inertia as discussed earlier. As an approximation, we believe that changes in the coefficient plots across sample years largely are indicative of shifts in either investment demand and mortgage credit availability, or both.

Bearing the above comments in mind, we examine coefficient plots for five of the control variables: (i) family income, (ii) whether the household head is employed, (iii) the median value of owner-occupied homes in the family's PUMA of residence, (iv) whether the household head is black versus white and (v) the historic level of local, quality-adjusted house price volatility. Two of these — house values and house price volatility — were highlighted earlier given their likely important role in the recent boom and bust in homeownership rates. The other controls (income, employment and race) are highlighted because they have often played a central role in prior homeownership studies, although the same could be said for many of the other model controls (all of which are presented in the appendix). In all cases, age of the sampled individuals is plotted along the horizontal axis, while the estimated coefficient is on the vertical axis. As emphasized above, because our models are estimated by OLS, the model coefficients reflect the percentage-point impact of a unit change in the variable in question on the probability that a family owns its home holding all other model controls constant.

We begin with the influence of family income, plots for which are in Figures 3a and 3b for the full sample and recent-mover sample, respectively. Income is measured in 1,000 units (in 2009 dollars). Focusing on the full sample estimates, as an illustration, the coefficient on income in the age-26 regression for the 2005 sample is roughly 0.003. This indicates that, holding all of the other controls in the model constant, for each 10,000 of additional income (in 2009 dollars), the typical 26-year- old household head would be three percentage points more likely to own a home.

Figure 3a

Full Sample Homeownership Model Coefficients:
Family Income (2009 Constant Dollar $1,000 Units)

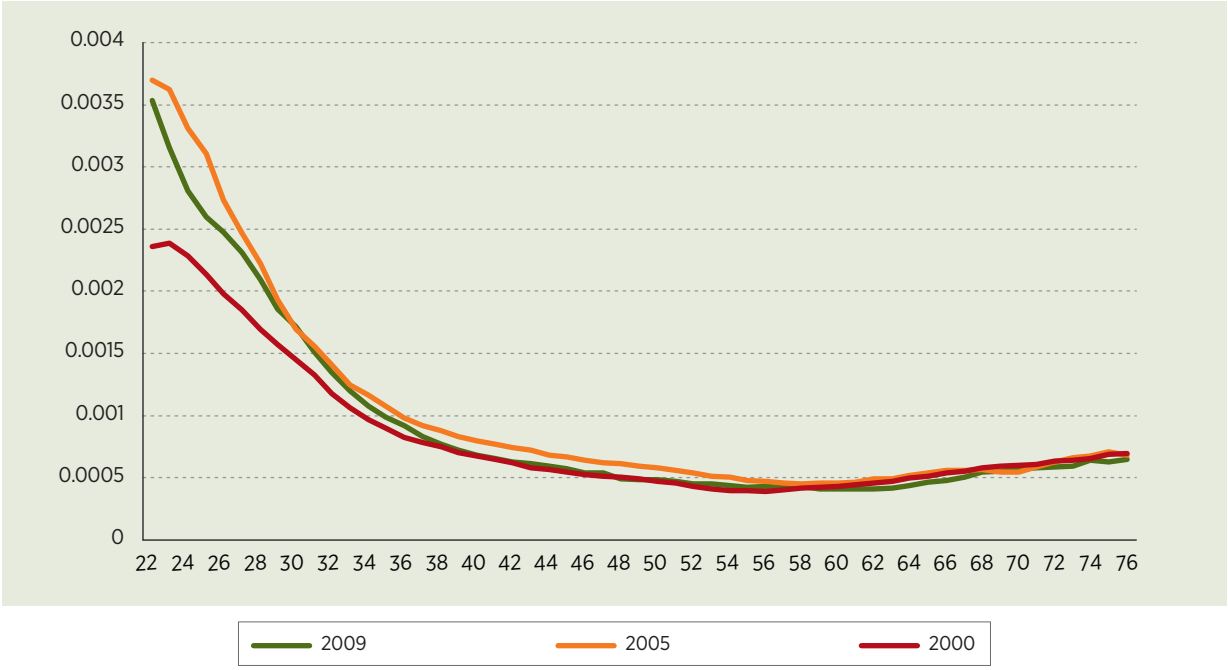
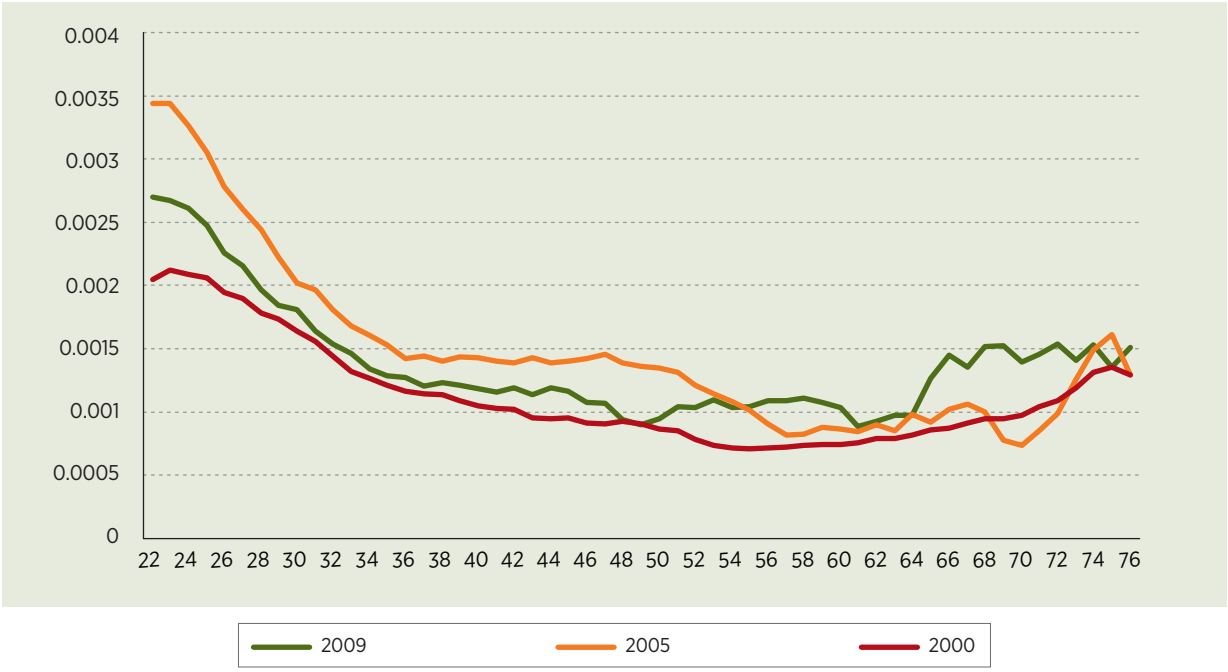


Figure 3b

Recent-Mover Homeownership Model Coefficients:
Family Income (2009 Constant Dollar $1,000 Units)



Observe further that, for each of the survey years, it is evident from the full sample estimates that income increases the propensity for homeownership, as indicated by the fact that all of the coefficients are positive. Also apparent, the influence of income declines sharply with age, as is seen from the marked downward-sloping contour of the plots. A possible explanation for the downward-sloping pattern could be that younger families have less wealth available for down payment and must therefore

take larger mortgages to attain homeownership. That would serve to increase the debt-to-income ratio for younger families (all else being equal), which would amplify the influence of household income. Another possible explanation for the downward-sloping contours is that the influence of income on the divergence between investment and consumption demands for housing is more pronounced for younger families than for older households. Although we do not have a compelling explanation for why that might be the case, we cannot rule it out.

It is also instructive to compare the income coefficient plots across the survey years. Note that, for most individuals beyond their mid-30s, there is remarkably little difference in the income coefficients between 2000, 2005, and 2009. However, for households with individuals in their 20s, coefficients increased in magnitude from 2000 to 2005, then fell back somewhat between 2005 and 2009. This pattern is reinforced in Figure 3b, which presents plots of the income coefficients for the recent-mover sample. In that figure, it is quite apparent that the influence of income increased from 2000 to 2005 for individuals up to age 55, then dropped back most of the way to the year-2000 pattern in 2009.

The elevated plot for 2005 appears consistent with the issuance of many conventional low down payment loans that would have required higher income, all else being equal. The shifting back towards a pattern more similar to that of 2000 suggests that such low down payment loans may have disappeared following the implosion of credit markets. It should be noted, however, that originations of Federal Housing Administration (FHA) loans — which allow for low down payments — have registered a sharp increase in the wake of the crash. To the extent that FHA lending remains a viable source of low down payment loans, a different explanation may lie behind the pattern of plots noted above. In that regard, we cannot rule out the possibility that the taste for investing in real estate shifted over the decade in ways that may have contributed to the patterns.

Figures 4a and 4b present analogous plots for the coefficients on a household head's employment status, where the dependent variable equals 1 if the individual is employed at the time of the survey and 0 otherwise. From the humped shape in both panels, it is evident that employment boosts homeownership most for individuals in the middle-age years. In considering this pattern, it is worth noting that few young families own homes and this reduces the magnitude of the employment coefficient for household heads in their early 20s. But, by the time families are in their 30s, many own homes — but with much less frequency if the household head is not employed. Among older households, most families own homes but few household heads work beyond age 65. Summarizing, absence of a job during the prime working years signals that the family is likely in trouble financially and likely dampens investment demand for homeownership while also making it difficult to qualify for a loan.

Comparing coefficients in Figures 4a and 4b across survey years is also instructive. Notice that the influence of employment status declined between 2000 and 2005. That is consistent with the issuance of no-doc and low-doc loans that appeared during this time and the general relaxation of

Figure 4a

Full Sample Homeownership Model Coefficients: Employment Status (1 Employed; 0 Otherwise)

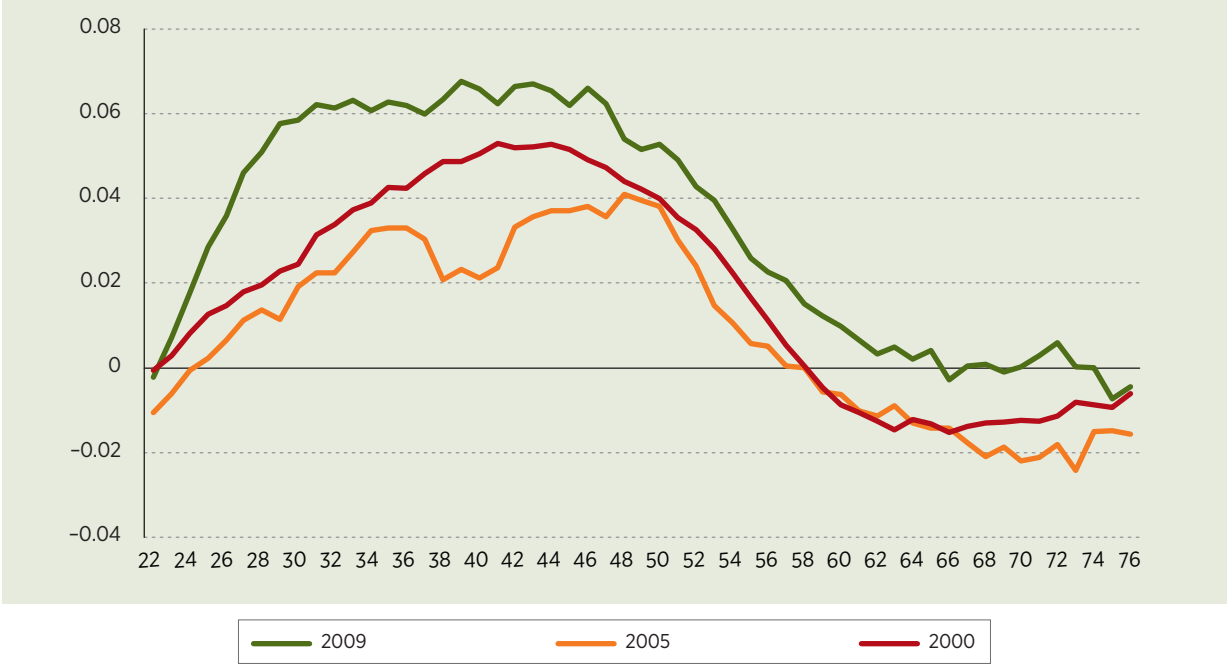
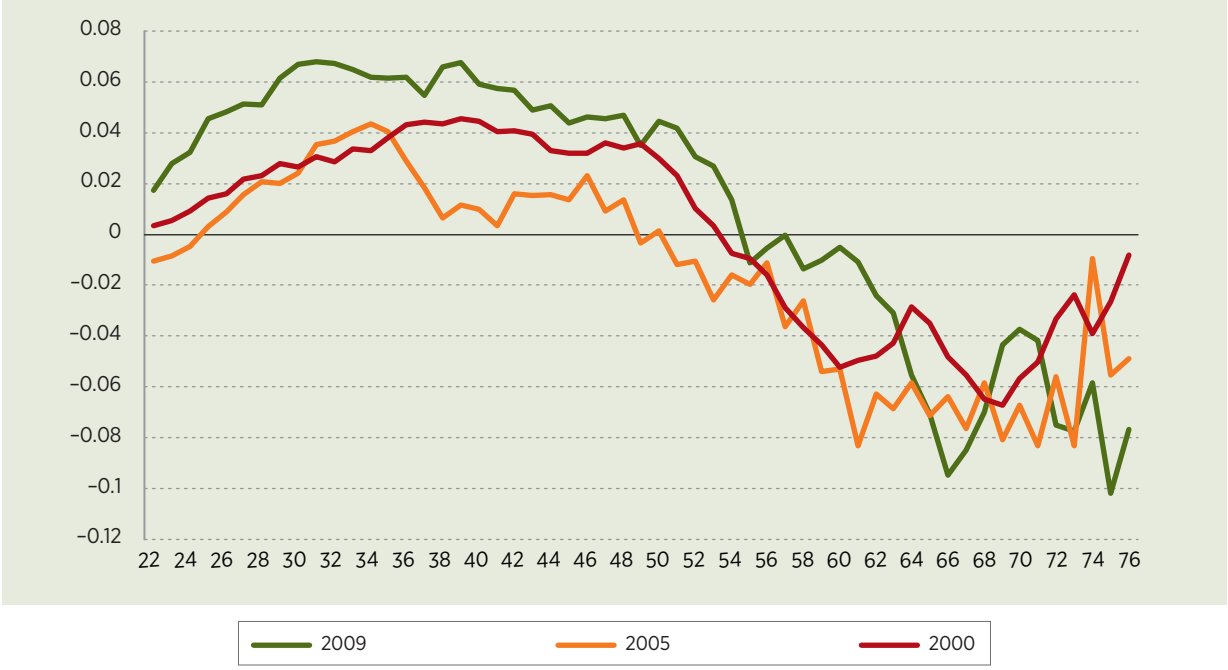


Figure 4b

Recent-Mover Homeownership Model Coefficients: Employment Status (1 Employed; 0 Otherwise)



documentation requirements for mortgage applications. In both panels of Figure 4, it is also evident that the age-specific coefficient plots jumped markedly in 2009 to a level noticeably above that of 2000. This is consistent with the renewed importance of documented employment in the mortgage application process. As before, we also cannot rule out the possibility that the influence of employment

status on a household's desire to invest in real estate declined in the first half of the 2000s and then rebounded following the financial crash.

Figure 5a presents full-sample plots of the impact of PUMA median house value on the propensity to own a home (with house values measured in 2009 $100,000 units). Notice that, for the full sample, the coefficient for individuals in their late 20s in 2009 is roughly –0.05. This suggests that a late-20s household would be roughly five percentage points less likely to own a home for every $100,000 increase in local house prices, all else being equal.

More generally, as suggested earlier, higher house prices are expected to deter homeownership because of the need for larger down payments or loans. The plots in Figure 5 are consistent with that view. Note that the coefficients on PUMA median house price are negative throughout with a trough in the full-sample plots in Figure 5a at about age 32. Thereafter, the influence of local house prices diminishes (becoming less negative) until it reaches a plateau at a more moderate negative level for individuals in their early 40s. While this pattern was remarkably robust over the decade of the 2000s, there is a marked upward shift in the age-specific coefficients from 2000 to 2005 across the age spectrum. This indicates that higher local house prices were much less of a deterrent to homeownership during the mid-decade easing of credit standards that allowed for greater access to low- and zero-down payment mortgage loans. The pattern reverses as one shifts from 2005 to 2009, consistent again with a tightening of credit standards — a result that is reinforced in the recent-mover sample (Figure 5b) and especially for younger households. As before, we cannot rule out the possibility that higher local housing values contributed to shifts in the desire to invest in real estate.

Figures 6a and 6b present estimates of the coefficients associated with whether a household head is African-American or white (where the variable is coded 1 for African-American and 0 for white). For the full sample, among individuals in their mid-30s, the coefficients are roughly –0.14 for each of the survey years: this indicates that blacks in their mid-30s are roughly 14 percentage points less likely to own a home than their white counterparts, all else being equal.

Recall that it is illegal for lenders to take race into account when evaluating a mortgage loan application. Of course, race is known to be correlated with wealth and credit history, so there could be an indirect correlation between race and access to credit through those channels. Bearing these comments in mind, three broad patterns stand out in Figures 5a and 5b. The first is that the coefficients are all negative, indicating that blacks are less likely to own a home than whites even after controlling for all of the other model covariates. This result is well known. The second is that the full-sample plots in Figure 6a display a marked u-shaped pattern for each of the survey years. This pattern likely reflects the fact that few individuals of any race own homes in their early 20s, and that many blacks do eventually own homes but later in life than typical whites.

A third pattern is especially evident in the recent-mover plots in Figure 6b. Notice that the negative influence of race diminished between 2000 and 2005 across all age groups, but then moved back up

Figure 5a

Full Sample Homeownership Model Coefficients:
PUMA Median House Value (2009 Constant Dollar $100,000 Units)

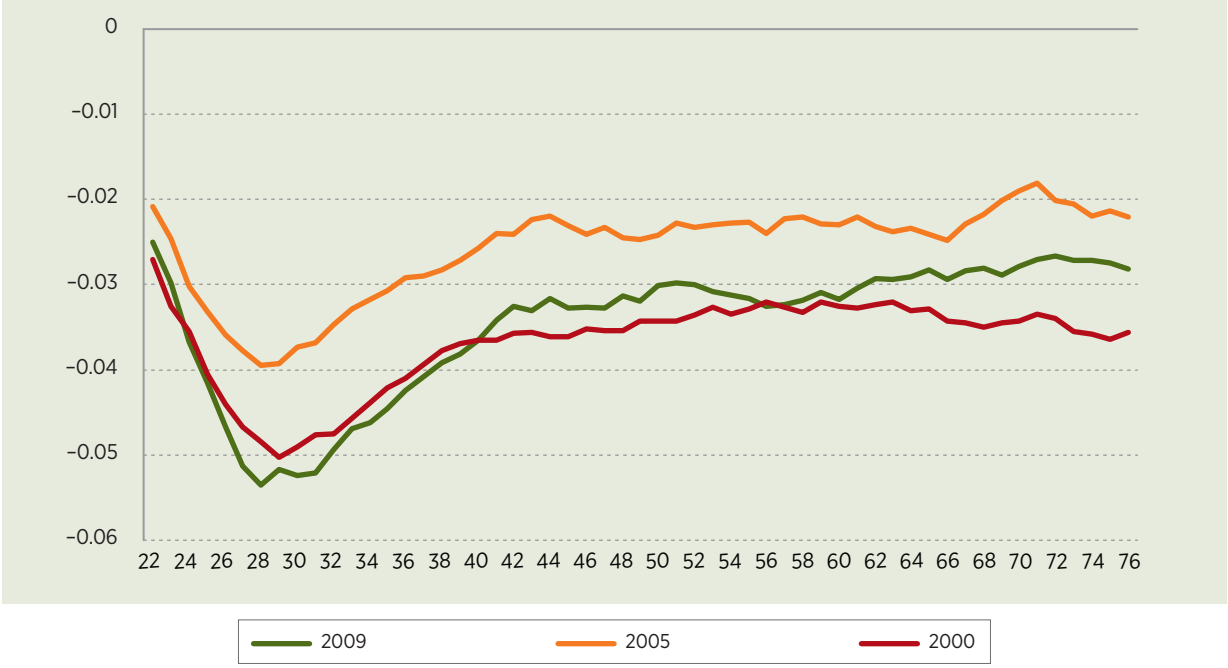
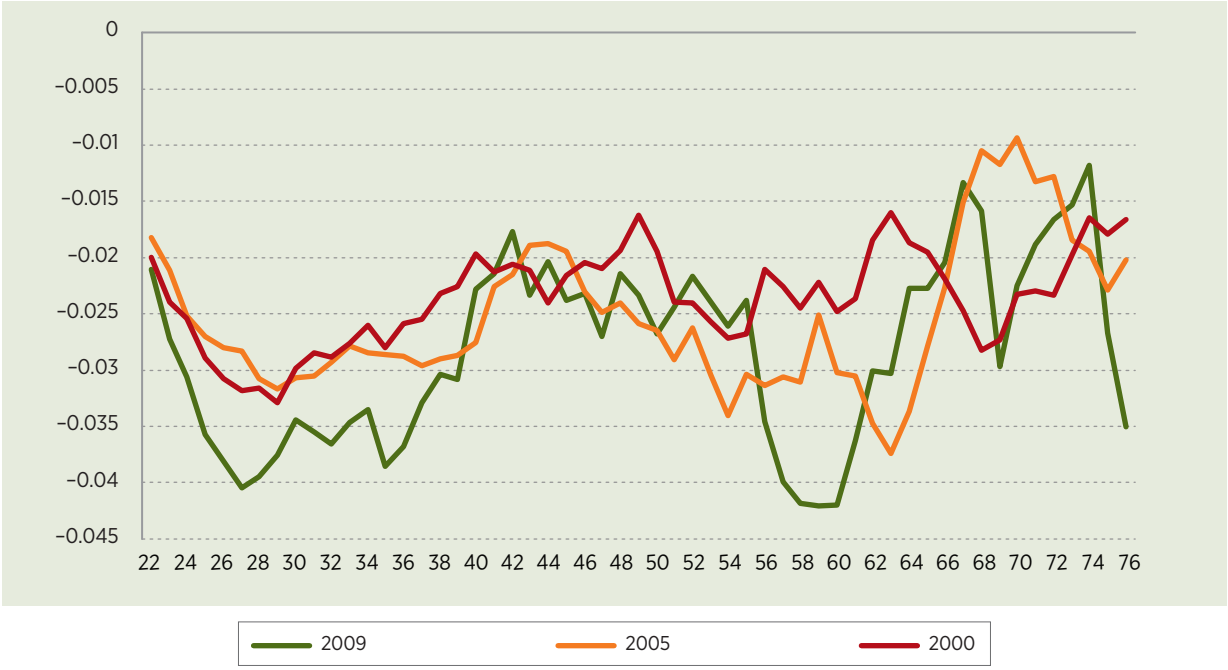


Figure 5b

Recent-Mover Homeownership Model Coefficients:
PUMA Median House Value (2009 Constant Dollar $100,000 Units)



to year-2000 levels with the 2009 survey. This result is again consistent with a relaxation of credit standards that targeted borrower down payment and credit history in the first half of the decade followed by a tightening after 2007. It is also consistent with the possibility that investment demand for real estate among black families became more similar to that of white households in the early part of the decade only to revert back to a more conservative (relative) posture with the financial crash.

Figure 6a

Full Sample Homeownership Model Coefficients: African-American Versus White Household Head (1 African American; 0 Otherwise)

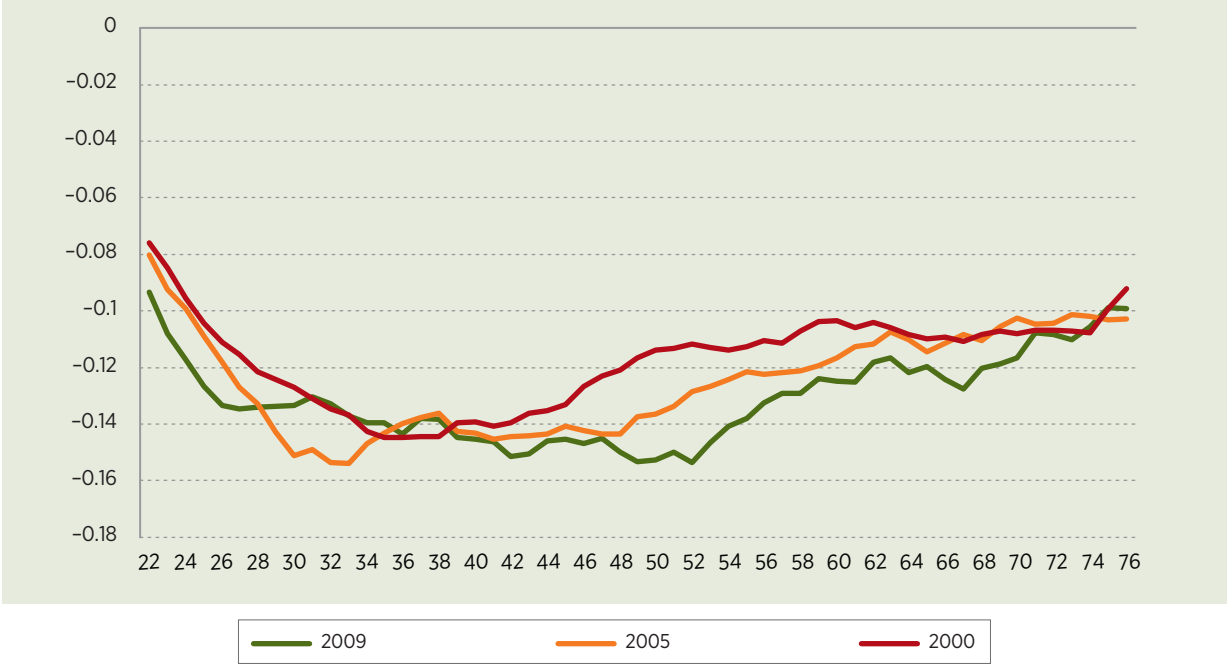
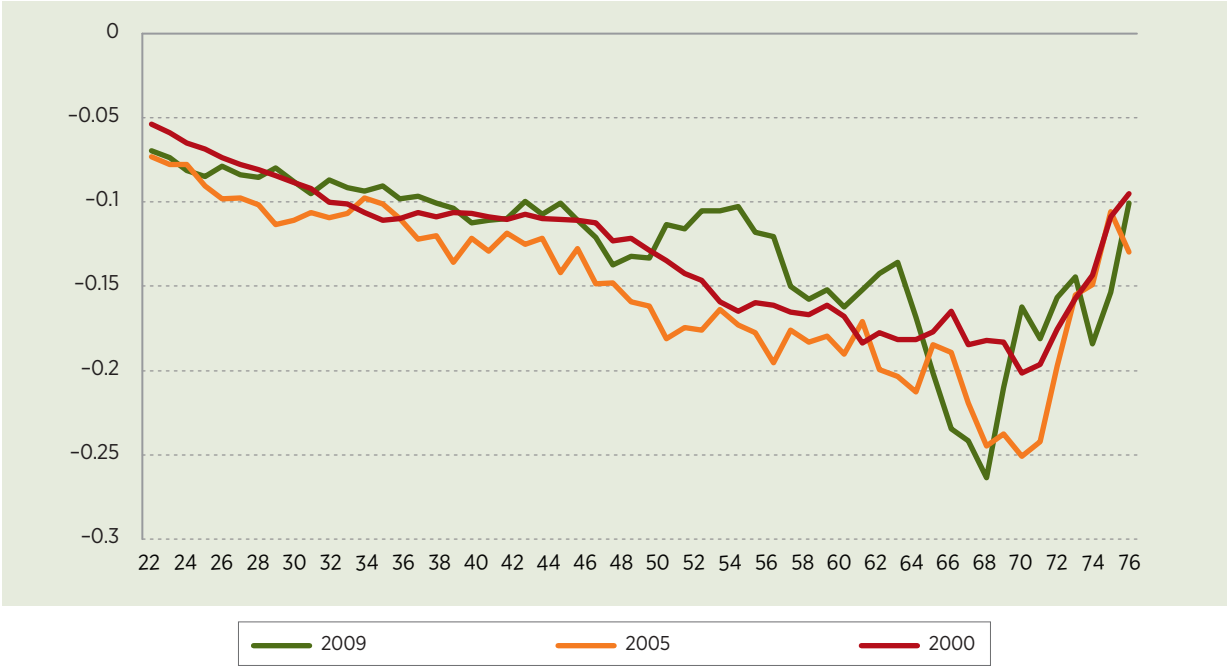


Figure 6b

Recent-Mover Sample Homeownership Model Coefficients: African-American Versus White Household Head (1 African American; 0 Otherwise)



Figures 7a and 7b display plots of the coefficients on historic patterns of local (MSA or state level) house price volatility. Three patterns are especially noteworthy. Observe first that higher local rates of house price volatility typically deter homeownership: this is evident from the largely negative coefficients in both figures for 2000 and 2009. Also, the deterrent effect of volatility is most pronounced for relatively young families, as seen by the largely rising pattern of coefficients in Figure 7a beyond the youngest

Figure 7a

Full Sample Homeownership Model Coefficients: Historical House Price Volatility

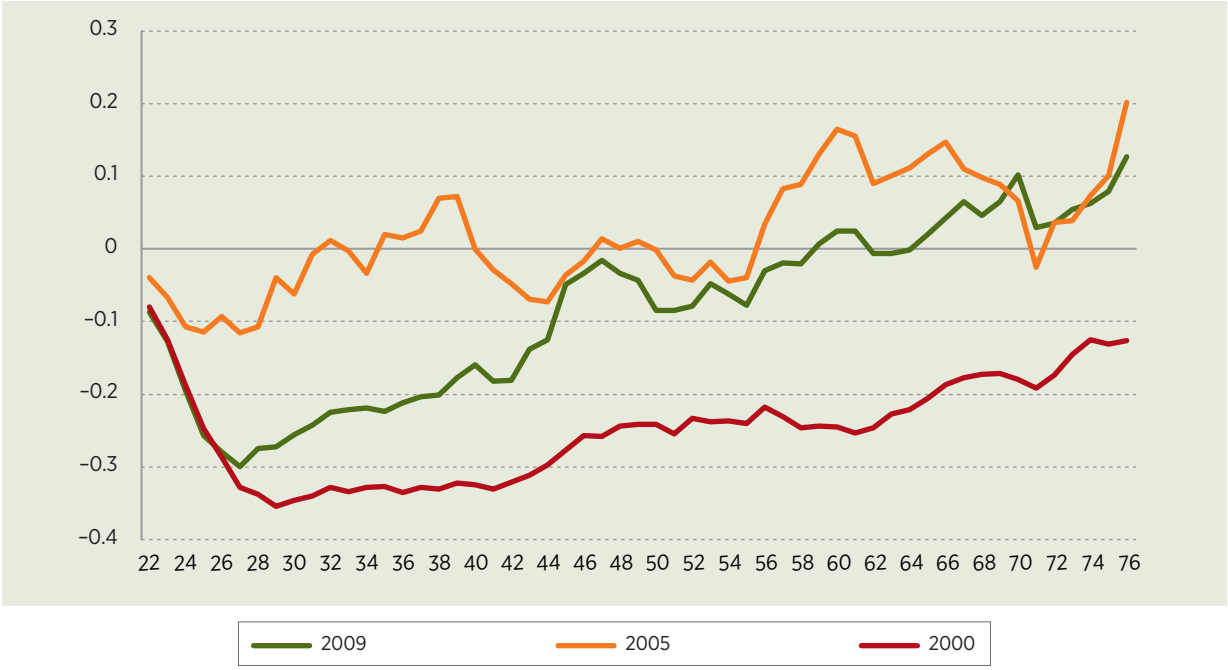
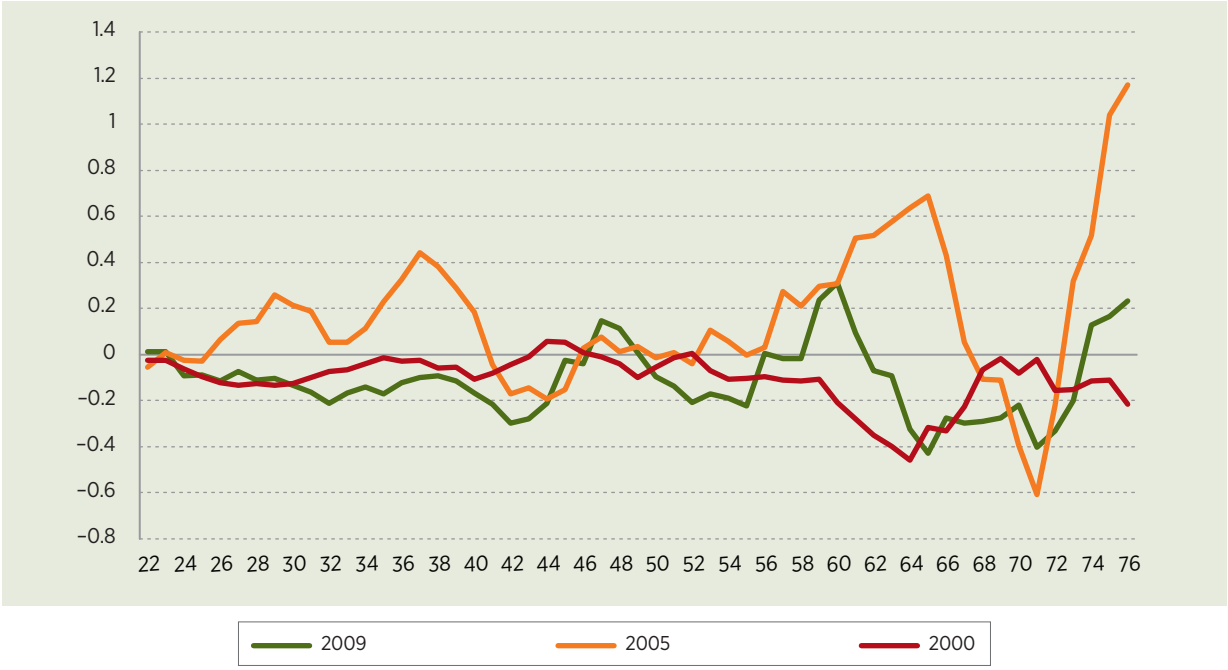


Figure 7b

Recent-Mover Homeownership Model Coefficients: Historical House Price Volatility



households. Finally, it is apparent that the deterrent effect of local house price volatility diminished considerably between 2000 and 2005. Indeed, that shift was so pronounced that for many age groups, the volatility coefficients were actually positive in 2005, and especially among recent movers (Figure 7b). With the financial crash, the volatility plots shifted back towards year-2000 levels.

Two factors seem especially likely to account for the shifting pattern of effects of local house price volatility over the past decade. As discussed earlier, a wealth of evidence suggests that lenders relaxed underwriting standards between 2000 and 2005. To the extent that the easing of credit standards was in part indicative of reduced lender concerns about default risk, this would have contributed to an upward shift in the volatility coefficient plots. In addition, it is now widely believed that a house price bubble took hold in many cities in the first half of the last decade, pushing up house prices beyond levels consistent with market fundamentals. In this view, households would likely have adopted a more risk-loving attitude towards investment in housing and homeownership, presumably because volatility would have been viewed by many families as synonymous with rising house prices and potential capital gains. That too would have contributed to an upward shift in the volatility coefficient plots, reducing the deterrent effect of volatility on the propensity for homeownership.[18]

The many *positive* coefficients on volatility for recent movers in 2005 (Figure 7b) also require explanation. Those coefficients suggest that volatility actually *encouraged* homeownership among recent movers in the middle part of the decade. It is possible that lenders could have induced such an effect by offering easier terms of credit in historically volatile housing markets like Los Angeles as compared to more stable housing markets such as Syracuse. Although we cannot rule out such behavior, it seems unlikely and especially after having conditioned on our other model controls, including PUMA-level housing prices. Instead, the positive volatility coefficients in 2005 (Figure 7b) tend to reinforce the perception that households did indeed adopt a more risk-loving attitude in the first half of the decade, only to revert to a more conservative posture following the financial crash.

5. HOMEOWNERSHIP RATES

Overview

The estimated coefficients described in the appendix and in part discussed above allow us to further identify the drivers of the boom and bust in homeownership in the 2000s. To do so, we decompose changes in homeownership rates across survey years into contributions from changes in the values of the control variables (e.g. the socio-economic attributes of the population) versus changes in the model coefficients. This approach is motivated in part by our prior work (Gabriel and Rosenthal (2005)) in which a similar exercise was conducted using all survey years of the Survey of Consumer Finances (SCF) from 1983 through 2001. Results from that exercise provided compelling evidence that the increase in homeownership during the 1990s — from roughly 64.5 percent to 67 percent — was driven largely by changes in the demographic and financial attributes of the population. By inference, changes in factors embedded in the model coefficients such as the degree of risk aversion and mortgage underwriting standards appeared to have had limited impact on the rise in homeownership between 1990 and 2000. Evidence discussed in the prior section suggests that the 2000s were a very different period.

Our analysis here is divided into three parts. We initially summarize the age-specific homeownership rates that actually occurred in each of our sample years. Next, we decompose changes in those age-specific rates using the shift-share approach described above. An analogous assessment follows for aggregate homeownership rates, pooling individuals of all ages.

Age-Specific Homeownership Rates

This section describes the age-specific aggregate homeownership rates for each survey year, both for the full population and for recent movers. We do this by first forming the predicted probability for each individual in the sample using the estimated coefficients corresponding to that individual's age, sample and survey year as displayed in the plots in the appendix. Homeownership probabilities are then averaged across individuals, applying household sampling weights available in the census and ACS to ensure that the results are representative of the United States.[19] Plots of the full sample age-

Figure 8a

Full Sample: Homeownership Rate Levels By Sample Year

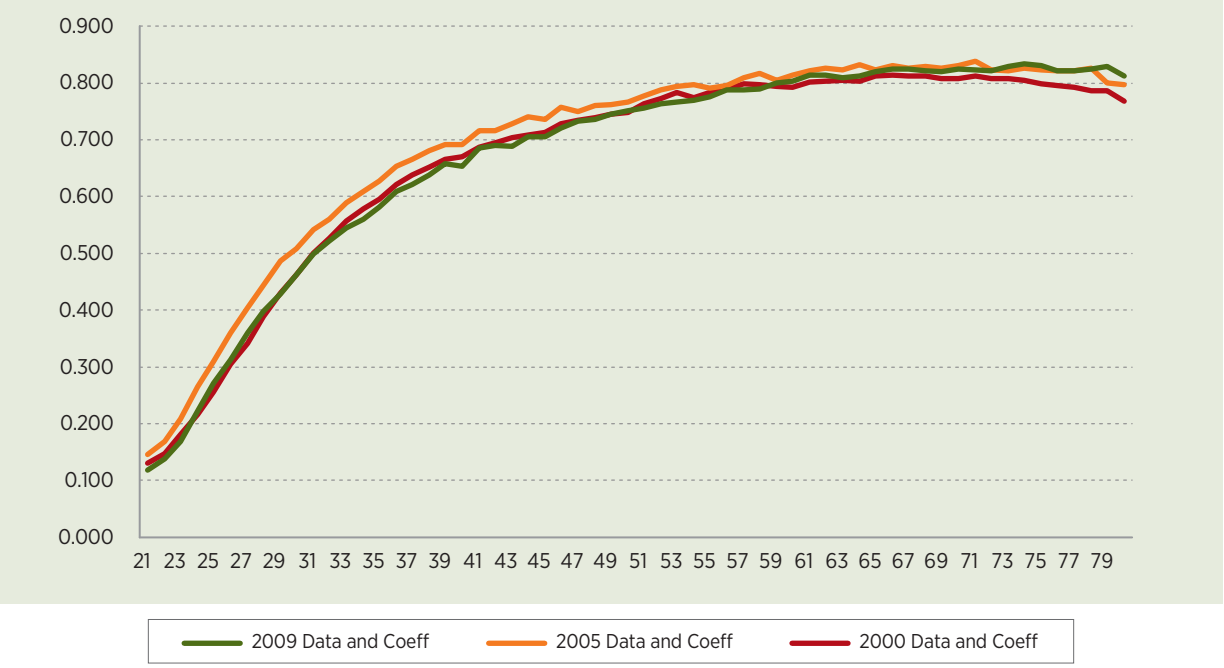
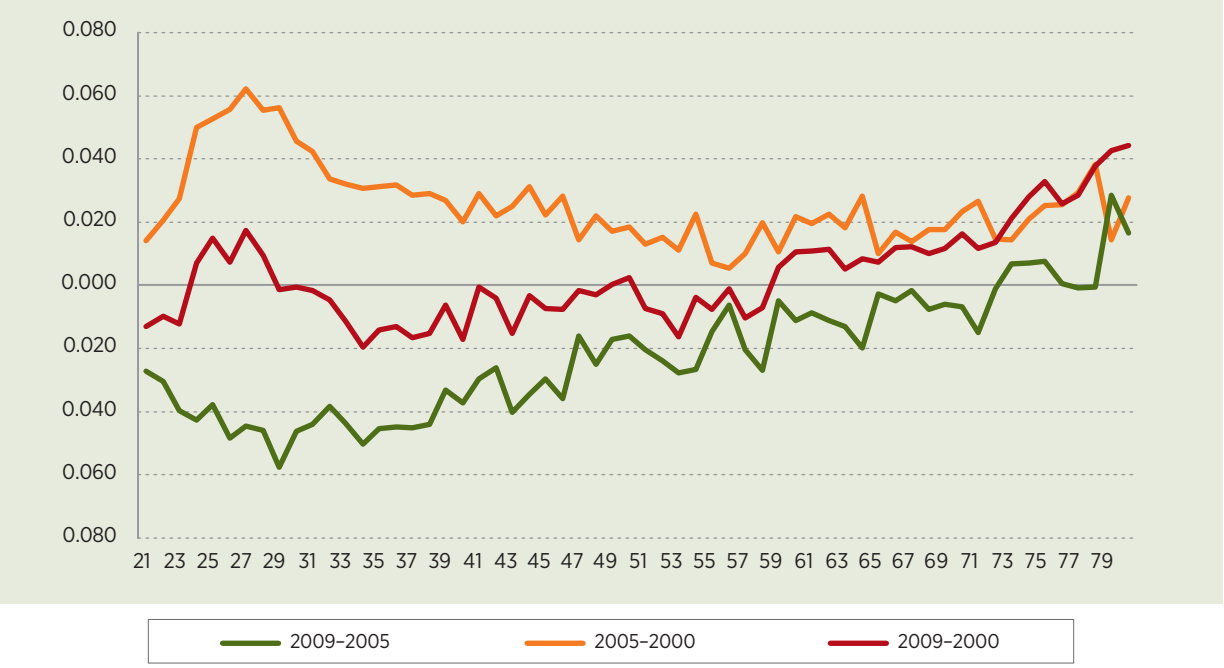


Figure 8b

Full Sample: Homeownership Rate Differences By Sample Year



specific homeownership rates are provided in Figure 8 while plots for the recent-mover sample are in Figure 9. In both cases, homeownership rate levels are plotted in panel (a) for each survey year while differences in ownership rates between survey years are plotted in panel (b).

Focusing first on the full-sample values, as is evident in Figure 8a, the estimated age-specific homeownership plots are approximately concave, rising rapidly for younger and middle-aged households to a plateau

Figure 9a

Recent Movers: Homeownership Rate Levels By Sample Year

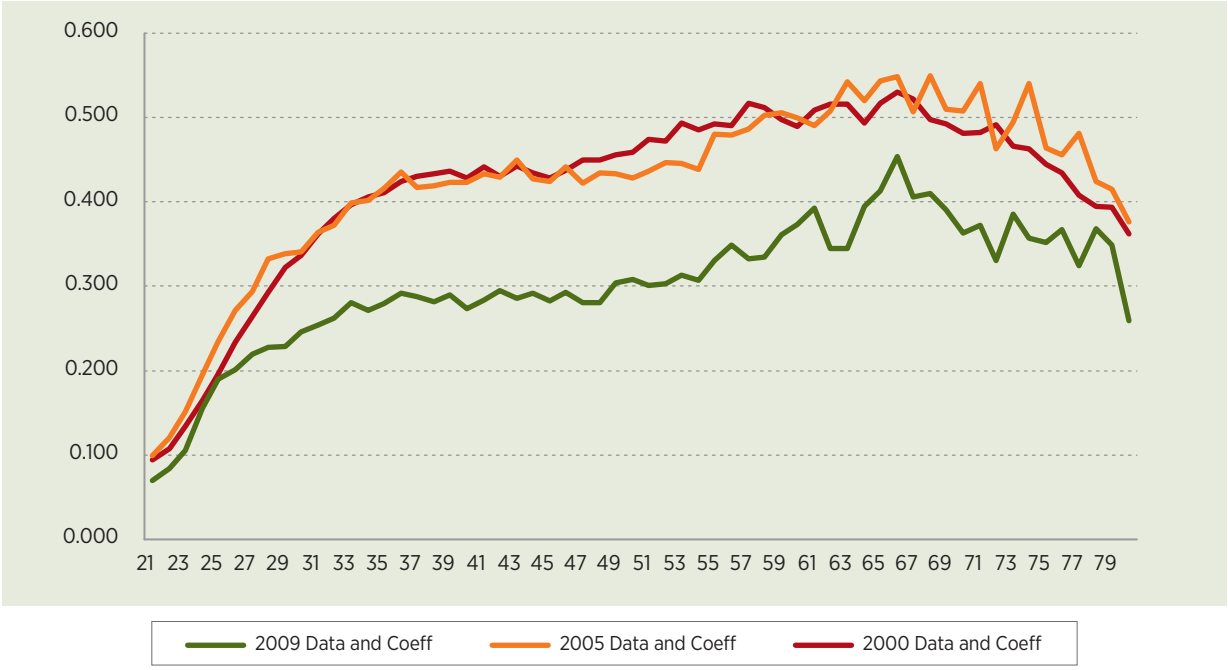
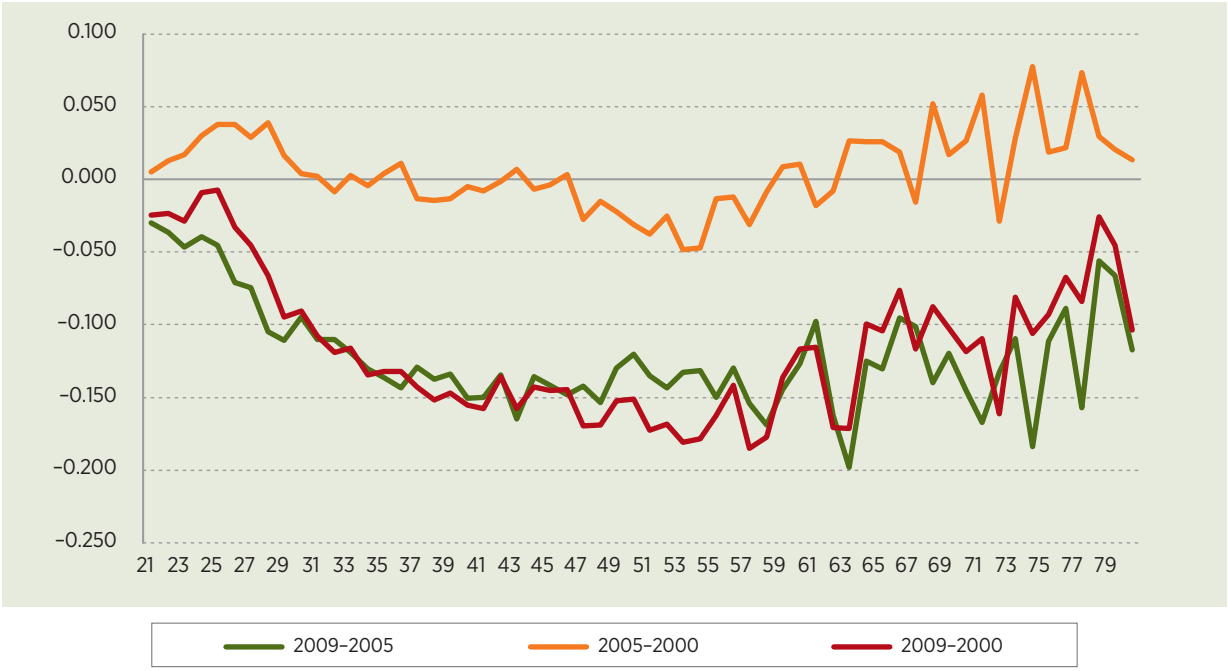


Figure 9b

Recent Movers: Homeownership Rate Differences By Sample Year



of roughly 80 percent for households in their 50s to mid-70s. This pattern is similar to that reported in Haurin and Rosenthal (2007) for earlier decades. Also notable, for all age groups except the elderly, homeownership rates were higher in 2005 than in 2000. That pattern is mostly fully reversed moving from 2005 to 2009 for all age groups under roughly age 57. As a result, year-2009 homeownership rates are nearly identical to those in 2000 for much of the population.

The patterns in Figures 9a and 9b for the recent-mover sample are especially dramatic. In panel (a), note that there is relatively little difference in age-adjusted homeownership rates between 2000 and 2005. However, there is a pronounced decline in the propensity of recent movers to purchase a home (versus rent) between 2005 and 2009. That decline increases in magnitude with the age of the household, leveling off for individuals in their early 40s at a rate roughly 15 percentage points below that of 2005. Among other factors, this dramatic decline likely reflects the increased perception of risk following the stunning implosion of credit markets and widespread mortgage defaults with the onset of the financial crisis.

Age-Specific Decomposition of the Boom-Bust in Homeownership

This section decomposes changes in the age-specific homeownership rates across survey years into contributions arising from shifts in the value of the covariates versus changes in the model coefficients. As suggested above, this sort of exercise can be revealing.

As before, we begin with the full sample. Figure 10a plots estimates of the age-specific homeownership rates using different model year coefficients and data. Three different scenarios are provided. The first are the actual estimated year-2000 homeownership rates, based on year-2000 coefficients and data. The second are year-2000 coefficients combined with year-2009 data. The third are the actual estimated year-2009 homeownership rates, based on year-2009 coefficients and data. Note that application of 2009 data to the year-2000 coefficient vector reduces homeownership rates for most age groups relative to year-2000 values. Applying the year-2009 coefficients to the year-2009 data reverses that effect, moving homeownership rates back up to levels quite close to those for the year 2000. This is true for nearly all age groups considered.

Figure 10b undertakes a similar set of computations for the sample of recent movers. The patterns are dramatic. Applying year-2009 data to year-2000 coefficients results in a sharp decline in home purchase rates for nearly all age groups. Application of the year-2009 coefficients to the year-2009 data further reduces age-specific home purchase rates, again across most of the age groups. This indicates that, at least for recent movers, home purchase rates were dramatically reduced in 2009 relative to 2000 both because of a change in the value of the model controls (i.e., the data) and also a change in the model coefficients.

Figure 10a

Full Sample Homeownership Rate 2009–2000 Decomposition Using Different Model-Year Coefficients and Data

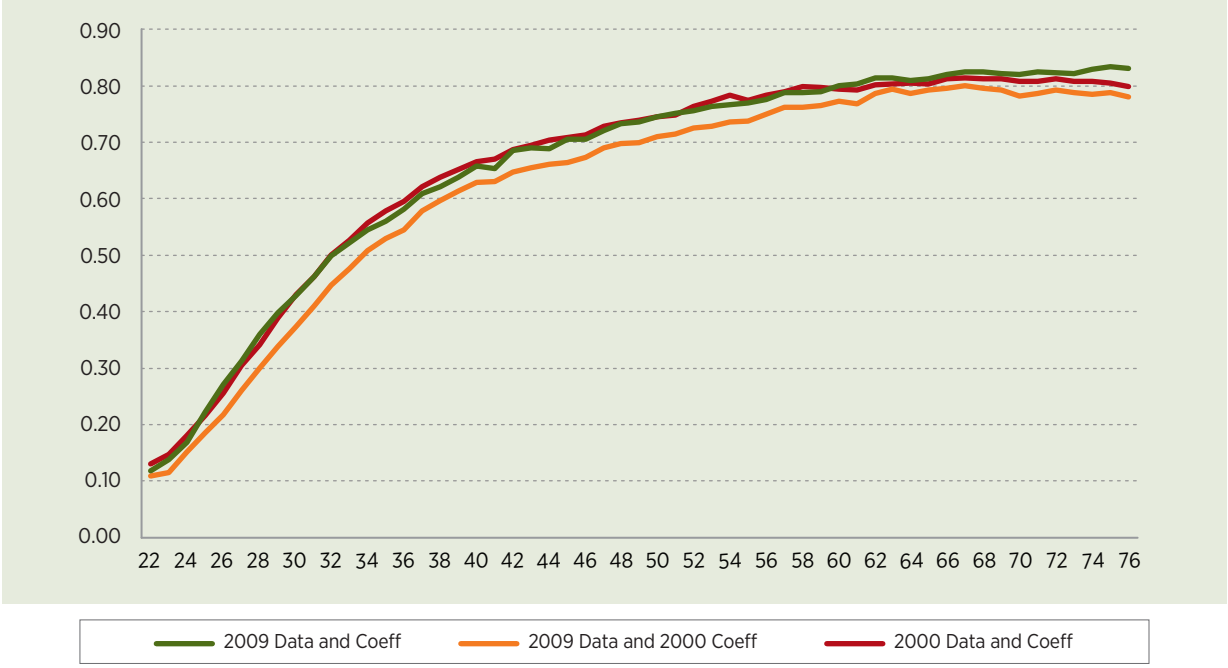
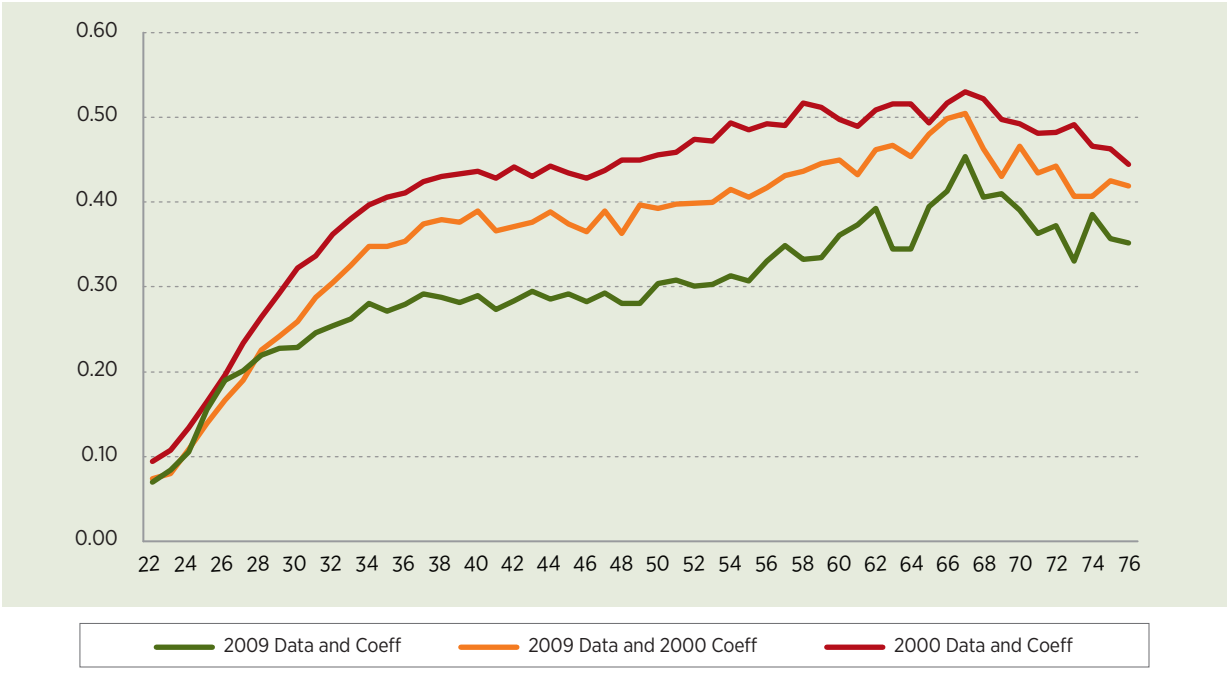


Figure 10b

Recent Movers Homeownership Rate 2009–2000 Decomposition Using Different Model-Year Coefficients and Data



Aggregate Decomposition of the Boom-Bust in Homeownership

Table 1 displays results of the shift-share analysis for the full sample pooling across individuals of all age groups. Note that the table is organized as a three-by-three matrix corresponding to the different combinations of survey year data and model coefficients for 2000, 2005 and 2009. As such, the main diagonal terms are estimates of the actual homeownership rates for the different survey years while the off-diagonal terms combine data and coefficients from different years.[20]

As is evident from the main diagonal entries in the table, the estimated aggregate homeownership rate increased from roughly 66.3 in 2000 to 69.1 in 2005. The homeownership rate then declined to 67.3 in 2009. Suppose now that the model covariate values (e.g., income, employment, volatility, etc.) remained constant at year-2000 values. Applying the 2005 coefficients, the homeownership rate would have been 6.2 percentage points higher than in 2000, or 72.5 percent. That dramatic increase is indicative of the easing of credit standards and an eagerness among households to invest in real estate as suggested above. Applying the year-2009 coefficients pushes the simulated homeownership rate back down to 69.2 percent, indicative of the likely increase in risk aversion among both households and lenders.[21] The incomplete adjustment back towards year-2000 homeownership levels is also likely indicative of inertia since many of the families that chose to become homeowners in the boom years were still in their homes in 2009.

Suppose now that the year-2000 data is replaced with the year-2009 data while retaining the year-2009 coefficients. This would reduce the simulated homeownership rate by another 1.9 percentage points — from 69.2 to 67.3 percent — back to the actual year-2009 value. That shift confirms that changes in household socio-economic attributes (and house prices and volatility) between 2000 and 2009 served to reduce homeownership rates, whereas changes in the model coefficients served to elevate homeownership. On net, the two effects resulted in an increase in homeownership over the 2000 to 2009 period of 1 percentage point.

Table 2 revisits the aggregate shift-share analysis using the sample of recent movers and related coefficients. The values in the table display several features that stand out. First, notice that only about

Table 1
Estimated Homeownership Rates From Shift-Share Analysis
All Individuals Age 20 to 80

	Survey Year From Which Sample Characteristics are Drawn[a]		
Regression Model-Year Coeff[a]	2000	2005	2009
Year 2000 Coefficients	0.663	0.617	0.638
Year 2005 Coefficients	0.725	0.691	0.709
Year 2009 Coefficients	0.692	0.649	0.673

a. Regression coefficients were taken from the figures in Appendix Figure A1 and were estimated using unweighted data as described in the text under the assumption that the control variables are exogenous. The homeownership rates reported above were then constructed using household sampling weights to ensure that results are representative of the target population of households in the United States.

one-third of the recent movers choose to own a home in a typical year (e.g. 35.8 percent in 2000). That is roughly half the share of households in the population that live in owner-occupied housing. Rosenthal (1988) demonstrates that this difference arises because length-of-stay in the home among owner-occupiers is substantially greater than that for renters.

Also evident in Table 2 is that the actual aggregate homeownership rate among recent movers held steady at about 36 percent between 2000 and 2005. That rate fell dramatically in 2009, however, to roughly 25.3 percent.

Following a procedure similar to that above, suppose now that we hold the data constant at its year-2000 levels. Applying the year-2005 coefficients would increase recent-mover homeownership rates from the actual year-2000 rate of 35.7 percent to 40.8 percent, a change of five percentage points. Applying the year-2009 coefficients more than offsets that change and lowers the homeownership rate to roughly 30 percent, a change from year-2005 market conditions of nearly 11 percentage points. The change in ownership rates resulting from the shift from year-2005 coefficients to year-2009 coefficients is much larger in the recent-mover sample than in the full sample models of Table 1. That difference reflects the absence of inertia in the recent-mover analysis. Replacing the year-2000 data with year-2009 data further reduces the recent-mover homeownership rate from 30 percent to the actual rate for 2009, of 29.9 percent. Summarizing, the share of recent movers that purchase a home was 35 percent in 2000 and 25.3 percent in 2009, a difference of about 10 percentage points. Roughly 5.5 percentage points of that decline can be attributed to changes in attitudes and market conditions as embodied in the model coefficients. The remaining 4.5 percentage points derive from a change in the attributes of the population.

How Much Further Might U.S. Homeownership Rates Fall?

We return now to a key question posed in the Introduction: how much further might homeownership rates fall? Implicit in the shift-share analyses presented above are a set of projections that offer

Table 2
Estimated Homeownership Rates From Shift-Share Analysis
Recent Movers Age 20 to 80[a]

	Survey Year From Which Sample Characteristics are Drawn[b]		
Regression Model-Year Coeff[b]	2000	2005	2009
Year 2000 Coefficients	0.357	0.312	0.305
Year 2005 Coefficients	0.408	0.361	0.356
Year 2009 Coefficients	0.299	0.254	0.253

a. The recent-mover sample includes only individuals who moved into their homes in the previous 12 months.

b. Regression coefficients were taken from the figures in Appendix Figure A2 and were estimated using unweighted data as described in the text under the assumption that the control variables are exogenous. The homeownership rates reported above were then constructed using household sampling weights to ensure that results are representative of the target population of households in the United States.

some perspective on this question. Before commenting further, however, it is important to recognize that any forecast of future homeownership rates must take into account (i) economic and financial market conditions, (ii) risk aversion on the part of lenders and borrowers and (iii) inertia as associated with past homeownership patterns. Because future market conditions and risk aversion can only be imperfectly surmised, any attempt to forecast future homeownership rates is inherently uncertain.

Bearing the above in mind, it seems unlikely that market conditions and attitudes towards risk will return to year-2005 patterns as embodied in the year-2005 model coefficients. Instead, a more plausible scenario is that market conditions and attitudes towards investing in housing will settle back to something much closer to pre-boom year-2000 levels, as reflected in the year-2000 coefficients.

Selecting values for the many covariates in the models is more difficult. That said, the recent year-2009 data likely provide a credible approximation of near-term future values of many of the covariates in the model. Accordingly, a plausible forecast of homeownership rates going forward is given by the combination of year-2000 coefficients and year-2009 data. For the full sample, from Table 1, the predicted homeownership rate is 63.8 percent. This is 3.5 percentage points below the actual estimated homeownership rate for 2009, of 67.3 percent. That estimate suggests that homeownership rates may fall quite a bit further.

There is reason, however, to believe that the outlook just offered is overly pessimistic. A decline of homeownership of 3.5 percentage points relative to year-2009 levels would almost certainly be accompanied by large numbers of additional mortgage defaults, distressed home sales and a marked decline in prices. The anticipated fall off in prices would likely mitigate the decline in homeownership given estimates discussed earlier (e.g. Figures 5a and 5b). Accordingly, a projected decline of 3.5 percent in homeownership rates following 2009 is probably unrealistically high. On the other hand, if all conditions — both as embodied in the model coefficients and the values of the control variables — returned to year-2000 levels, that would imply a post-2009 decline in homeownership rates of 1 percentage point. That seems overly optimistic and likely therefore a lower bound.

Based on these arguments, we believe a plausible range for near-term decline in homeownership rates post-2009 is roughly 1 to perhaps 3 percentage points. To put this in further perspective, data from the Department of Housing and Urban Development (HUD) indicate that U.S. aggregate homeownership rates fell roughly 1 percentage point from early 2009 to the first quarter of 2011.[22] Taking that into account, there is a possibility that homeownership rates may have already bottomed out at the more optimistic end of the forecast range indicated above. However, that seems unlikely given other information outside of our analysis. Recent reports indicate that over 25 percent of U.S. homeowners are in negative net equity positions,[23] while unemployment remains at high levels (9.1 percent as of May, 2011). For these reasons, and given the caveats above, we think it is plausible that homeownership rates could fall by another 1 to 2 percentage points over the next few years.

Heterogeneity in Future Homeownership Rates

This section presents a final set of projections that highlight a further point about future possible homeownership rates that should not be overlooked: future homeownership trends are likely to differ for different population subgroups and locations. To illustrate, we repeat the analysis in Table 1 — drawing upon both recent movers and non-movers — but stratify the sample into various subgroups. Table 3 presents results based on individuals aged 25 to 35, Table 4 reports results for African-Americans and Table 5 presents results for MSA (or state, where the MSA is not identified) locations characterized by low, medium and high historical levels of house price volatility. In viewing the results in these tables, it should be stressed that the coefficients used to produce the homeownership estimates are taken from Appendix A and are the same coefficients as those used in Table 1. Accordingly, any differences in homeownership rates relative to Table 1 arise because of differences in the value of the model-control variables and the corresponding socio-economic composition of the particular subsample.

Bearing the above caveat in mind, in Table 3 observe that the level of homeownership among the age 25 to 35 group is much lower than for the population overall: this is evident from a comparison of the main diagonal terms in Tables 1 and 3 and is also consistent with the plots in Figure 8a. In contrast, the amplitude of the shift-share patterns is a bit larger for the age 25–35 subgroup relative to the overall population. Holding the data values constant at 2009 levels in Table 3 (the far-right column), a shift from year-2009 coefficients in the bottom row back to year-2000 coefficients (in the top row) implies a decline of 4.8 percentage points, somewhat larger than the 3.5 percentage-point decline that was discussed in the context of Table 1 for the overall sample of aged 20 to 80 individuals.

As shown in Table 4, homeownership rates for African-Americans (aged 20 to 80) are much lower than for the overall population. Notice that the main diagonal terms in Table 4 are all below 50 percent, in contrast to the full-sample main diagonal values in Table 1, which range from 66 and 69 percent. Setting the control variables in Table 4 to year-2009 values (the far-right column), notice that a shift from year-2000 coefficients (Row 1) to year 2005 coefficients (Row 2) increases the African-American

Table 3
Estimated Homeownership Rates From Shift-Share Analysis
All Individuals Age 25 to 35[a]

	Survey Year From Which Sample Characteristics are Drawn		
Regression Model-Year Coeff[a]	2000	2005	2009
Year 2000 Coefficients	0.464	0.404	0.408
Year 2005 Coefficients	0.554	0.505	0.507
Year 2009 Coefficients	0.507	0.447	0.456

a. Regression coefficients were taken from the figures in Appendix Table A-1 and were estimated using unweighted data as described in the text under the assumption that the control variables are exogenous. The homeownership rates reported above were then constructed using household sampling weights to ensure that results are representative of the target population of households in the United States.

Table 4

Estimated Homeownership Rates From Shift-Share Analysis

African-Americans Age 20 to 80

	Survey Year From Which Sample Characteristics are Drawn		
Regression Model-Year Coeff[a]	2000	2005	2009
Year 2000 Coefficients	0.465	0.433	0.451
Year 2005 Coefficients	0.515	0.489	0.507
Year 2009 Coefficients	0.478	0.446	0.467

a. Regression coefficients were taken from the figures in Appendix Table A-1 and were estimated using unweighted data as described in the text under the assumption that the control variables are exogenous. The homeownership rates reported above were then constructed using household sampling weights to ensure that results are representative of the target population of households in the United States.

homeownership rate by roughly 5.5 percentage points. However, four percentage points of that change is reversed with the shift from year-2005 coefficients to year-2009 coefficients (Row 3). Qualitatively, this is the same pattern as in Table 1, but the amplitude of the pattern is somewhat larger.

Table 5 completes this illustration by repeating the analysis in Table 1 for individuals residing in MSAs and states for which house price volatility is typically low (Panel A), medium (Panel B) and high (Panel C). For these purposes, high-, medium- and low-volatility areas were defined based on natural breaks in the distribution of historical levels of house price volatility across locations as of 2005; that distribution is displayed in Figure 11. MSAs identified as high-, medium- and low-volatility locations are also listed in Tables 6a, 6b and 6c, respectively. The resulting patterns suggest two broad characterizations.

First, it is clear that homeownership rates are higher in locations where house prices are less volatile. This is apparent upon reading up from Panel C towards Panel A. That pattern likely arises because the most volatile locations tend to be expensive metropolitan areas for which homeownership rates are lower (consistent with the plots in Figure 5). The correlation in our sample between median house prices at the PUMA level and our MSA/state level volatility measure in 2005, for example, is 73.6 percent. That correlation is also evident in Tables 6a–6c, which clearly indicate that house prices are much lower in less volatile locations.

Second, the boom-bust sequence in homeownership is much more pronounced as one moves from low- to middle-volatility locations, and from middle- to high-volatility locations. This is evident from a comparison of the year-2009 columns in the three panels; recall that for those columns, the model control variables are set to year-2009 values, while the rows correspond to the coefficients associated with the different survey years as displayed in Appendix A. In Panel A (low volatility), there is only a 1.7 percentage-point difference in projected homeownership rates associated with the coefficients from the three different survey years. The sensitivity of the estimated homeownership rates to model-year coefficients is considerably larger, however, when considering middle- and high-

Table 5

Estimated Homeownership Rates From Shift-Share Analysis By House Price Volatility

Panel A: Low Volatility MSAs (Volatility < 0.05)[a]

	Survey Year From Which Sample Characteristics are Drawn		
Regression Model-Year Coeff[b]	2000	2005	2009
Year 2000 Coefficients	0.715	0.686	0.695
Year 2005 Coefficients	0.751	0.726	0.732
Year 2009 Coefficients	0.730	0.702	0.712

Panel B: Middle-Level Volatility MSAs (Volatility between 0.05 and 0.15)[a]

	Survey Year From Which Sample Characteristics are Drawn		
Regression Model-Year Coeff[b]	2000	2005	2009
Year 2000 Coefficients	0.692	0.628	0.665
Year 2005 Coefficients	0.744	0.696	0.725
Year 2009 Coefficients	0.714	0.659	0.695

Panel C: High Volatility MSAs (Volatility between > 0.15)[a]

	Survey Year From Which Sample Characteristics are Drawn		
Regression Model-Year Coeff[b]	2000	2005	2009
Year 2000 Coefficients	0.595	0.500	0.553
Year 2005 Coefficients	0.687	0.631	0.668
Year 2009 Coefficients	0.642	0.553	0.612

a. The sample used for these simulations was restricted to households in MSAs (and state-specific areas not in MSAs) for which the historical level of quality adjusted house price volatility was in the indicated range as of 2005. See Figure 11 for the distribution of volatility measures across MSAs in 2005 and Tables 6a–6c for a listing of MSAs belonging to each group.

b. Regression coefficients were taken from the figures in Appendix Table A-1 and were estimated using unweighted data as described in the text under the assumption that the control variables are exogenous. The homeownership rates reported above were then constructed using household sampling weights as for the earlier tables.

volatility locations. Overall, the patterns in Table 5 indicate a strong association between house price volatility and volatility in aggregate homeownership rates. Holding the data values constant at year-2009 levels (the far-right column), in Table 5c a shift from year-2009 coefficients back to year-2000 coefficients implies a decline of nearly six percentage points (from 61.2 percent to 55.3 percent). This is substantially larger than for the full sample in Table 1. It also suggests that the risk of further decline in homeownership is likely to be greater in locations that have experienced high rates of house price volatility in the last decade.

Figure 11

Distribution of House Price Volatility Across Locations (MSA or State)

(Based on Year-2005 Quality Adjusted House Price Measure)

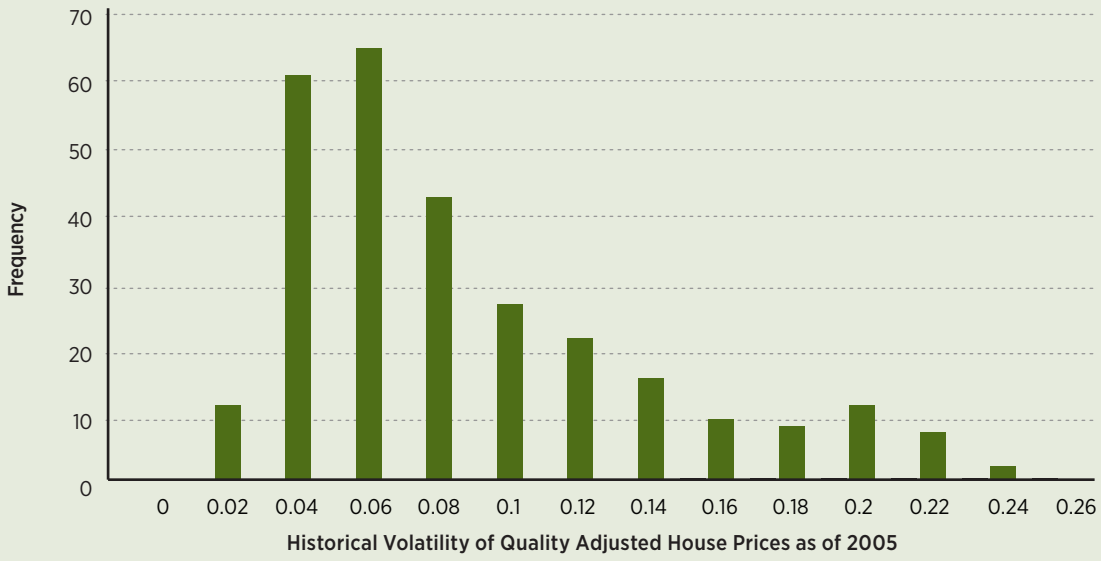


Table 6A

High House Price Volatility Locations

(Based on year-2005 volatility measures described in the text; MSA names are truncated to conserve space)

MSA Name	Median House Value (year-2009 $100,000)	Historical House Price Volatility as of 2005	MSA Name	Median House Value (year-2009 $100,000)	Historical House Price Volatility as of 2005
Honolulu, HI	5.183	0.237	New Haven-Meriden, CT	3.549	0.184
Los Angeles-Long B., CA	5.652	0.222	Stockton, CA	4.031	0.180
San Luis Obispo, CA	7.199	0.214	Pensacola, FL	1.584	0.176
Manchester, NH	2.592	0.209	Boston, MA-NH	4.277	0.175
Nashua, NH	2.592	0.209	Worcester, MA	3.532	0.173
Barnstable, MA	5.183	0.208	Salinas-Sea Side	5.183	0.171
Ventura-Oxnard, CA	7.199	0.205	Danbury, CT	4.031	0.170
San Jose, CA	7.199	0.203	Waterbury, CT	1.872	0.170
San Francisco-Oakland, CA	7.576	0.203	Brockton, MA	4.031	0.166
Santa Cruz, CA	7.199	0.200	Fitchburg-Leomin	4.031	0.166
Riverside, CA	4.031	0.197	New Bedford, MA	4.031	0.165
Santa Rosa, CA	7.199	0.194	Providence, MA	3.287	0.165
Norfolk-VA Beach, VA	2.399	0.192	Newburgh-Middlet	3.167	0.164
Yolo, CA	5.183	0.191	Bridgeport, CT	3.476	0.157
Sacramento, CA	4.583	0.190	Stamford, CT	5.156	0.157
San Diego, CA	7.199	0.189	Springfield-Holy	3.406	0.155
Santa Barbara, CA	7.199	0.188	Merced, CA	4.031	0.154
Modesto, CA	4.031	0.184	Austin, TX	1.872	0.151
Hartford-Bristol, CT	3.468	0.184			

Table 6B

Medium House Price Volatility Locations

(Based on year-2005 volatility measures described in the text; MSA names are truncated to conserve space)

MSA Name	Median House Value (year-2009 $100,000)	Historical House Price Volatility as of 2005	MSA Name	Median House Value (year-2009 $100,000)	Historical House Price Volatility as of 2005	MSA Name	Median House Value (year-2009 $100,000)	Historical House Price Volatility as of 2005	MSA Name	Median House Value (year-2009 $100,000)	Historical House Price Volatility as of 2005
Trenton, NJ	3.697	0.146	Bakersfield, CA	2.592	0.103	Pueblo, CO	2.592	0.079	Janesville-Beloit, WI	1.584	0.063
New York, NY	5.519	0.146	Jackson, MI	1.584	0.103	Fort Myers, FL	2.592	0.078	Atlanta, GA	2.085	0.062
Portland, ME	1.584	0.144	Reading, PA	1.584	0.103	Santa Fe, NM	1.584	0.078	Flagstaff, AZ-UT	2.592	0.062
Binghamton, NY	1.296	0.143	Grand Junction, CO	2.592	0.102	Lancaster, PA	1.872	0.077	Billings, MT	1.584	0.061
Denver-Boulder, CO	2.592	0.140	Colorado Springs, CO	2.592	0.101	Albuquerque, NM	1.584	0.077	Fort Pierce, FL	2.592	0.060
Yuba City, CA	4.031	0.139	Punta Gorda, FL	2.592	0.101	Bryan-College St	1.296	0.075	Sioux City, IA/ND	0.979	0.060
Albany, NY	1.843	0.138	Wilmington, DE	2.592	0.101	Jacksonville, FL	1.718	0.075	Lubbock, TX	1.094	0.060
Monmouth, NY	4.641	0.136	Yakima, WA	1.296	0.100	Houston-Brazoria	1.296	0.075	Sheboygan, WI	1.584	0.059
Redding, CA	3.167	0.133	Phoenix, AZ	2.592	0.097	Benton Harbor, MI	1.584	0.075	Savannah, GA	1.584	0.059
Glens Falls, NY	1.296	0.131	Naples, FL	2.592	0.095	Ocala, FL	1.584	0.074	Abilene, TX	0.864	0.059
Utica-Rome, NY	1.296	0.130	San Antonio, TX	1.118	0.095	Shreveport, LA	0.979	0.074	Rochester, MN	1.584	0.058
Seattle-Everett, WA	4.104	0.130	Duluth-Superior, WI	1.584	0.094	Corpus Christi, TX	0.864	0.074	Boise City, ID	1.991	0.058
Salt Lake City, UT	2.023	0.130	Lafayette, LA	1.094	0.093	Oklahoma City, OK	1.094	0.073	Chicago, IL	2.713	0.058
Greeley, CO	2.592	0.128	Visalia-Tulare, CA	2.160	0.092	Fort Lauderdale, FL	3.167	0.072	Nashville, TN	1.740	0.057
Chico, CA	3.167	0.126	Spokane, WA	1.872	0.092	Minneapolis-St. Paul, MN	2.912	0.072	Huntsville, AL	1.094	0.057
Washington, DC/MD	5.195	0.125	Rochester, NY	1.181	0.092	Houma-Thibodoux, LA	1.296	0.072	McAllen-Edinburg, TX	0.749	0.057
Allentown, PA	1.537	0.122	Ann Arbor, MI	2.719	0.091	Madison, WI	2.592	0.071	Laredo, TX	0.864	0.057
Bellingham, WA	3.167	0.122	Anchorage, AK	2.592	0.090	Eau Claire, WI	1.584	0.071	Milwaukee, WI	2.107	0.057
Dutchess Co., NY	5.183	0.122	Olympia, WA	2.592	0.090	Charlottesville, VA	2.592	0.071	Grand Rapids, MI	1.658	0.056
Jamestown, NY	0.864	0.122	Bremerton, WA	2.592	0.088	Monroe, LA	1.094	0.070	Asheville, NC	1.872	0.056
Portland, OR-WA	2.592	0.120	Amarillo, TX	1.094	0.087	Flint, MI	1.022	0.070	Kenosha, WI	1.872	0.055
Fort Collins, CO	2.592	0.119	Baltimore, MD	2.871	0.086	Orlando, FL	2.485	0.070	Hagerstown, MD	2.160	0.054
Eugene-Springfield, OR	2.160	0.118	El Paso, TX	0.864	0.085	Baton Rouge, LA	1.296	0.069	Longview-Marshall, TX	0.979	0.054
Odessa, TX	0.868	0.116	New Orleans, LA	1.557	0.085	Kileen-Temple, TX	1.094	0.069	Springfield, MO	1.296	0.054
Provo-Orem, UT	2.160	0.116	West Palm Beach-	4.031	0.085	Tulsa, OK	1.094	0.069	Davenport, IA	1.468	0.053
Atlantic City, NJ	2.592	0.116	Galveston, TX	1.584	0.084	Daytona Beach, FL	1.872	0.067	Waco, TX	1.094	0.053
Philadelphia, PA	2.619	0.115	Tacoma, WA	2.592	0.083	Tyler, TX	1.094	0.067	Sarasota, FL	2.592	0.053
Syracuse, NY	1.159	0.113	Melbourne-Titusville, FL	2.592	0.083	York, PA	1.872	0.067	Evansville, IN	1.296	0.052
Dallas-Fort Worth, TX	1.399	0.112	Scranton, PA	1.584	0.082	Kankakee, IL	1.296	0.065	Akron, OH	1.643	0.052
Salem, OR	1.872	0.109	Charleston, SC	2.238	0.082	St. Cloud, MN	2.592	0.065	Hattiesburg, MS	0.979	0.052
Buffalo-Niagara, NY	1.120	0.108	Waterloo-Cedar Falls, IA	1.296	0.082	Dover, DE	2.160	0.065	Canton, OH	1.296	0.051
Medford, OR	2.592	0.107	Johnstown, PA	0.979	0.081	Kansas City, MO-KS	1.642	0.065	Saginaw-Bay City, MI	1.296	0.051
Detroit, MI	2.127	0.107	Sharon, PA	1.296	0.081	LaCrosse, WI	1.584	0.064	Lakeland-Winter., FL	1.296	0.051
Richland, WA	1.584	0.104	Tampa-St. Pete., FL	2.081	0.080	Alexandria, LA	1.094	0.064	Kalamazoo, WI	1.498	0.050
Fresno, CA	3.425	0.104	Vineland-Milville, NJ	1.584	0.080	Biloxi-Gulfport, MS	1.107	0.063	Las Cruces, NM	1.584	0.050

Table 6C

Low House Price Volatility Locations

(Based on year-2005 volatility measures described in the text; MSA names are truncated to conserve space)

MSA Name	Median House Value (year-2009 $100,000)	Historical House Price Volatility as of 2005	MSA Name	Median House Value (year-2009 $100,000)	Historical House Price Volatility as of 2005	MSA Name	Median House Value (year-2009 $100,000)	Historical House Price Volatility as of 2005	MSA Name	Median House Value (year-2009 $100,000)	Historical House Price Volatility as of 2005
Panama City, FL	1.584	0.050	Gainesville, FL	1.872	0.043	Lincoln, NE	1.584	0.034	Reno, NV	3.167	0.025
Green Bay, WI	1.584	0.050	Myrtle Beach, SC	1.094	0.043	Fort Wayne, IN	1.241	0.034	Jackson, TN	1.094	0.025
Louisville, KY	1.732	0.050	Mobile, AL	1.094	0.042	Charlotte-Gaston, NC	1.584	0.034	Greensboro-Winst., NC	1.468	0.025
Beaumont, TX	0.864	0.049	Miami-Hialeah, FL	2.592	0.042	Rockford, IL	1.296	0.033	Cincinnati, OH	1.507	0.025
Montgomery, AL	1.094	0.049	Columbia, MO	1.584	0.041	Des Moines, IA	1.584	0.033	Hamilton, MD	1.872	0.025
Jackson, MS	0.979	0.049	Pittsburgh, PA	1.278	0.041	Macon, GA	1.603	0.032	Dothan, AL	1.094	0.024
Richmond, VA	2.342	0.048	Cedar Rapids, IA	1.584	0.041	Sumter, SC	1.094	0.032	Appleton-Oskosh, WI	1.872	0.024
Las Vegas, NV	3.167	0.048	Sioux Falls, SD	1.094	0.040	Fargo-Morehead, ND	0.979	0.031	Clarksville- Hop. TN	1.094	0.024
Tucson, AZ	1.872	0.048	Springfield, IL	1.296	0.040	Bloomington, IN	1.584	0.031	Birmingham, AL	1.482	0.023
Wausau, WI	1.584	0.047	Fayetteville, NC	1.296	0.039	Hickory-Morg., NC	1.418	0.031	Tallahassee, FL	1.584	0.023
Omaha, NE	1.480	0.047	Albany, GA	1.872	0.039	Columbus, GA	1.872	0.030	State College, PA	1.584	0.023
St. Louis, MO-IL	1.734	0.047	Cleveland, OH	1.674	0.038	Rocky Mount, NC	1.296	0.030	South Bend, IN	1.296	0.022
Wichita, KS	1.296	0.047	Wichita Falls, TX	0.979	0.038	Brownsville, NY	0.749	0.030	Lima, OH	1.296	0.021
Lansing, MI	1.811	0.047	Iowa City, IA	1.296	0.037	Elkhart-Goshen, IN	1.296	0.030	Muncie, IN	1.094	0.021
Augusta-Aiken, GA	1.489	0.047	Decatur, AL	1.094	0.037	Gadsden, AL	1.094	0.029	Danville, VA	1.094	0.020
Lexington, KY	1.872	0.046	Harrisburg, PA	1.701	0.037	Columbus, OH	1.775	0.029	Greenville-Spart., NC	1.435	0.019
Athens, GA	1.584	0.046	Memphis, TN	1.508	0.037	Dayton-Springfield, OH	1.389	0.029	Auburn-Opelika, AL	1.094	0.018
St. Joseph, MO	1.296	0.046	Raleigh-Durham, NC	2.289	0.036	Texarkana, TX	1.296	0.029	Jacksonville, NC	1.296	0.018
Little Rock, AR	1.094	0.046	Topeka, KS	1.296	0.036	Altoona, PA	1.094	0.029	Lynchburg, VA	2.592	0.018
Kokomo, IN	1.296	0.046	Bloomington, IN	1.296	0.035	Champaign-Urbana, IL	1.584	0.029	Indianapolis, IN	1.720	0.015
Williamsport, PA	1.296	0.045	Youngstown-Warre	1.260	0.035	Johnson City-Kin., TN	1.296	0.028	Anniston, AL	1.094	0.014
Mansfield, OH	1.296	0.045	Fort Smith, AR/O	0.864	0.035	Lake Charles, LA	0.864	0.028	Roanoke, VA	2.592	0.014
Lafayette, IN	1.296	0.045	Fayetteville-Spr	1.444	0.035	Fort Walton Beach, FL	1.584	0.028	Goldsboro, NC	1.296	0.013
Wilmington, NC	1.584	0.045	Toledo, OH/MI	1.296	0.035	Columbia, SC	1.584	0.028	Decatur, IL	0.979	0.013
Racine, WI	2.160	0.044	Tuscaloosa, AL	1.584	0.035	Joplin, MO	0.979	0.028	Florence, AL	1.094	0.013
Erie, PA	1.144	0.044	Yuma, AZ	1.584	0.035	Chattanooga, TN	1.495	0.027	Knoxville, TN	1.296	0.010
Peoria, IL	1.296	0.043	Terre Haute, IN	1.296	0.035	Greenville, NC	1.296	0.026			

6. CONCLUSIONS

The opening decade of the 2000s witnessed unprecedented volatility in housing markets, with a dramatic boom in housing starts and prices followed by the catastrophic crash that began in 2007. While the boom and bust in housing starts and prices is well known, a marked swing in homeownership rates has received less attention. For our target sample of individuals in the United States aged 20 to 80, the homeownership rate rose 2.8 percentage points between 2000 and 2005, then dropped back 1.8 percentage points from 2005 to 2009. Moreover, recent reports by the HUD indicate that U.S. homeownership rates fell an additional 1 percentage point between 2009 and 2011.

The recent sharp declines in homeownership rates have not only symbolic adverse effects on perceptions of the health of the economy, but also tangible adverse effects. That is because the desire to invest in homeownership is intimately linked to the demand for mortgage services, housing starts and the willingness of families to invest in their neighborhoods. This paper considers these issues and has sought to address several key questions including: (i) What drove the boom and bust in homeownership of the past decade? (ii) Is there evidence that households and lenders have become more risk-averse when considering investment in homeownership subsequent to the financial crash? (iii) To what extent did shifts in mortgage credit standards contribute to the boom and bust in homeownership? and (iv) How much further are homeownership rates likely to fall?

We examine these and related questions using individual-level data from the 2000 census and the 2005 and 2009 ACS. Findings indicate that the boom and bust in homeownership rates over the last decade almost certainly were driven in part by an initial relaxation of credit standards followed by a tightening of credit with the onset of the 2007 financial crash. Evidence also suggests that households adopted a more risk-loving attitude towards homeownership in the boom years followed by a return to a more conservative stance post-crash, and that these shifts contributed to the boom and bust in homeownership. A third factor contributing to changes in homeownership rates over the decade were shifts in the distribution of socio-economic attributes of the population: those changes served to pull homeownership rates down somewhat as the decade progressed.

How much more will homeownership rates fall? This is not an easy question to answer and depends on uncertain forecasts of attitudes towards investing in homeownership, as well as changes in credit market and other economic conditions. Nevertheless, we are able to offer a bounded estimate. Suppose one assumes that market conditions, including underwriting conditions and attitudes about investing in homeownership, will settle back to the patterns of the year 2000, before the boom-bust cycle began. Those conditions are embodied in the year-2000 coefficients from our homeownership regressions. If one further assumes that the future distribution of socio-economic and demographic traits of the population will look similar to that of 2000, then our estimates suggest that homeownership rates have likely bottomed out and will not decline further. If instead one assumes that future population traits are more likely to be similar to those of 2009 — including income, hours worked, education, race, and the like — then homeownership rates could fall by as much as 1 or 2 percentage points.[24]

Just where within this range — from 0 to 2 percentage points of further decline — homeownership rates will move is difficult to say with any real confidence. In part, this is because projections of the future socio-economic composition of the population are uncertain. Nevertheless, year-2009 attributes of the population are surely better predictors of population attributes over the next five years or so than attributes from 2000. We believe that these patterns and the weight of the evidence from our empirical assessments point to further notable declines in homeownership rates in the United States.

APPENDIX 1

Figure A1

Full Sample Homeownership Model Coefficients

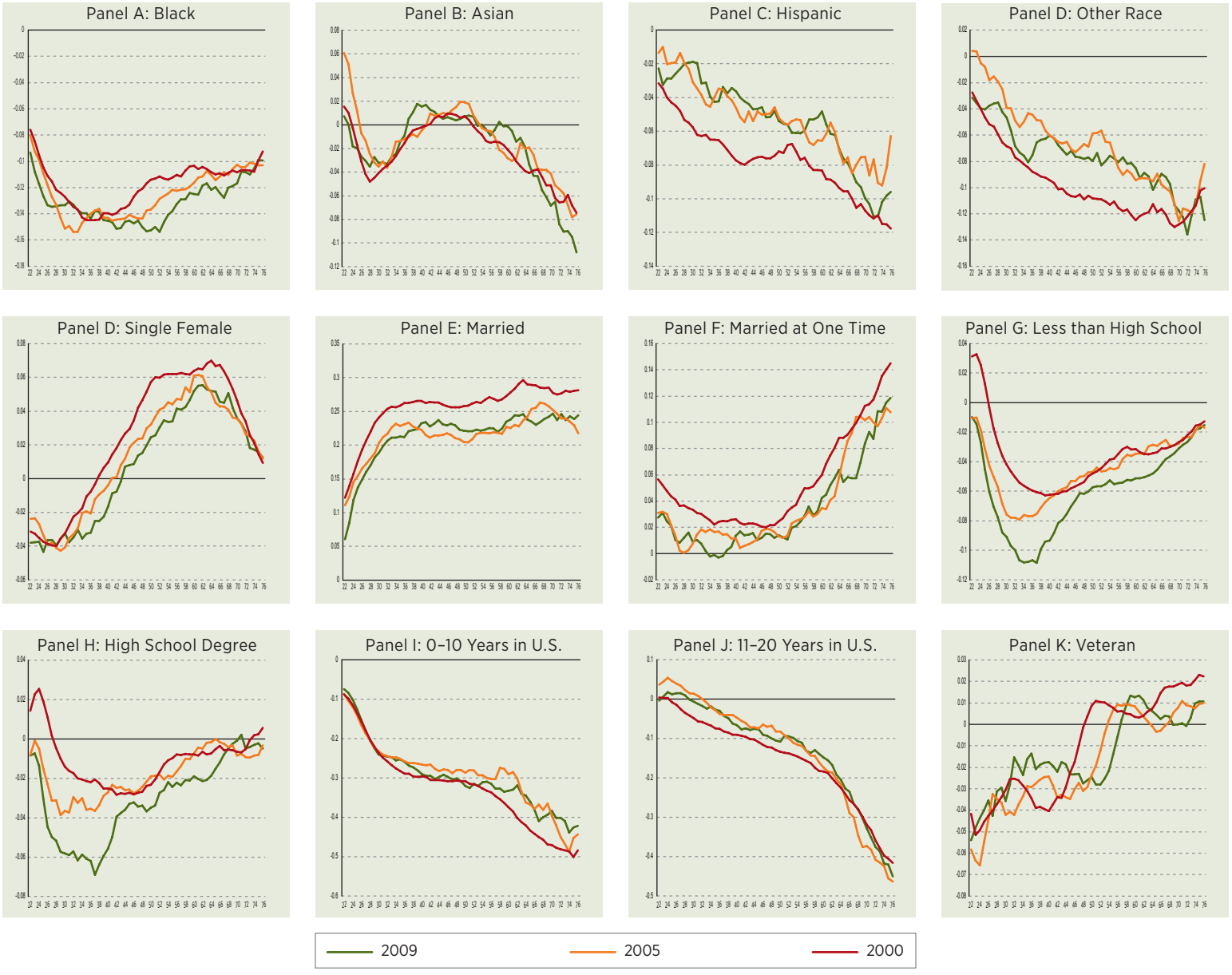


Figure A1 Continued

Full Sample Homeownership Model Coefficients

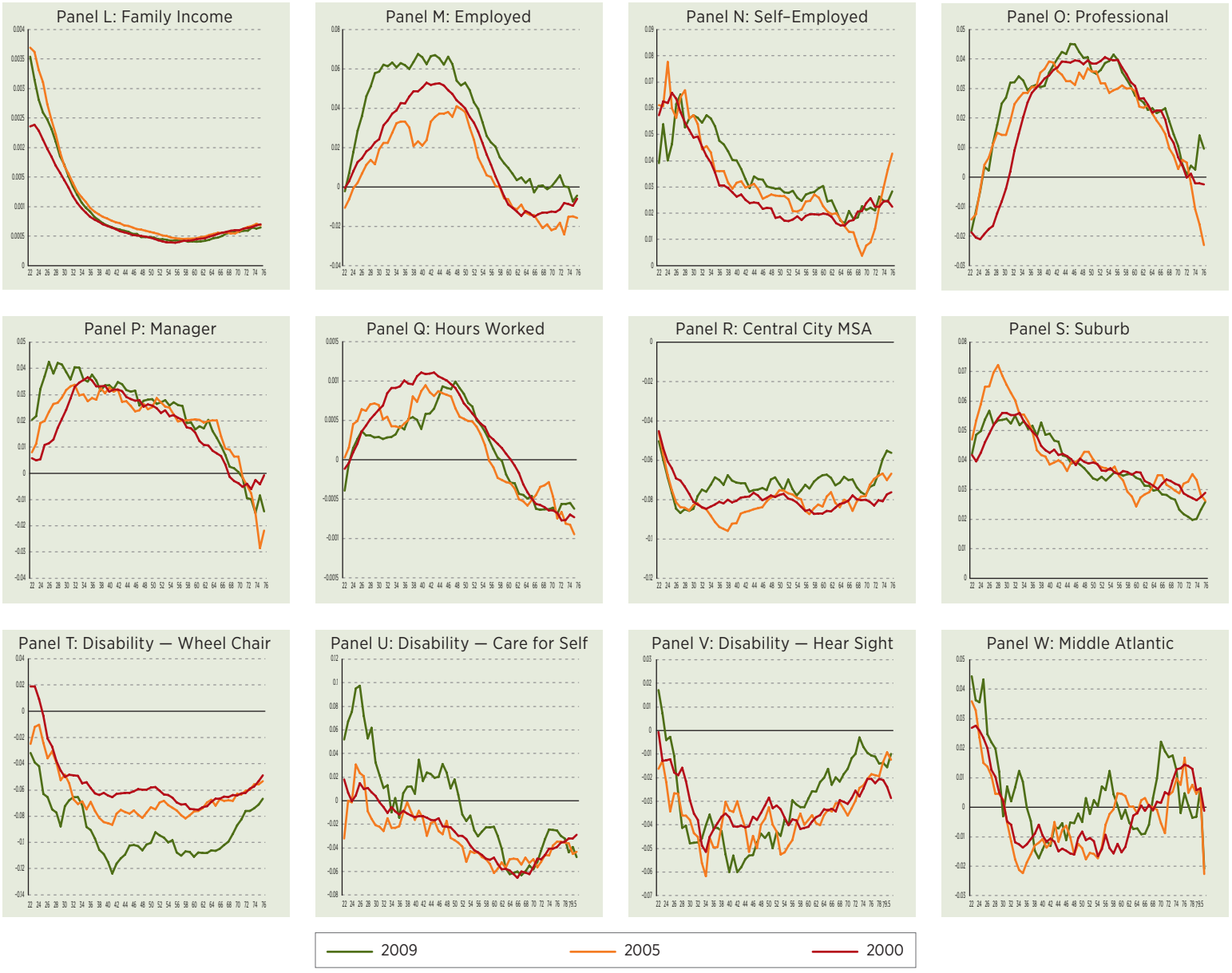
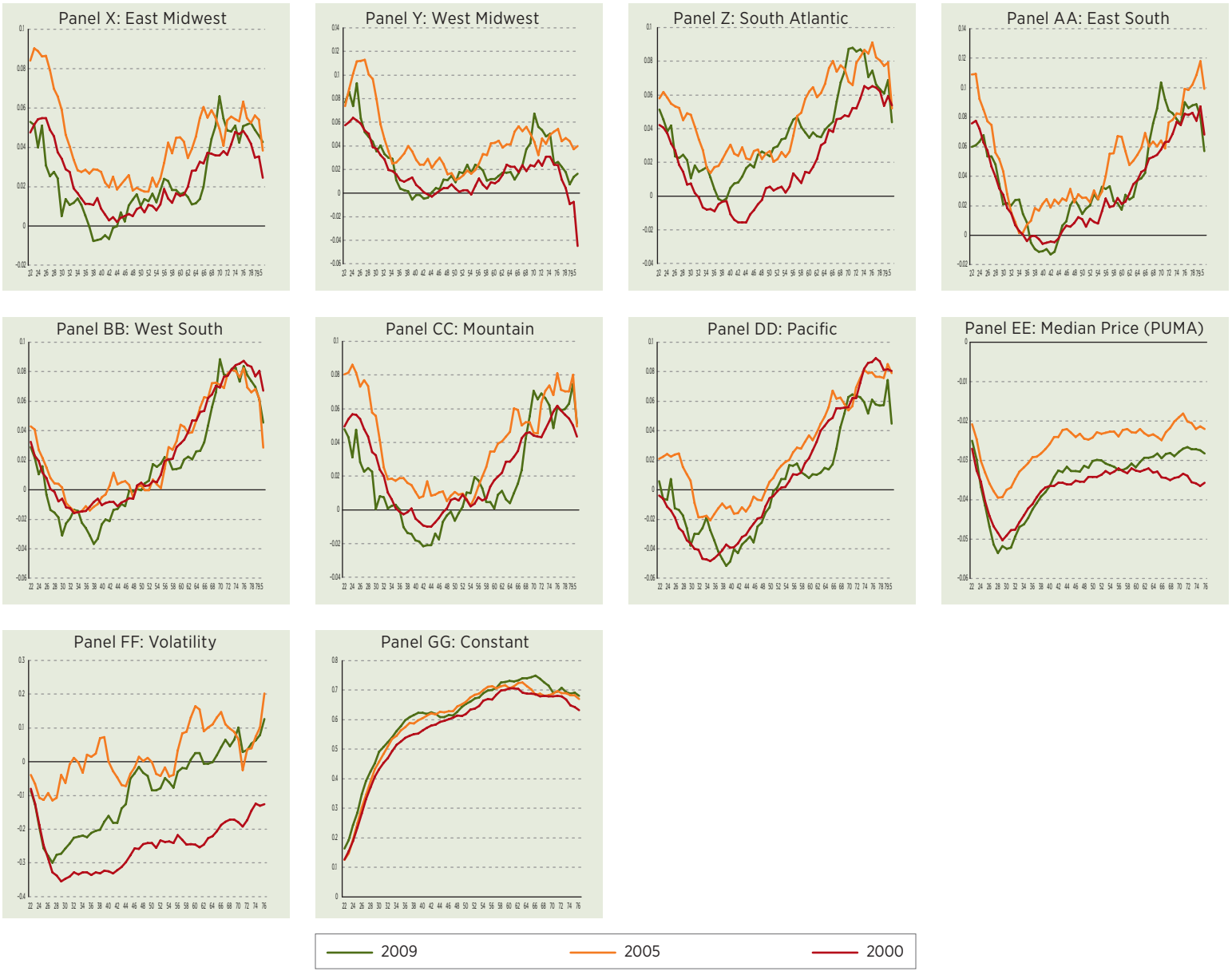


Figure A1 Continued

Full Sample Homeownership Model Coefficients



APPENDIX 2

Figure A2

Recent-Mover Sample Homeownership Model Coefficients

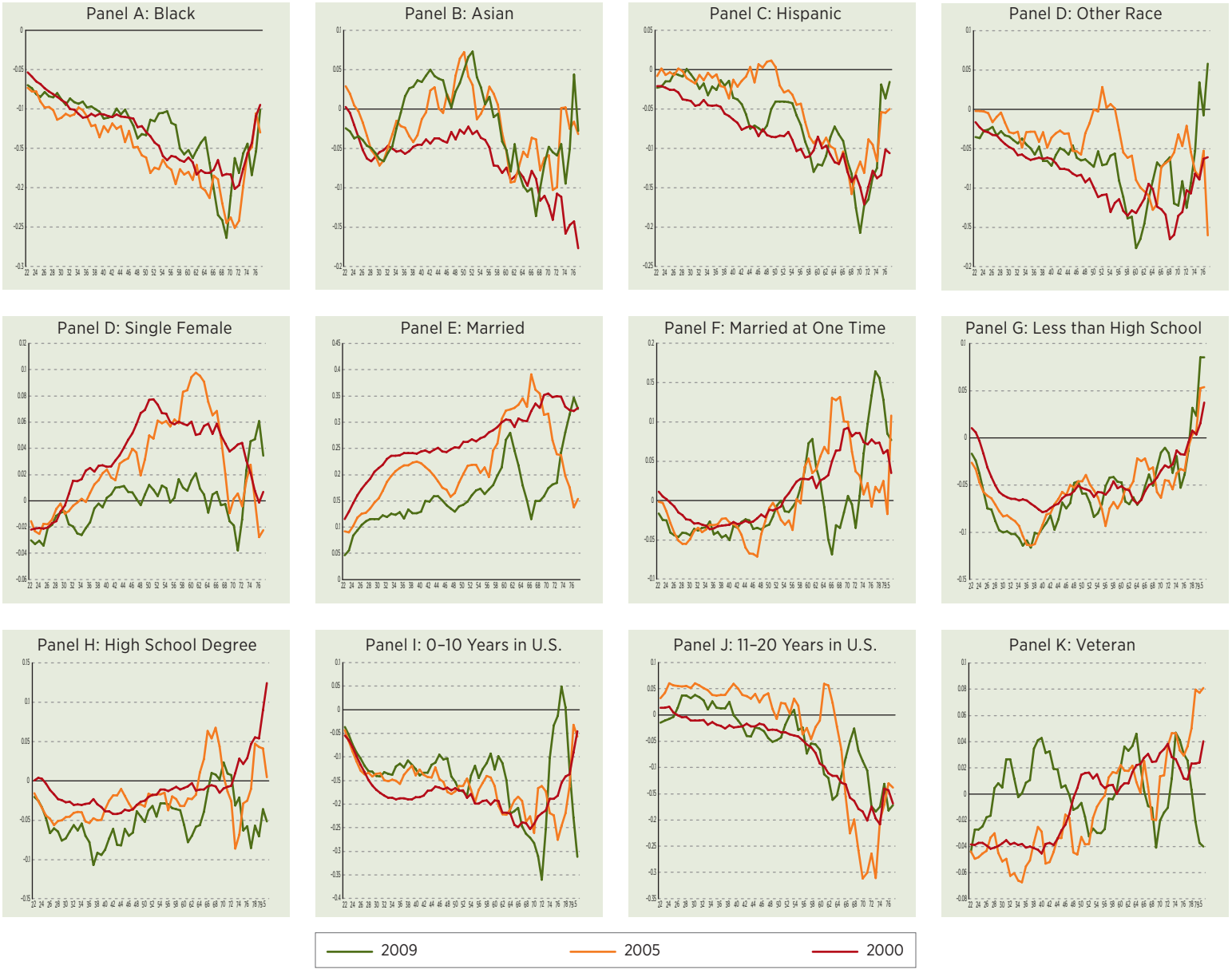


Figure A2 Continued

Recent-Mover Sample Homeownership Model Coefficients

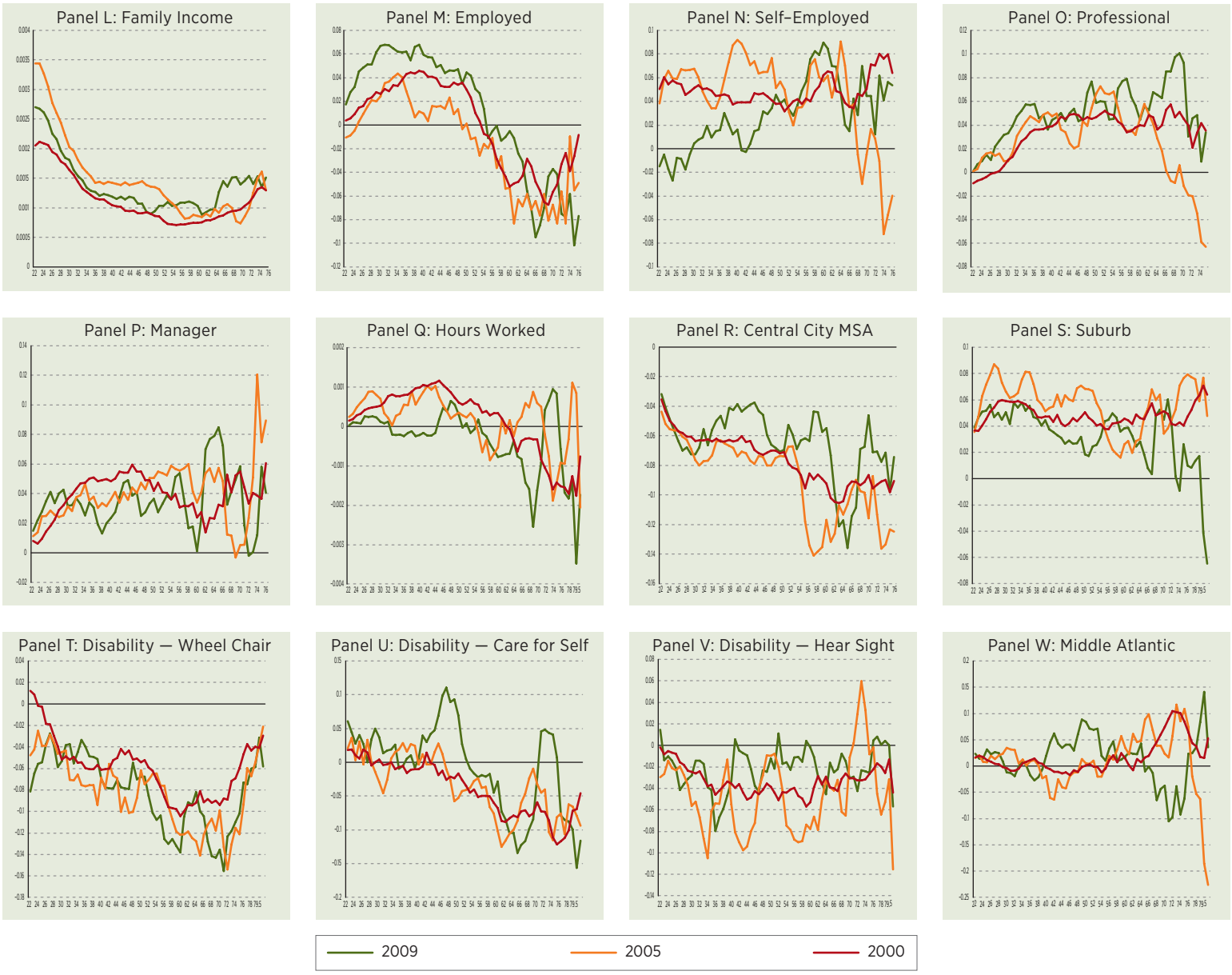
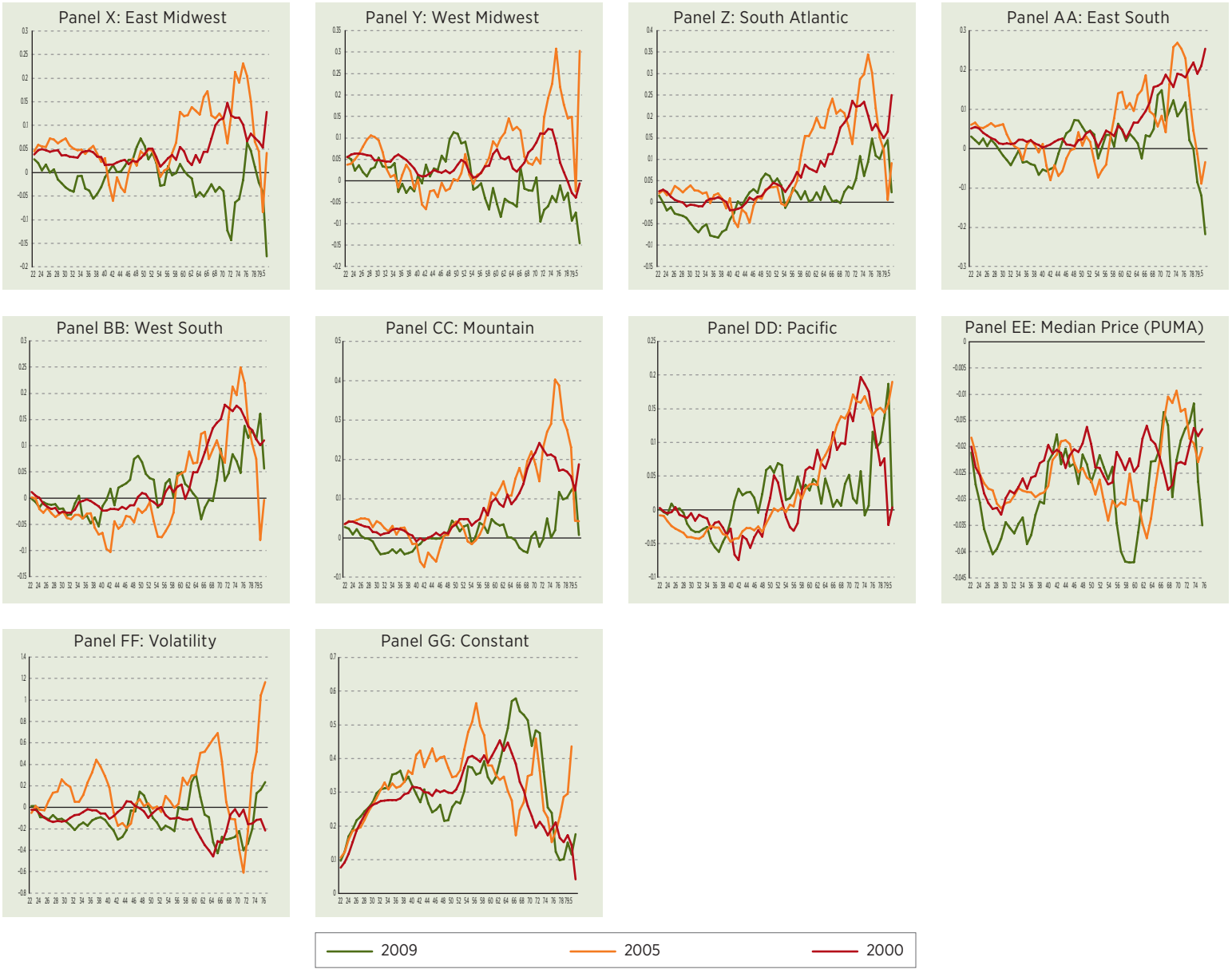


Figure A2 Continued

Recent-Mover Sample Homeownership Model Coefficients



END NOTES

1. This is implicit in the title of the federal "American Dream Act," which provided incentives to promote homeownership in the early 2000s.

2. DiPasquale and Glaeser (1999) find that homeowners are more likely to garden, more likely to know the name of their local congressional representative and, in general, more likely to behave in ways that enhance the local community. They recognize that homeowners are not a randomly selected segment of the population and that this may contribute to their findings, while also offering an instrumenting strategy to help address this issue. Rosenthal (2008) finds that the presence of homeowners 20 to 30 years in the past is a predictor of rising neighborhood economic status today, consistent with the idea that nearby homeowners set in motion a set of self-reinforcing behaviors that strengthen a community's economic standing for years into the future.

3. In part, this is because homeowners are typically of higher income and tend to favor new as opposed to older homes (e.g. Bruckner and Rosenthal (2009), Rosenthal (2011, 2008), Baer (1986)). See also Case, Cotter, and Gabriel (2011) for related discussion.

4. In testimony before the Joint Economic Committee of Congress (November 13, 2002), Chairman Greenspan stated "...the extraction of equity from homes has been a significant support to consumption during a period when other asset prices were declining sharply. Were it not for this phenomenon, economic activity would have been notably weaker in the wake of the decline in the value of household financial assets."

5. Such policies include post-World War II Federal Housing Administration (FHA) creation of the fully amortizing, long-term fixed rate mortgage, long-standing federal tax policies that subsidize homeownership (e.g. Rosen (1979), Rosenthal (1988)), and mortgage lending policies that require the GSEs to make special efforts to expand the supply of mortgage credit for lower-income families and neighborhoods (e.g. Gabriel and Rosenthal (2010)).

6. For additional details on historical homeownership rates for the entire U.S. and by region see the following chart at the U.S. Census Bureau website: www.census.gov/hhes/www/housing/hvs/charts/files/fig05.pdf

7. We comment further on these issues later in the paper.

8. As constructed by the U.S. Census Bureau, there are roughly 2,000 PUMAs covering the entire United States. In comparison, there are roughly 3,100 counties in the United States, so a given PUMA is about 50 percent larger than a typical county.

9. Inclusion of the volatility variable is motivated in part by recent work by Case, Cotter, and Gabriel (2011) and Davidoff (2005). Davidoff (2005) demonstrates that house price volatility affects family housing decisions, and more so if their labor income is correlated with movements in housing values. Case, Cotter, and Gabriel (2011) show that localized house price volatility is often priced into metropolitan house price returns.

10. As noted in the Introduction, an alternative approach is to measure the cost of owning a home for one year relative to renting. This measure of the user costs of homeownership (e.g. Rosen (1979)) summarizes information on local and federal tax policies that subsidize the cost of owning, along with depreciation net of maintenance, and expected capital gains. These factors all affect the return on investment in owner-occupied housing and are embodied in the investment demand function for real estate described below. Also implicit in that investment demand function is the return on alternative investments inclusive of rental costs should the family choose to rent rather than own its home.

11. Geography of the individual person records in the 2000 census and the ACS PUMS data is identified down to the PUMA (public use micro area) level. By definition, a PUMA contains at least 100,000 people in residence.

12. PUMS data from both data sets are available from the census website (www.census.gov) and also in a more user-friendly form from the IPUMS website (www.ipums.org).

13. Davidoff (2006) finds that households purchase less valuable homes if their earned income is more positively correlated with house price movements, as with individuals in real estate related industries. That pattern does not carry over to homeownership, however, which is not found to be particularly sensitive to correlations between house price movements and earned income. As will become apparent, we find that house price volatility does deter homeownership for most age groups, but to a degree that differs sharply across survey years and over the life cycle.

14. For example, private-label single-family mortgage-backed securities include an indication of geographic distribution of loans comprising the pool. Bids on those securities in the secondary market reflect investor assessment of geographic variation in loan performance risk.

15. Note that this is the longest history that will still allow us to retain all MSAs in the U.S. in the sample given that early years of the FHFA price indexes are not available for some metropolitan areas.

16. Estimating the model by Probit had little impact on the model coefficients after adjusting for the non-linearity of the probit function.

17. We do not report the standard errors on any of our estimates since to do so would become unwieldy given the extensive number of model coefficients. Instead, we note here that sample sizes for the age-specific regressions ranged from about 15,000 observations for some of the younger and older age cohorts to approximately 200,000 observations for middle-aged cohorts. These sample sizes are large enough to ensure quite precise estimates of most of the model coefficients. In addition, as noted above, all of the plots in the text and in the appendix present five-year moving average values of the estimated values. This has the effect of increasing the sample size by a factor of five, further enhancing the precision of the reported estimates.

18. Findings by Sinai and Souleles (2005) suggest another possibility. In the absence of a house price bubble, housing price equals its fundamental value, the discounted stream of anticipated net future rents. In that case, house price volatility would be associated with increased volatility in anticipated future rents and risk-averse households might seek to protect themselves from possible future rent increases by becoming homeowners.

19. In contrast, we use unweighted data when estimating the regression coefficients. That is because we assume that the model covariates are exogenous in which case the estimated coefficients converge to their unobserved population values.

20. It is worth noting that the estimated actual homeownership rate for 2000 (seen in the upper left corner of the table) differs somewhat from values often noted in the media for U.S. aggregate homeownership rates as reported in Figure 1. This is for two reasons. The first is that our sample comprises only households with heads age 20 to 80, as opposed to the entire U.S. population. The second is that homeownership rates in Figure 1 and as typically reported in the media are derived from the current population survey (CPS). Conversations with analysts at the U.S. Census Bureau confirmed that the CPS sample is known to yield slightly different values for U.S. homeownership rates as compared to values obtained from decennial census data. For our sample, the year-2000 actual (estimated) homeownership rate is 66.3 percent while the aggregate U.S. homeownership rate in Figure 1 is roughly 67 percent. In contrast, our actual (estimated) homeownership rates for 2005 and 2009 based on the ACS data largely match those reported in Figure 1 for the entire U.S.

21. Similar magnitude changes in homeownership rates are obtained when holding the data constant at 2005 or 2009 levels.

22. See www.census.gov/hhes/www/housing/hvs/historic/index.html .

23. See, "Foreclosure Fiasco: 30% of mortgages are underwater," CNNMoney.com, February 9, 2011, http://money.cnn.com/2011/02/09/real_estate/underwater_mortgages_rising/index.htm .

24. Further analysis in the paper points to even larger possible future declines in homeownership in locations that have recently been subject to high levels of house price volatility.

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