

# **Borrowing Constraints during the Housing Bubble\***

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## **Abstract**

The impact of borrowing constraints on homeownership has been well established in the literature. Wealth is most likely to restrict homeownership followed by credit and income. Using recent movers from the 1979 National Longitudinal Survey of Youth and borrowing constraint definitions commonly used in the literature, we examine the impact of these constraints on the probability of homeownership during the housing market boom between 2003 and 2007. We show that whereas the pool of financially constrained households expanded, the marginal impact of borrowing constraints associated with income and credit quality declined during this period. The fact that lending standards relaxed is accepted; however the impact of this on homeownership has not been previously studied. Here we find that loosened underwriting does appear to have reduced the impact of income and credit quality on homeownership but the impact of the wealth constraint persists.

JEL Codes: G01 - Financial Crises; G21 - Banks; Depository Institutions; Micro Finance Institutions; Mortgages; G28 - Government Policy and Regulation; R21 - Housing Demand; R31 - Housing Supply and Markets; R38 - Government Policy; Regulatory Policy

Keywords: tenure choice, borrowing constraint, credit constraint, mortgage supply, homeownership, credit bubble

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## 1. Introduction

An extensive literature studying financial barriers to homeownership has developed over the past two decades. This line of research provides ample evidence that down payment and monthly payment requirements, which respectively depend on the household's wealth and income, traditionally have been a factor in tenure status. The research also documents the impact of borrowers' credit quality, a determinant of access to mortgage credit, on tenure status. A second line of research, theoretical and empirical, demonstrates both that loosened mortgage underwriting helped fuel the boom and that the boom in house prices supported the credit expansion.

What the literature does not identify is the effect of this credit expansion on borrowing constraints, and the effect of changing borrowing constraints on homeownership. In fact, homeownership did not expand after 2004 despite the expansion of credit supply and loosening of traditional credit constraints. Our paper contributes to the literature by being the first to measure the changes in borrowing constraints during the 2003 to 2007 period of rapidly rising house values, and the associated impacts on homeownership.<sup>5</sup> We also consider the relationship of changing borrowing constraints to regional house price appreciation.

We use data from the National Longitudinal Survey of Youth (NLSY) which is comprised of households headed by persons in their 40s, excluding immigrants. As a relatively homogeneous demographic group, these households provide a controlled sample for studying the impact of the evolving housing and credit environment. The survey provides information on the home-ownership status and current house values, as well as income, wealth and credit quality of the individuals that allows us to identify those that face potential income, wealth or credit constraints. Within this sample, we focus on households that have recently moved, because these households face an actual tenure choice decision. The timing of the survey provides two important snapshots bounding the boom period: we use the 2004 and 2008 data which reflects tenure choices among households that moved during 2002-2003 and 2006-2007, respectively.

Consistent with prior studies, the three constraint categories of income, wealth, and credit history are found to be associated with reduced likelihood of homeownership among the recent movers in the first wave of the survey. Importantly, however, although the pool of financially constrained households increased during the boom period, as reflected in comparison across the two snapshots, the marginal impact of borrowing constraints, other than the wealth constraint, declined.

The paper is organized as follows: The next section reviews the relevant literature, section three discusses the data, and section four outlines the methodology. Section five

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<sup>5</sup> See "Explaining the Housing Bubble" (Levitin and Wachter, 2012) for a discussion of the timing of the housing bubble as it relates to real estate fundamentals in particular as it relates to rents and interest rates.

discusses the results, and section six concludes.

## **2. Literature Review**

As noted, our paper builds on the well-established literature that documents a significant role of borrowing constraints as a factor in homeownership status, especially among low-income and minority households. For instance, Haurin et al. (1996, 1997) demonstrate that the wealth constraint plays an important role, after taking into account the endogeneity of wealth in tenure decisions.

The earlier literature examines wealth and income constraints but does not consider the role of borrowing constraints tied to household credit quality. Rosenthal (2002) introduces credit quality in investigating barriers to homeownership by considering the combined impact of all three types of borrowing constraints using the 1998 Survey of Consumer Finance. Barakova et al. (2003) confirms the importance of credit quality and evaluates the relative impact of credit quality on homeownership rates, distinguishing it from wealth and income constraints. They supplement the Survey of Consumer Finance data with imputed credit scores from a model based on a sample from one of the three large consumer credit bureaus.

This study extends Calem et al. (2010), which uses the newly available information on wealth and credit in the 2004 wave of the National Longitudinal Survey of Youth (NLSY). This database includes U.S. resident individuals aged 14-22 in 1979 who were observed periodically through 2004. Therefore, it restricts attention to a particular cohort (39-47 in 2004) of non-immigrant individuals. This database highlights the effect of wealth, income and credit constraints in accessing the housing market; in addition to impaired credit, the lack of credit history also has been found in the literature to have a considerable impact on homeownership status.

This paper also relates to the recent and expanding literature that considers the relationship of collateral values to house price dynamics. Demyanyk and Van Hemert (2009) argue that the decline in underwriting standards prior to the mortgage crisis could have been detected but was masked by rapid house-price appreciation. Pavlov and Wachter (2011) investigate the relationship between aggressive mortgage lending instruments and asset market prices and find that the expansion of credit supply increases asset prices and magnifies the effects of demand shocks.

Like Pavlov and Wachter (2011), Adelino et al. (2011) agree that higher credit supply induces an increase in asset prices. In particular, they reject the explanation that an increase in housing demand loosens financial constraints. On the other hand, Brueckner

et al. (2012) find feedback effects between expectations of rising house prices and loosened mortgage underwriting. Coleman et al. (2008) also find that the expansion of credit is a result of the rise in house prices during the boom period.

To test for directionality of impact, the macro literature uses structural vector error correction models to determine whether mortgage expansion Granger-causes price rises or whether price rises Granger-causes an expansion in mortgage credit in the US and elsewhere. The findings are mixed, generally supporting bidirectional causality. (See Anundsen & Jansen 2012; Berlinghieri, 2010; Oikarinen, 2009a; Oikarinen, 2009b; Sophocles & Vlassopoulos, 2009; Fitzpatrick & McQuinn, 2007; Gerlach & Peng, 2005; Gimeno & Martinez-Carrascal, 2010; Hoffman, 2004; Hoffman, 2003.)

Another question the literature addresses relates to the pricing of mortgage credit and considers whether the rise in house prices is concomitant with greater reliance on risk-based pricing allowing for lower credit scores, and low- or no-documentation (low-, no-doc) mortgages (see Getter, 2011). The argument is that when collateral (house) values are rising, lenders do not need to verify income to underwrite a loan but rather can rely primarily on credit scores and price the loan according to the riskiness of the borrower. Based on this analysis, wealth, income and credit constraints reduce the probability of homeownership when house prices do not increase, but when they do increase, risk-based pricing (with the assumption that house values will continue to rise) makes these constraints non-binding.<sup>6</sup> Our empirical tests will allow us to identify whether this applies generally and also for each constraint, separately.

Our paper contributes to both strands of the literature. First, the paper documents the impact of the change in borrowing constraints on homeownership in this unusual period. Second, quantifying the impact of borrowing constraints during the boom period helps explain the linkages between credit supply and collateral values.

### **3. Data**

We use data from the 1979 National Longitudinal Survey of Youth (NLSY) to study the interaction between borrowing constraints and house market price dynamics in

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<sup>6</sup> This is consistent with practices documented in the Federal Reserve interagency guidance on Nontraditional Mortgage Product Risks (Sept. 29, 2006), Final Rule amending Regulation Z (July 14, 2008). The result, according to Getter (2011), is that no-doc lending makes it possible to follow a life-cycle consumption pattern where income is no longer tied to consumption, consistent with the literature on credit constraints to consumption (Zeldes, 1989; Campbell and Cocco, 2003). This possible relationship between house borrowing constraints and consumer welfare outcome is discussed in theoretical general equilibrium models (see Favilukis et al., 2010); see also “Why Housing” (Levitin and Wachter, Forthcoming) for another perspective on this argument.

determining whether households become homeowners. This survey is conducted every other year across a fixed sample of households. A set of sampling weights is provided (and which we utilize) to adjust for attrition of the sample over time.

We use the 2004 and 2008 waves of the NLSY, which bound the housing boom period of 2004 through 2007, and individual variables are described in Table 1. In particular, the 2004 data reflect home purchases mostly in 2002 and 2003, preceding the rapid acceleration in home values and availability of nontraditional mortgage products, and the 2008 data reflect purchases mostly in 2006 and 2007, when the use of nontraditional mortgage products and home values peaked.

There are several advantages to using these data in addition to its relevant timing. First, the survey has information for the three major borrowing constraint categories— income, wealth, and credit—for both periods. Second, the data identify participants that have moved since the prior survey, enabling us to focus on recent movers. Focusing on recent movers mitigates concerns about mismatch between current households' financial condition and original tenure choice. Moreover, recent movers are of particular relevance because these households recently faced an actual tenure choice decision.<sup>7</sup> In other words, the tenure status of some non-movers may not reflect their current preferences, but they remain in their current status because of (exogenous) transactions costs.

Obviously, the NLSY79 sample is representative only of a specific generational cohort (individuals mostly between 40 and 50 years of age), not of all U.S. households. We do not view this as a significant drawback because our focus is on the evolving impact of borrowing constraints over the boom period, and their interaction with local housing market conditions, which we expect would be similar for other demographic groups. Indeed, it can be viewed as an advantage to the extent that it allows for such analysis within a relatively controlled sample.<sup>8</sup>

Table 1 shows summary statistics for the two samples, labeled 2003 and 2007, respectively. We have 1,962 individuals who changed their residence in 2003 and 1,591 individuals who did so in 2007. The age has increased from 43 to 46 for both the full sample and the owners and renters groups (where owning and renting reflect tenure status after the move). A somewhat larger portion is in MSAs after the move, which is true both

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<sup>7</sup> Even though the National Longitudinal Survey of Youth collects panel data, this is not a panel data study since repeat movers are too few within a four year period.

<sup>8</sup> An alternative data source for our question is the Survey of Consumer Finances, but the survey does not identify location of households. We do however use the SCF data to replicate our tests to the extent possible. Prior research has confirmed that the relative importance of borrowing constraints is similar across the NLSY and SCF surveys (see Barakova et al. (2003) and Calem et al. (2010)).

for owners and renters. Fewer are married and have children in the 2007 recent mover group than in the 2003 recent mover group. Family log income has not changed significantly and wealth has slightly decreased for owners. One can see that renters in both years have significantly lower wealth and somewhat lower income. For the recent movers, the mean house value has not changed between 2003 and 2007.

In this sample of recent movers the homeownership rate decreases from 47 to 39 percent. This drop in homeownership for recent movers in the sample follows the national trend of a decrease in homeownership in the population since 2004 shown in Figure 1. The decrease in homeownership from the national data for the 40-49 age group is from 69% to 67%.

Table 3 provides the same set of summary statistics for the full survey data of over 7,000 observations in both years. The statistics are similar to those reported in Table 1 for the recent mover sample, but nonmovers are more likely to be married, to have children at home, to have a larger family size and, on average to have a higher average house value and wealth. Two alternative measures of local housing market conditions are used in this study. We measure local house price appreciation rates using the FHFA house price index at the MSA level, or the index for the non-MSA part of the states for households residing outside MSAs. We also use a value-to-rent ratio based on American Community Survey median house value and median gross rent for the MSA or state in which the respondent resides.

Figure 2 shows the aggregate change in house prices from 2000 to 2007. Comparison to Figure 1 indicates that homeownership rates peaked in 2004 before house prices peaked in 2006 and declined more sharply thereafter. Figure 3 shows how the change in the FHFA index is distributed across MSAs for the two periods 2000 to 2003 and 2004 to 2007.

#### **4. Methodology**

Following the established methodology in the literature, we jointly estimate a (first-stage) selection equation identifying homeowner households that are not subject to borrowing constraints, and a (second-stage) housing demand equation indicating the preferred (target) home value of these unconstrained, owner households. We then apply the estimated, target home value equation to the entire (renter and owner) population to distinguish borrowing constrained households.

Four conditions must be satisfied for a household to be considered unconstrained. First, their wealth must exceed 5% of their targeted house value, implying an ability to

make a 5 percent down payment. Second, the mortgage payment associated with borrowing 95 percent of the targeted house value, given the prevailing market interest rate for a fixed-rate mortgage plus the typical premium for private mortgage insurance, does not exceed 28% of their monthly income, implying ability to meet the standard requirement for prime mortgage credit. We consider alternative thresholds of higher down payment and payment-to-income ratios for robustness. Third, they must have favorable credit records with respect to having none of the following risk indicators: a credit line that is fully drawn; a credit request refusal in the last 5 years; or bankruptcy in the last 9 years; and they are not “thin file”, meaning they have current or previous credit utilization.

The housing demand equation is estimated within the group of unconstrained homeowners and relates a household’s home value to household income, demographic variables, and geographic location.<sup>9</sup> Unconstrained homeowners are those whose home value, wealth, and income satisfy the specified thresholds, and who have good credit. As membership in this group is not a random event, we control for sample selection by jointly estimating the probability of being an unconstrained homeowner with our housing demand equation. We follow Calem et al. (2010) in constructing the specification for the jointly estimated selection model and unconstrained housing demand model. Results from this joint estimation are in Table 4.

After applying the estimated housing demand equation to distinguish constrained from unconstrained households for the full population of owners and renters, we estimate a probit model of homeownership likelihood in relation to the borrowing constraints. As noted earlier, the analysis is restricted to households that were recent movers. The impact of borrowing constraint is analyzed for both 2003 and 2007 in order to assess changes associated with the housing market boom during the interim period.

In addition to the borrowing constraint indicators, demographic and other control variables are included on the right hand side of the equation. Controls include race, ethnicity, marital status, whether the respondent has children, and the respondent’s education level.

In addition to exploring the direct relationship between homeownership outcomes and borrowing constraints at the beginning and end of the boom period, we look at tenure choice in relation to local house price appreciation and also in relation to value-to-rent

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<sup>9</sup> US Census region is the most disaggregated geographic information generally available to the public from the NLSY data. For this study, we obtained access to the confidential MSA-level geographic identifier; such access is granted to academic institutions subject to certain qualifications.

ratios. The rapid rise in home values in many regions that characterized the boom period between 2003 and 2007 may have positively influenced homeownership through the impact on households' expected asset returns from ownership, since housing is both an investment and consumption good. At the same time, rapidly rising house prices or value-to-rent ratios could generate concerns about overpricing and imminent declines in value or could affect homeownership outcomes directly through the relative costs of renting v. owning or indirectly through their impact on borrowing constraints or on other aspects of affordability.

## 5. Results

We first report the results, in Table 4, from the two-equation model of housing demand of unconstrained owner households, from which we determine a household's preferred (target) house price in the absence of borrowing constraints, in relation to household location and demographic characteristics.<sup>10</sup> The model is estimated on the entire homeowner population, consisting of 6,130 observations in 2003 and 6,084 observations in 2007.

From the house price equation we see that in both years, the East, West, and South Central regions are associated with lower house prices and the three large MSAs, Boston, NY, and DC are associated with higher house prices. Larger families are associated with higher house values, but controlling for household size, marital status is associated with a lower house value.

Next, we report summary statistics on prevalence of borrowing constraints. Table 5 reports the percentages of borrowing constrained households among recent movers, by type of borrowing constraint and sample period, using traditional measures. The first two columns allow us to compare the percent constrained by wealth, income, credit, or all constraints combined in 2007 relative to 2003, using traditional measures. For example, 44 percent of recent movers were wealth constrained in 2003 as compared to 52 percent in 2007. There is a similar increase in the percent income constrained. Both constraints are impacted by the rise in house prices in this period. The credit constraint very slightly changes, using the traditional measures. The percent with at least one constraint and all three constraints also increases between 2003 and 2007.<sup>11</sup>

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<sup>10</sup> The same set of variables is used in the house price and the unconstrained household selection equations, as in Calém et al. (2010). Other demographic variables were used but did not appear significant and are thus not reported.

<sup>11</sup> Also the percent non-constrained although higher for homeowners in both years decreases more for owners than for renters in 2007 relative to 2003 as can be seen in the last four columns of Table 5.



### **a. Probit Model**

Tables 6 and 7 report the estimation results for probability of homeownership in relation to the three borrowing constraint indicators. Table 6 provides estimated coefficients and standard errors and Table 7 reports the marginal effects corresponding to the results in Table 6, for three alternative specifications. Model A1 (column 1) omits the housing market variables, while models A2 and A3 (columns 2 and 3) include the change in HPI and the value-to-rent ratio respectively and model A4 include both variables (column 4).

Across all three specifications, we see a substantial decrease in the effect of income and credit constraints between 2003 and 2007. In 2007 we no longer see coefficients that are significantly different from zero for income and credit constraints. The wealth constraint effect also declines in magnitude, although it is still significant and negative. In 2003 all constraints have a significant negative sign with the wealth constraint having the largest effect followed by income and credit. In 2007, only the wealth constraint remains statistically significant. These results may reflect the expanded supply of subprime and non-traditional credit products. These products may have mitigated income and credit barriers to borrowing for homeownership.

Table 6 also shows a statistically significant negative association between homeownership and the value-to-rent ratio (model A3) for both 2003 and 2007, with a similar magnitude in both years. This result is consistent with the literature that links value-to-rent ratios to the relative cost of homeownership or it could reflect expected mean reversion of housing prices. House price appreciation over the past three years is negatively associated with homeownership in 2003 but insignificant in 2007 and is insignificant in both years when value-to-rent is included (model A4).<sup>12</sup>

Other variables included in the regressions as controls also show shifting coefficients across these two periods. Of greatest interest perhaps are the rising negative coefficients for minority status. Over this period minorities become less likely to choose homeownership, all else equal. This may be due to omitted variables in the measurement of constraints across race and ethnicity, magnified by rising house prices.<sup>13</sup>

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<sup>12</sup> 2003 homeownership rates are not available from the US Census so we use 2004 and 2008 rates instead as these are most relevant to our sample period.

<sup>13</sup> We also replicate the base model using SCF data. Without geography we find it is difficult to identify target house values, thus, although the results (which are available from the authors) are supportive of the findings here, we do not include them.

## **b. Model Extensions**

We re-estimate these equations under a variety of alternative assumptions. We begin by varying the down payment and payment-to-income ratios that respectively define the wealth and income constraints in Table 8. The results are robust to alternative, wealth constraint threshold of 10 percent down payment. The results are also robust to an alternative income constraint threshold of 30 percent payment-to-income ratio.

We also combine all three of our constraints and ask the question whether recent movers react to whether they are constrained by any of the three measured constraints differently in 2003 than in 2007. These results are shown in Table 9 for all four specifications. We find that the status of being constrained by any of the measured constraints decreases the probability of homeownership in both periods, and, although the coefficient on the constraint decreases in size, this decline is not statistically significant.<sup>14</sup>

In addition, because preferences and other unobserved factors may vary significantly between recent movers that were previously owners and those that were previously renters, we repeat the baseline analysis separately for these two cohorts. Results are reported in Table 10. The estimated relationships are similar across the two cohorts and align with those observed for the combined population. One difference, however, when the regressions are estimated by cohort, is that the coefficient of value-to-rent ratio is larger in absolute value for previous renters and statistically significant only for this cohort. This may reflect a stronger revealed preference for ownership among previous owners which causes them to be less sensitive to changes in the relative cost of owning to renting as measured by this ratio.

Finally, we test for whether the impact of credit constraints varies with housing market conditions by including interaction of the constraint indicators with an indicator of significant house price increase. We apply the 80<sup>th</sup> percentile of three-year house price appreciation to distinguish high appreciation areas, as well as alternative thresholds.<sup>15</sup> We do this to test for whether greater relaxation of borrowing constraints is associated with high-appreciation areas. Tables 11 and 12 show results for four alternative specifications (models B1, B2, B3 and B4) analogous to models A1, A2, A3 and A4 in Tables 6 and 7, distinguished by choice of variable to measure housing market conditions. Table 11

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<sup>14</sup> We replicate the income and wealth models used in Calem et al. (2010), including instruments for income and wealth, and use these instrumented income and wealth to define the income and wealth constraints. The relative impact of constraints changes but the decrease in the impact of the credit constraint between 2007 and 2003 remains the same.

<sup>15</sup> We report only results based on the 80<sup>th</sup> percentile threshold. We also applied a 25% increase in prices as the threshold (which corresponds to the 80<sup>th</sup> percentile in the 2000 to 2003 period), and obtained similar findings.

provides estimated coefficients and standard errors and Table 12 reports the marginal effects corresponding to the results in Table 11.

We find that the credit quality constraint does not have a significant impact on homeownership in areas with high rates of house price appreciation in 2003, and by 2007, this variable is not statistically significant in either price appreciation category. The declining impact of the income constraint and relatively stability of the wealth constraint appears to be robust across the two price appreciation categories. We also interact constraints with the value-to-rent ratio with similar results.

These findings are broadly consistent with the earlier results without interaction terms. However, the interaction effects for the credit quality constraint may provide some additional insight on evolution of lending practices in this period as discussed below.

### **c. Discussion**

Overall, the model and its extensions establish the persistent significant impact of the wealth constraint and the declining impact of income and credit quality constraints during the bubble years. These findings are consistent with relaxation of credit standards between 2003 and 2007, along with the expanded supply of subprime, alt A, and other non-traditional credit products. These may have largely eliminated income and credit barriers affecting households' ability to finance the purchase of a target valued home.

Despite the measured decreasing impact of credit quality and income constraints, homeownership does not increase when comparing recent movers in 2003 to recent movers in 2007. In fact, there is a slight decrease in homeownership among movers, as in the general population over this period. The decline in homeownership in our sample may be explained by the increase in the percent who are constrained; the persistent impact of the wealth constraint; and the rising value-to-rent ratio.

The fact that the wealth constraint holds while the credit and income constraints weaken is consistent with lenders relying on collateral while easing other underwriting criteria. This result is agnostic as to whether rising house prices enabled greater reliance on collateral or whether relaxed credit constraints contributed to rising prices.

The persistence of the wealth constraint may seem surprising, since during this period it was possible to get a 100% combined LTV (CLTV) loan (called a no ratio).<sup>16</sup> There are several reasons, however, for why the wealth constraint could nonetheless be binding. First, a 100% loan generally would require the borrower to obtain a so-called 80-20 piggyback loan, combining a first and second lien, which would have a relatively high

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<sup>16</sup> Some non-regulated non depository institutions did make second liens available which raised the CLTV up to 125% but such loans were not generally available and did not become common.

blended rate. Moreover, there still would be closing costs, moving costs, and fix-up costs for which the borrower would need disposable wealth. In addition, the asking price for the home might be higher than the appraised value, used to underwrite the loan, requiring the borrower to come up with the cash to close this “appraisal gap.”

We cannot identify the mechanism by which the wealth constraint applies. It may be due to an incentive effect through risk based pricing through a higher blended rate as the first of these mechanisms suggests. Or the causation may be through a wealth constraint through the lack of cash to cover closing and other costs or the appraisal gap. Nonetheless, this constraint holds and discourages homeownership in 2003 and in the height of the bubble in 2007. Even with risk based pricing eliminating the impact of credit and income constraints, it does not appear that the shift to risk based pricing eliminates the impact of a collateral based wealth constraint. This constraint on homeownership remains binding in a period of risk based pricing and loosened underwriting conditions.

Our results also shed some light on the association between house price appreciation and relaxation of borrowing constraints. Prior to the credit expansion beginning in 2003, subprime credit appears to have been more readily available where collateral values were appreciating, as indicated by the easing of the credit quality constraint in rising house price areas in this period. This is consistent with other studies that have found an association between rising house prices and relaxed underwriting, including studies pointing to the use of risk based pricing where prices were rising. However, we do not observe an association between house price appreciation and the impact of income constraints in 2003. This is consistent with the rapid growth of alt-A, interest only, and other nontraditional mortgage products aimed at increased affordability, only after 2003.

As of 2007, we observe a general removal of credit quality and income constraints independent of geography. This suggests that marginal impacts of local house price appreciation on credit supply had a secondary impact during the bubble years, consistent with broad expansion of mortgage credit independent of geography.<sup>17</sup>

## **6. Conclusions**

This paper examines the evolution of borrowing constraints during the 2003 to 2007 period of rapidly rising house values, using data from the National Longitudinal Survey of Youth (NLSY). Use of the NLSY sample focuses the analysis on households in their

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<sup>17</sup> One possible explanation is the predominance of rapid house price growth during this period combined with the fact that mortgages from weaker housing markets could be packaged into MBS together with mortgages from markets with strong house price appreciation.

40s, excluding young individuals and immigrants. However, we do not view this as a significant drawback because our focus is on the evolving impact of borrowing constraints over the boom period and their interaction with local housing market conditions, which we expect would be similar for other demographic groups. Moreover, the NLSY sample of individuals is likely less financially constrained than the excluded household categories, so any impact of constraints could be larger for the broader population.

Consistent with prior studies, the three constraint categories income, wealth, and credit quality (impaired credit history as well as thin file) are associated with reduced likelihood of homeownership among the recent movers in the 2003 wave of the NLSY, but only the impact of the wealth constraint persists in 2007. These findings suggest that easing of lending standards during the boom period had a mitigating impact on income, and credit quality constraints to homeownership but not on the wealth constraint.

Persistence of the wealth constraint may help explain why the homeownership rate declined during the boom period. The general increase in the proportion of borrowing constrained households consequent to rising house prices and the rise in the value-to-rent ratio could have further curtailed homeownership.

In the 2003 sample, subprime credit appears to have been more readily available where collateral values were appreciating, as indicated by the easing of the credit quality constraint in rising house price areas in this period. This is consistent with other studies that have found an association between rising house prices and relaxed underwriting. As of 2007, we observe a general removal of credit quality and income constraints that appears to be independent of geography.

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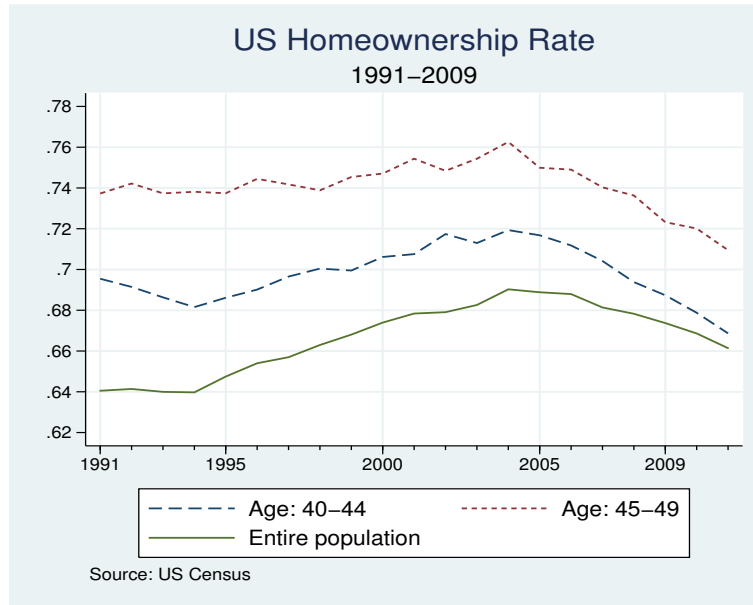
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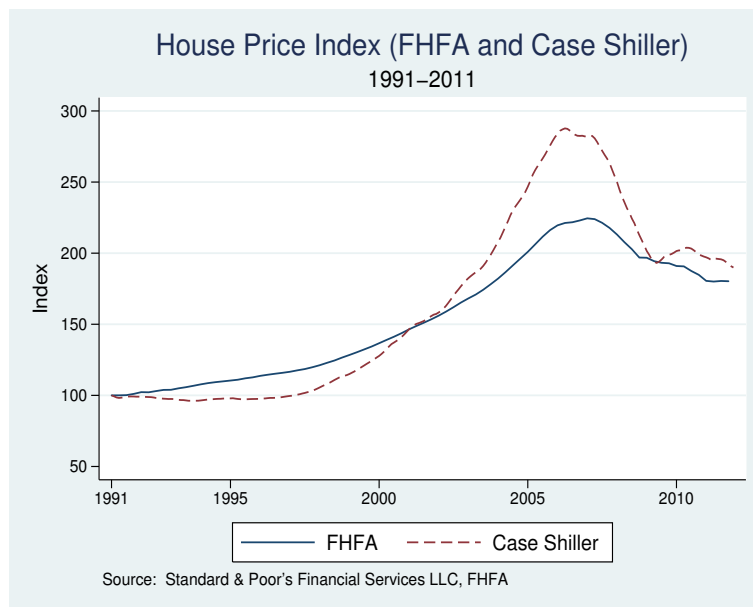
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## 8. Figures and Tables

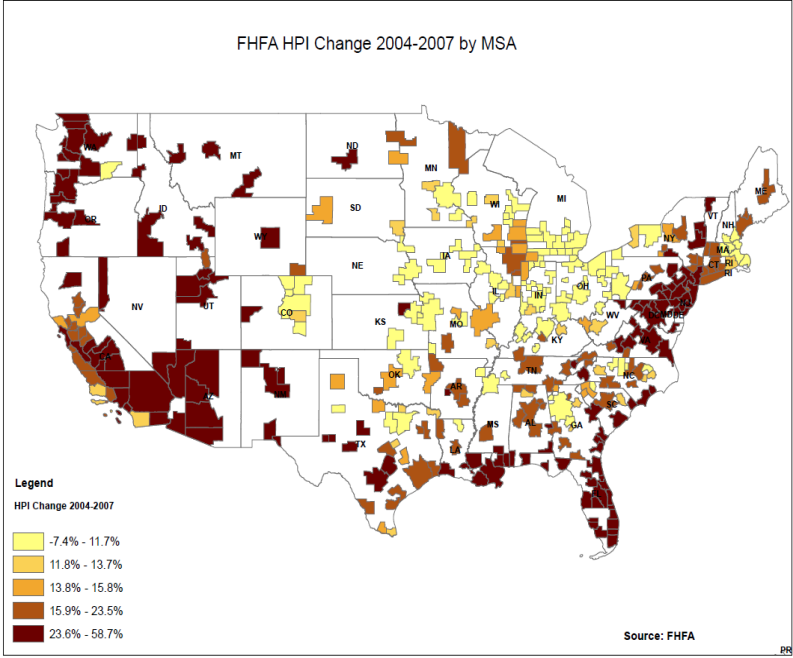
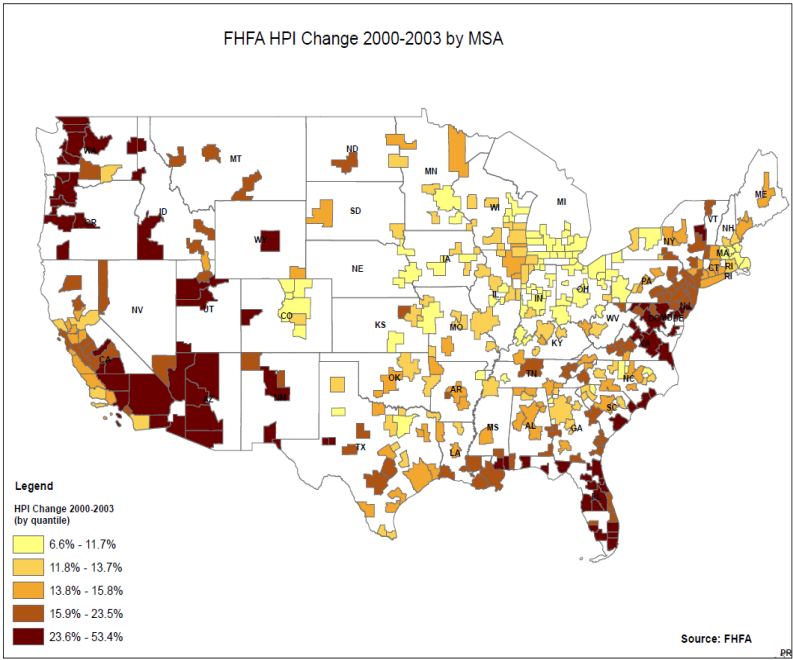


**Figure 1:** US homeownership rate

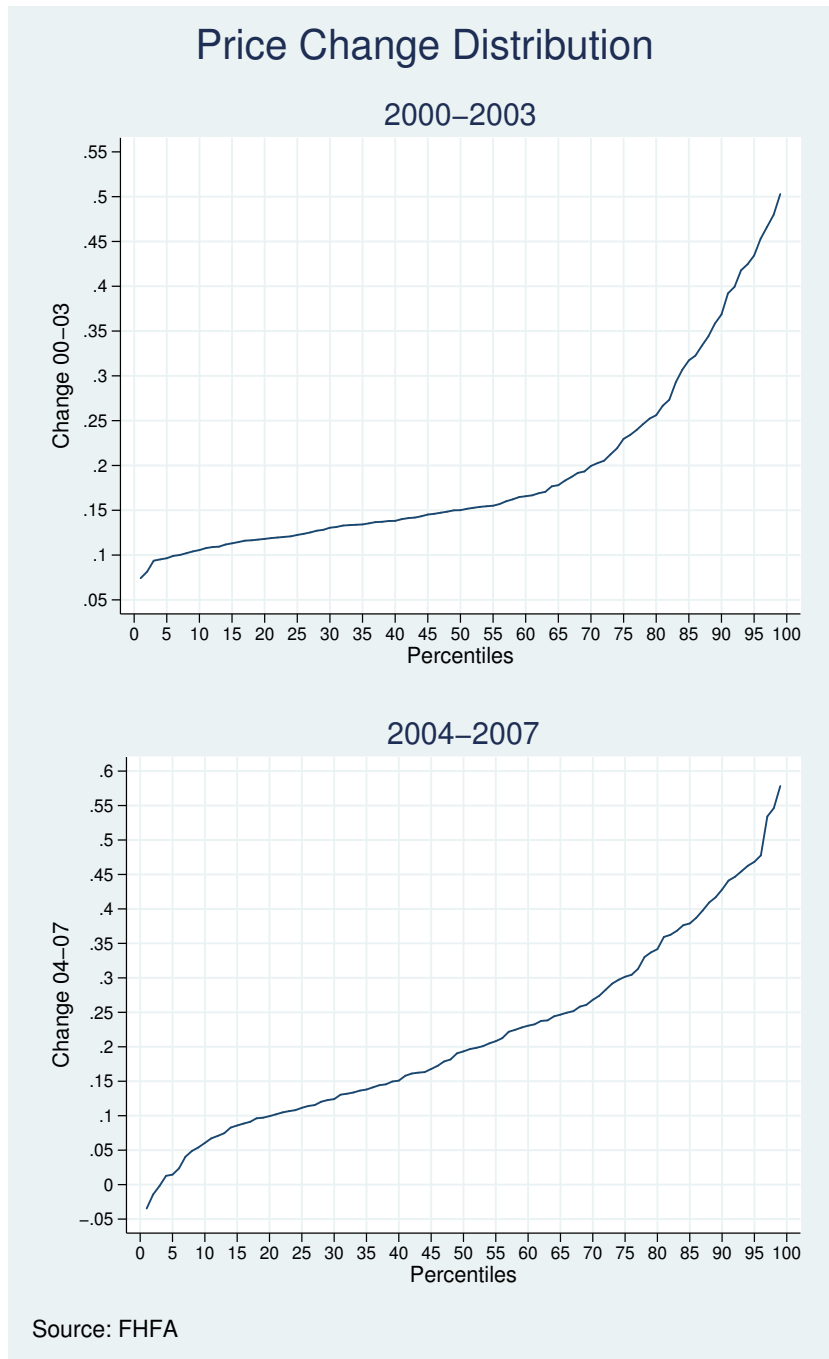


**Figure 2:** US house appreciation





**Figure 3:** HPI change between 2000-2003 and 2004-2007



**Figure 4:** FHFA HPI change distribution for the two periods 2000-2003 and 2004-2007

**Table 1: Variables description**

<b>Variable</b>	<b>Definition</b>	<b>Source</b>
Wealth Constraint	respondents whose wealth is inferior to 5% of their optimal house value	NLSY
Income Constraint	respondents who would have to spend more than 28% of their annual income on a mortgage corresponding to 95% of their optimal house value based on minimal weekly interest rates from Freddie Mac Primary Mortgage Market.	NLSY, Freddie Mac
Credit Constraint	respondents who are deemed to have high credit risk because of a credit line that is fully drawn(2004: r8417600, 2008: t2181900); a credit request refusal in the last 5 years (2004: r8418300, 2008: t2182600); or bankruptcy in the last 9 years (2004: r8418001, 2008: t2182301). Or who are considered as thin-file because they do not report previous credit utilization.	NLSY
Change HPI	percent change in the FHFA house price index for the MSA or state in which the respondent resides as of 2004 or 2008, using FHFA all-transaction indexes for MSAs and state non metropolitan areas,	FHFA
Value to Rent	median house value divided by the median annual rent for the MSA or state in which the respondent resides	US Census (ACS)
Log Income	log of total family income in last calendar year: 2003: r8496100, 2008: t2210000	NLSY
Log Family Size	family size: 2004: r8496000, 2008: t2209900	NLSY
Married	marital status: 2204: r8496600, 2008: t2210400	NLSY
Black	race of respondent: r0810100	NLSY
Hispanic	ethnicity of respondent: r7093000	NLSY
Log Grade Attained	log of highest grade completed by respondent: 2004: r8497000, 2008: t2210700	NLSY
Kids	there are children in household: 2004: R8504300, 2008: T2217800	NLSY
In MSA	respondent currently resides in a Metropolitan Statistical Area:2004: R8498700, 2008: T2212300	NLSY
Regions	regional division as defined by the US Census: California or Hawaii, East North Central, East South Central, Mid-Atlantic, Mountain, New England, Pacific, South Atlantic Region, West North Central, West South Central	US Census
MSAs	Metropolitan Statistical Areas in which the respondent resides: Boston, New York, Washington	NLSY
incr HPI	MSA whose house price increase during the period (2000-2003 and 2004-2007) place them above the 80th percentile of the distribution according to FHFA House Price Index	NLSY
non-incr HPI	MSA whose house price increase during the period (2000-2003 and 2004-2007) place them below the 80th percentile of the distribution according to FHFA House Price Index or non-MSA areas	NLSY
Income Constr*incr HPI	interaction of the income constraint and increasing HPI variables	
Income Constr*non-incr HPI	interaction of the income constraint and non-increasing HPI variables	
Wealth Constr*incr HPI	interaction of the wealth constraint and increasing HPI variables	
Wealth Constr*non-incr HPI	interaction of the wealth constraint and non-increasing HPI variables	
Credit*incr HPI	interaction of the credit constraint and increasing HPI variables	
Credit*non-incr HPI	interaction of the credit constraint and non-increasing HPI variables	

**Table 2: Descriptive Statistics  
Recent Movers**

Variables		Mean	
		2003	2007
Respondent Age	All	43.12	46.66
	Owners	43.20	46.61
	Renters	43.06	46.69
Black (%)	All	17.38	20.70
	Owners	9.57	10.46
	Renters	24.28	27.16
Hispanic (%)	All	7.47	7.55
	Owners	6.78	5.73
	Renters	8.08	8.70
In MSA (%)	All	81	94.15
	Owners	79.22	92.11
	Renters	82.57	95.43
Highest Grade	All	13.26	13.19
	Owners	13.96	13.83
	Renters	12.64	12.78
Married (%)	All	45.46	37.86
	Owners	68.34	60.66
	Renters	25.26	23.46
Kids (%)	All	52.53	43.33
	Owners	63.60	53.02
	Renters	42.76	37.22
Family Size	All	2.65	2.37
	Owners	3.01	2.65
	Renters	2.33	2.20
Log Family Income	All	10.57	10.45
	Owners	11.14	11.00
	Renters	10.04	10.08
Wealth	All	175,342	167,299
	Owners	337,632	352,292
	Renters	32,122	50,535
Home Value	Owners	264,737	265,351
Home Owner (%)	All	46.88	38.69
Credit Constraint (%)	All	27.93	30.29
	Owners	20.09	23.40
	Renters	34.85	34.64
Observation	All	1,962	1,591
	Owners	778	508
	Renters	1,184	1,083

The computations in the table use sample weights.

**Table 3: Descriptive Statistics  
Entire Population**

Variables		Mean	
		2003	2007
Respondent Age	All	43.34	46.82
	Owners	43.41	46.86
	Renters	43.15	46.72
Black (%)	All	13.36	13.30
	Owners	8.85	8.55
	Renters	24.70	26.04
Hispanic (%)	All	6.46	6.26
	Owners	5.51	5.23
	Renters	8.84	9.00
In MSA (%)	All	79.03	91.71
	Owners	78.20	91.07
	Renters	81.11	93.43
Highest Grade	All	13.57	13.71
	Owners	13.93	14.03
	Renters	12.68	12.85
Married (%)	All	63.30	61.53
	Owners	77.53	74.86
	Renters	27.52	25.82
Kids (%)	All	64.67	57.69
	Owners	73.23	65.10
	Renters	43.15	37.87
Family Size	All	3.10	2.87
	Owners	3.35	3.07
	Renters	2.49	2.34
Log Family Income	All	10.89	10.98
	Owners	11.16	11.25
	Renters	10.14	10.19
Wealth	All	251,822	350,557
	Owners	338,303	462,566
	Renters	34,402	50,477
Home Value	Owners	231,072	280,530
Home Owner (%)	All	71.54	72.82
Credit Constraint (%)	All	20.91	20.90
	Owners	16.40	16.18
	Renters	32.26	33.52
Observation	All	7,132	7,084
	Owners	4,567	4,597
	Renters	2,565	2,487

The computations in the table use sample weights.

**Table 4: Two-Stage Housing Demand**

VARIABLES	2003		2007	
	Home Value	Select	Home Value	Select
Log Income	0.45*** (0.03)	0.65*** (0.03)	0.49*** (0.04)	0.58*** (0.04)
Married	-0.41*** (0.05)	0.49*** (0.07)	-0.57*** (0.05)	0.58*** (0.07)
Log Family size	0.14*** (0.04)	-0.08 (0.05)	0.19*** (0.04)	-0.19*** (0.05)
East North Central Region	-0.12 (0.10)	0.07 (0.14)	-0.07 (0.07)	0.11 (0.08)
Mid-Atlantic Region	-0.17* (0.10)	0.16 (0.13)	-0.00 (0.08)	0.01 (0.09)
Mountain Region	0.13 (0.08)	-0.19* (0.11)	0.11 (0.10)	-0.08 (0.11)
New England	0.08 (0.12)	0.02 (0.17)	0.38*** (0.10)	-0.43*** (0.11)
Pacific Region	0.34** (0.14)	-0.32* (0.18)	0.24 (0.16)	-0.25 (0.18)
South Atlantic Region	-0.05 (0.11)	-0.06 (0.14)	0.03 (0.07)	-0.01 (0.08)
West North Central Region	-0.14 (0.11)	0.26* (0.15)	-0.05 (0.08)	0.05 (0.10)
West South Central Region	-0.29*** (0.11)	0.01 (0.15)	-0.19** (0.10)	0.14 (0.14)
East South Central Region	-0.39*** (0.11)	0.26 (0.16)	-0.18* (0.10)	0.15 (0.11)
California or Hawaii	0.48*** (0.12)	-0.58*** (0.14)	0.63*** (0.09)	-0.68*** (0.11)
Boston MSA	0.47*** (0.15)	-0.55** (0.22)	0.29 (0.19)	-0.28 (0.23)
NY MSA	0.74*** (0.08)	-0.79*** (0.11)	0.77*** (0.08)	-0.80*** (0.09)
DC MSA	0.46*** (0.10)	-0.51*** (0.14)	0.47*** (0.09)	-0.48*** (0.12)
In MSA	0.42*** (0.04)	-0.43*** (0.05)	0.33*** (0.06)	-0.32*** (0.07)
Constant	7.19*** (0.34)	-6.88*** (0.38)	6.87*** (0.53)	-6.22*** (0.42)
Rho	-2.37*** (0.18)		-3.57*** (1.23)	
Sigma	-0.26*** (0.04)		-0.11* (0.06)	
Observations	6,130	6,130	6,084	6,084

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 5: Recent Movers and Financing Constraints**

<b>Constraint</b>	<b>2003 2007</b>		<b>2003</b>		<b>2007</b>	
	All (%)		Renter (%)	Owner (%)	Renter (%)	Owner (%)
Not Wealth Wealth	56	48	31	83	29	77
	44	52	69	17	71	23
Not Income Income	30	19	11	51	9	34
	70	81	89	49	91	66
Not Credit Credit	72	70	65	80	65	77
	28	30	35	20	35	23
Wealth and Credit	15	18	24	5	25	7
	14	17	23	4	23	6
	22	14	5	42	5	28
Total			53	47	61	39

The computations in the table use sample weights.

**Table 6: Probability of Homeownership - Model A  
Recent Movers**

MODELS	Model A1		Model A2		Model A3		Model A4	
	2003	2007	2003	2007	2003	2007	2003	2007
Log Income	0.31*** (0.06)	0.16** (0.07)	0.34*** (0.07)	0.16** (0.07)	0.37*** (0.07)	0.21*** (0.08)	0.37*** (0.07)	0.21*** (0.08)
Wealth Constraint	-1.44*** (0.11)	-1.25*** (0.12)	-1.44*** (0.11)	-1.25*** (0.12)	-1.45*** (0.11)	-1.25*** (0.12)	-1.45*** (0.11)	-1.25*** (0.12)
Income Constraint	-0.45*** (0.13)	-0.00 (0.16)	-0.35*** (0.13)	0.00 (0.16)	-0.28** (0.13)	0.12 (0.17)	-0.27** (0.13)	0.12 (0.17)
Credit Constraint	-0.37*** (0.11)	-0.15 (0.11)	-0.36*** (0.11)	-0.15 (0.11)	-0.36*** (0.11)	-0.17 (0.11)	-0.36*** (0.11)	-0.17 (0.11)
Change HPI			-1.03** (0.45)	-0.18 (0.38)			-0.25 (0.56)	0.24 (0.40)
Value to Rent					-2.51*** (0.66)	-2.63*** (0.62)	-2.31*** (0.82)	-2.75*** (0.64)
Married	0.26** (0.12)	0.49*** (0.14)	0.30*** (0.12)	0.50*** (0.14)	0.31*** (0.12)	0.54*** (0.14)	0.32*** (0.12)	0.54*** (0.14)
Black	-0.29*** (0.10)	-0.50*** (0.10)	-0.30*** (0.10)	-0.50*** (0.10)	-0.34*** (0.10)	-0.53*** (0.11)	-0.34*** (0.10)	-0.53*** (0.11)
Hispanic	0.04 (0.12)	-0.22* (0.12)	0.08 (0.13)	-0.21* (0.13)	0.06 (0.13)	-0.15 (0.13)	0.07 (0.13)	-0.17 (0.13)
Log Grade Attained	-0.31 (0.24)	0.09 (0.28)	-0.28 (0.24)	0.10 (0.28)	-0.24 (0.25)	0.16 (0.28)	-0.23 (0.25)	0.16 (0.28)
Kids	0.37*** (0.10)	0.12 (0.11)	0.37*** (0.10)	0.12 (0.11)	0.37*** (0.10)	0.10 (0.11)	0.37*** (0.10)	0.10 (0.11)
Observations	1658	1325	1658	1323	1658	1323	1658	1323

Marginal effects; Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



**Table 7: Probability of Homeownership - Model A  
Recent Movers - Marginal effects**

MODELS	Model A1		Model A2		Model A3		Model A4	
	2003	2007	2003	2007	2003	2007	2003	2007
Log Income	0.07*** (0.01)	0.04** (0.02)	0.08*** (0.01)	0.04** (0.02)	0.09*** (0.02)	0.05*** (0.02)	0.09*** (0.02)	0.05*** (0.02)
Wealth Constraint	-0.43*** (0.03)	-0.39*** (0.04)	-0.43*** (0.03)	-0.39*** (0.04)	-0.42*** (0.03)	-0.38*** (0.04)	-0.42*** (0.03)	-0.38*** (0.04)
Income Constraint	-0.12*** (0.03)	-0.00 (0.04)	-0.09** (0.04)	0.00 (0.04)	-0.07** (0.03)	0.03 (0.04)	-0.06* (0.03)	0.03 (0.04)
Credit Constraint	-0.09*** (0.03)	-0.04 (0.03)	-0.09*** (0.03)	-0.04 (0.03)	-0.09*** (0.03)	-0.05 (0.03)	-0.09*** (0.03)	-0.05 (0.03)
Change HPI			-0.24** (0.10)	-0.05 (0.10)			-0.06 (0.13)	0.06 (0.10)
Value to Rent					-0.58*** (0.15)	-0.69*** (0.16)	-0.54*** (0.19)	-0.72*** (0.17)
Married	0.06** (0.03)	0.14*** (0.04)	0.07** (0.03)	0.14*** (0.04)	0.08*** (0.03)	0.15*** (0.04)	0.08*** (0.03)	0.15*** (0.04)
Black	-0.07*** (0.02)	-0.13*** (0.03)	-0.07*** (0.02)	-0.13*** (0.03)	-0.08*** (0.02)	-0.14*** (0.03)	-0.08*** (0.02)	-0.14*** (0.03)
Hispanic	0.01 (0.03)	-0.06* (0.03)	0.02 (0.03)	-0.06* (0.03)	0.01 (0.03)	-0.04 (0.03)	0.02 (0.03)	-0.04 (0.03)
Log Grade Attained	-0.07 (0.06)	0.02 (0.08)	-0.07 (0.06)	0.03 (0.08)	-0.05 (0.06)	0.04 (0.07)	-0.05 (0.06)	0.04 (0.07)
Kids	0.09*** (0.02)	0.03 (0.03)	0.09*** (0.02)	0.03 (0.03)	0.09*** (0.02)	0.03 (0.03)	0.09*** (0.02)	0.03 (0.03)
Observations	1658	1325	1658	1323	1658	1323	1658	1323

Marginal effects; Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 8:** Probability of Homeownership - Varying Debt to Income and Down Payment Recent Movers

MODELS	Down: 5 DTI: 28		Down: 5 DTI: 30		Down: 10 DTI: 28	
	2003	2007	2003	2007	2003	2007
Log Income	0.35*** (0.07)	0.17*** (0.06)	0.35*** (0.07)	0.16** (0.06)	0.35*** (0.06)	0.21*** (0.06)
Wealth Constraint	-1.51*** (0.11)	-1.38*** (0.12)	-1.50*** (0.11)	-1.41*** (0.12)	-1.48*** (0.10)	-1.31*** (0.12)
Income Constraint	-0.31** (0.15)	0.02 (0.21)	-0.31** (0.14)	-0.08 (0.21)	-0.30** (0.15)	0.19 (0.21)
Credit Constraint	-0.35*** (0.11)	-0.13 (0.12)	-0.35*** (0.11)	-0.12 (0.12)	-0.26** (0.11)	-0.12 (0.11)
Value to Rent	-2.46*** (0.65)	-2.26*** (0.61)	-2.46*** (0.65)	-2.29*** (0.60)	-2.38*** (0.67)	-2.24*** (0.59)
Married	0.31*** (0.11)	0.36*** (0.13)	0.30*** (0.11)	0.35*** (0.13)	0.29** (0.11)	0.34** (0.13)
Black	-0.32*** (0.10)	-0.53*** (0.11)	-0.32*** (0.10)	-0.53*** (0.11)	-0.31*** (0.10)	-0.50*** (0.10)
Hispanic	0.10 (0.13)	-0.11 (0.12)	0.11 (0.13)	-0.10 (0.12)	0.19 (0.13)	-0.18 (0.12)
Log Grade Attained	-0.27 (0.24)	0.06 (0.29)	-0.26 (0.24)	0.01 (0.28)	-0.22 (0.23)	0.08 (0.28)
Kids	0.36*** (0.10)	0.12 (0.11)	0.36*** (0.10)	0.12 (0.11)	0.33*** (0.10)	0.18* (0.11)
Observations	1658	1323	1658	1323	1658	1323

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 9:** Probability of Homeownership - Constraints Combined  
Recent Movers

MODELS	A1		A2		A3	
	2003	2007	2003	2007	2003	2007
Log Income	0.48*** (0.07)	0.27*** (0.08)	0.50*** (0.07)	0.28*** (0.08)	0.53*** (0.07)	0.31*** (0.09)
Constrained	-0.88*** (0.16)	-0.50** (0.24)	-0.79*** (0.16)	-0.49** (0.24)	-0.74*** (0.16)	-0.48* (0.25)
Change HPI			-1.19*** (0.40)	-0.27 (0.36)		
Value to Rent					-2.63*** (0.60)	-2.59*** (0.57)
Married	0.36*** (0.11)	0.51*** (0.12)	0.38*** (0.11)	0.52*** (0.12)	0.37*** (0.11)	0.51*** (0.12)
Black	-0.39*** (0.09)	-0.58*** (0.10)	-0.40*** (0.09)	-0.58*** (0.10)	-0.43*** (0.09)	-0.61*** (0.10)
Hispanic	0.01 (0.11)	-0.24** (0.12)	0.07 (0.12)	-0.23* (0.12)	0.05 (0.11)	-0.18 (0.12)
Log Grade Attained	0.08 (0.22)	0.52* (0.28)	0.12 (0.23)	0.53* (0.28)	0.17 (0.23)	0.58** (0.28)
Kids	0.22** (0.09)	0.14 (0.10)	0.23** (0.09)	0.14 (0.10)	0.23*** (0.09)	0.13 (0.10)
Observations	1658	1325	1658	1323	1658	1323

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 10:** Probability of Homeownership  
Recent Movers with Previous Tenure

MODELS	All Movers		Previously Owners		Previously Renters	
	2003	2007	2003	2007	2003	2007
Log Income	0.37*** (0.07)	0.21*** (0.08)	0.23** (0.10)	0.21* (0.12)	0.50*** (0.11)	0.18* (0.10)
Wealth Constraint	-1.45*** (0.11)	-1.25*** (0.12)	-1.30*** (0.19)	-1.31*** (0.21)	-1.39*** (0.14)	-1.10*** (0.15)
Income Constraint	-0.28** (0.13)	0.12 (0.17)	-0.38* (0.20)	0.16 (0.24)	-0.14 (0.19)	0.12 (0.24)
Credit Constraint	-0.36*** (0.11)	-0.17 (0.11)	-0.55*** (0.15)	-0.22 (0.18)	-0.31** (0.15)	-0.11 (0.15)
Value to Rent	-2.51*** (0.66)	-2.63*** (0.62)	-1.49 (1.06)	-1.38 (1.01)	-3.39*** (0.91)	-3.15*** (0.82)
Married	0.31*** (0.12)	0.54*** (0.14)	0.37** (0.18)	0.48** (0.21)	0.27* (0.16)	0.62*** (0.19)
Black	-0.34*** (0.10)	-0.53*** (0.11)	-0.24 (0.17)	-0.44*** (0.16)	-0.27** (0.13)	-0.51*** (0.14)
Hispanic	0.06 (0.13)	-0.15 (0.13)	-0.08 (0.19)	-0.11 (0.19)	0.20 (0.17)	-0.13 (0.18)
Log Grade Attained	-0.24 (0.25)	0.16 (0.28)	-0.68 (0.43)	-0.15 (0.47)	-0.17 (0.33)	0.29 (0.38)
Kids	0.37*** (0.10)	0.10 (0.11)	0.52*** (0.15)	0.14 (0.17)	0.16 (0.14)	-0.05 (0.15)
Observations	1658	1323	637	469	1021	854

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 11: Probability of Homeownership - Model B**  
**Recent Movers**  
**80th Percentile of the HPI Distribution**

MODELS	Model B1		Model B2		Model B3	
	2003	2007	2003	2007	2003	2007
Log Income	0.32*** (0.06)	0.16** (0.07)	0.34*** (0.06)	0.16** (0.07)	0.37*** (0.07)	0.21*** (0.08)
Income Constr*incr HPI	-0.62*** (0.16)	-0.04 (0.23)	-0.26 (0.21)	0.00 (0.25)	-0.35** (0.17)	0.15 (0.24)
Income Constr*non-incr HPI	-0.36** (0.14)	0.01 (0.17)	-0.36** (0.14)	0.00 (0.17)	-0.27* (0.14)	0.11 (0.17)
Wealth Constr*incr HPI	-1.59*** (0.22)	-1.20*** (0.23)	-1.58*** (0.22)	-1.19*** (0.23)	-1.59*** (0.22)	-1.20*** (0.23)
Wealth Constr*non-incr HPI	-1.40*** (0.12)	-1.26*** (0.13)	-1.40*** (0.13)	-1.26*** (0.13)	-1.40*** (0.13)	-1.26*** (0.13)
Credit Constr*incr HPI	-0.04 (0.19)	-0.16 (0.24)	0.01 (0.19)	-0.16 (0.24)	-0.04 (0.19)	-0.15 (0.24)
Credit Constr*non-incr HPI	-0.48*** (0.12)	-0.14 (0.13)	-0.50*** (0.13)	-0.15 (0.13)	-0.47*** (0.12)	-0.18 (0.13)
Change HPI			-1.78** (0.77)	-0.22 (0.50)		
Value to Rent					-2.53*** (0.76)	-2.70*** (0.63)
Married	0.29** (0.12)	0.50*** (0.14)	0.32*** (0.12)	0.50*** (0.14)	0.33*** (0.12)	0.54*** (0.14)
Black	-0.31*** (0.10)	-0.50*** (0.10)	-0.31*** (0.10)	-0.50*** (0.10)	-0.35*** (0.10)	-0.53*** (0.11)
Hispanic	0.06 (0.13)	-0.21* (0.13)	0.08 (0.13)	-0.21 (0.13)	0.06 (0.13)	-0.17 (0.13)
Log Grade Attained	-0.30 (0.24)	0.09 (0.28)	-0.28 (0.24)	0.09 (0.28)	-0.24 (0.24)	0.16 (0.28)
Kids	0.36*** (0.10)	0.12 (0.11)	0.37*** (0.10)	0.12 (0.11)	0.37*** (0.10)	0.11 (0.11)
Constant	-2.11** (0.82)	-1.83* (0.95)	-2.10** (0.84)	-1.82* (0.96)	-2.37*** (0.84)	-2.02** (0.99)
Observations	1658	1325	1658	1323	1658	1323

Marginal effects; Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 12: Probability of Homeownership - Model B**  
**Recent Movers - Marginal effects**  
**80th Percentile of the HPI Distribution**

MODELS	Model B1		Model B2		Model B3	
	2003	2007	2003	2007	2003	2007
Log Income	0.07*** (0.01)	0.04** (0.02)	0.08*** (0.01)	0.04** (0.02)	0.08*** (0.02)	0.05*** (0.02)
Income Constr*incr HPI	-0.15*** (0.04)	-0.01 (0.06)	-0.06 (0.05)	0.00 (0.07)	-0.08** (0.04)	0.04 (0.06)
Income Constr*non-incr HPI	-0.09** (0.04)	0.00 (0.04)	-0.09** (0.04)	0.00 (0.05)	-0.06* (0.04)	0.03 (0.04)
Wealth Constr*incr HPI	-0.37*** (0.04)	-0.29*** (0.04)	-0.37*** (0.04)	-0.29*** (0.05)	-0.37*** (0.04)	-0.29*** (0.05)
Wealth Constr*non-incr HPI	-0.39*** (0.03)	-0.37*** (0.04)	-0.39*** (0.03)	-0.37*** (0.04)	-0.39*** (0.03)	-0.36*** (0.04)
Credit Constr*incr HPI	-0.01 (0.04)	-0.04 (0.06)	0.00 (0.04)	-0.04 (0.06)	-0.01 (0.04)	-0.04 (0.06)
Credit Constr*non-incr HPI	-0.12*** (0.03)	-0.04 (0.03)	-0.12*** (0.03)	-0.04 (0.03)	-0.11*** (0.03)	-0.05 (0.03)
Change HPI			-0.41** (0.18)	-0.06 (0.13)		
Value to Rent					-0.59*** (0.17)	-0.71*** (0.16)
Married	0.07** (0.03)	0.14*** (0.04)	0.08*** (0.03)	0.14*** (0.04)	0.08*** (0.03)	0.15*** (0.04)
Black	-0.07*** (0.02)	-0.13*** (0.03)	-0.07*** (0.02)	-0.13*** (0.03)	-0.08*** (0.02)	-0.14*** (0.03)
Hispanic	0.01 (0.03)	-0.06* (0.03)	0.02 (0.03)	-0.06* (0.03)	0.01 (0.03)	-0.04 (0.03)
Log Grade Attained	-0.07 (0.06)	0.02 (0.08)	-0.07 (0.06)	0.03 (0.08)	-0.05 (0.06)	0.04 (0.07)
Kids	0.09*** (0.02)	0.03 (0.03)	0.09*** (0.02)	0.03 (0.03)	0.09*** (0.02)	0.03 (0.03)
Observations	1658	1325	1658	1323	1658	1323

Marginal effects; Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$