Homeownership and the Use of Nontraditional and Subprime Mortgages[*]

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March 2016

[*]The authors are grateful to Barry Cynamon and Neil Bhutta for helpful comments on an earlier version of this paper. All errors are the responsibility of the authors alone. Wachter gratefully acknowledges support from the Research Sponsors Program of the Zell/Lurie Real Estate Center at The Wharton School of the University of Pennsylvania.

I. Introduction

Most households cannot purchase a first home without a mortgage. Thus, credit markets are important for access to homeownership (Linneman and Wachter 1989). The first half of the 2000s saw significant changes and innovations in the credit markets, perhaps most notably the increased prevalence of non-traditional mortgage products (NTMs) and an increased access to mortgages for subprime borrowers.[1] The use of NTM and subprime mortgages expanded considerably in this period, both absolutely and as a share of total mortgage lending across the nation. For NTMs, this represented an expansion into the mainstream of mortgage products that had been marginal until then. For subprime mortgages, the growth reflected an expansion of credit to increasingly marginal borrowers. While numerous papers have shown that the prevalence of NTMs and subprime mortgages have contributed to the run up of house price and the subsequent mortgage market crisis (see, e.g., Bostic and Lee 2008; Mian and Sufi 2011; Pavlov and Wachter 2011), little has been done regarding the association between NTMs and subprime mortgages and homeownership.

The paper accomplishes four things. It first documents the evolution of NTMs and subprime mortgages through the 2000s, thereby establishing some stylized facts about their rise, increasing dominance, and decline in mortgage markets. This discussion highlights both overall volume and geographic distribution of the mortgage classes. A

[1] These two developments are connected but separate. Non-traditional mortgages are mortgage products with characteristics that differ substantially from the fully amortizable 30 year fixed-rate mortgages, "the American Mortgage" (Green and Wachter 2005). Subprime mortgages are loans made to borrowers with low credit score (variously defined as below 680, 640 or 620). Many NTMs were originated to subprime borrowers and many subprime borrowers used NTMs (Bostic et al. 2012). The correlation between the share of NTM and the share of subprime mortgages at the county level is 0.7 based on the data and definition used in this paper.

key theme, which will arise throughout the discussion, is that NTMs and subprime mortgages, though similar, are distinct in measurable and important ways.

Second, rather than focus on the means and mechanisms through which credit expanded, which is the usual subject of papers on this topic, this paper then focuses on an end product of mortgage credit - homeownership. Specifically, we ask whether the expansion of credit at the local level through NTMs and subprime mortgages was associated with an increase in the number of homeowners and in the homeownership rate.

The nature of the link between NTMs and subprime mortgages and homeownership has been addressed only to a very limited extent. While it is often assumed that the expansion in credit through NTMs and subprime credit was associated with an increase in the number or share of homeowners, this need not be the case. Existing homeowners may have used NTMs and subprime mortgages to consume more housing or purchase housing in better neighborhoods or to purchase non-housing goods. New homeowners may have substituted the use of NTMs and subprime mortgages for existing mortgage products, particularly, mortgages insured by FHA (Jaffee 2009). Another reason for the possible absence of a link between homeownership and the use of NTMs and subprime mortgages is that investors may have disproportionately used these mortgages (Haughwout et al. 2011). Finally, the increase in prices associated with NTM and subprime lending worked against the affordability gains possible via the features of these products, potentially limiting the number of new homeowners. In short, the relationship between these products and homeownership remains an outstanding question.

This paper estimates relationships between homeownership and NTM and subprime mortgages, using the housing boom and bust of the 2000s as a lens for understanding

them. We develop a unique county-level dataset which combines census data on homeownership with public data on subprime mortgages and proprietary data for NTMs. Because we include demographic data on borrower age and racial/ethnic status we can examine the relationship of the use of these products and homeownership for subgroups as well as for the entire population. These data also make it possible to relate changes in homeownership to the use of NTMs and subprime mortgages at the local level during the recent housing cycle.

Third, an important aspect of access to homeownership is the degree to which associations vary across populations, with a particular consideration of whether associations were stronger or weaker among young, low income or minority populations. Young, low-income and minority households are most affected by borrowing constraints (Haurin et al., 1997; Gyourko et al., 1999). The early literature on mortgage discrimination and redlining pointed to geographical differences at the local level in the supply of mortgage credit as impacting homeownership outcomes. In fact, one of the possible benefits of nonprime mortgages, including the products we discuss here, is that more flexible lending criteria may enable more lending to underserved communities. If access to these products eases local lending constraints, increased homeownership may result from their increased availability. More recently, Mian and Sufi (2011) point to the increase in mortgage debt in the boom years among lower income households.

We find a positive and significant association between NTM and subprime mortgage use and changes in the number of homeowners but no significant association with changes in the homeownership rate, during the boom period of 2000 to 2006. We extend the examination of these relationships through 2012 and find a negative and significant

association between NTM and subprime mortgage activity and changes in the number of homeowners during the bust. Over the 2000-2012 period the relationship between the number and share of NTM and subprime mortgages originated during the boom and changes in the number of homeowners remains positive overall.

Looking at specific categories of the population, we find a positive relationship between the presence of NTMs and subprime mortgages and increased numbers of homeowners for young households as well as for low income and minority households, but the relationship is smaller than for the general population. These results are consistent with a view that these products were not used in a way associated with increases in homeownership more by low-income and minority households.

Fourth, throughout these analyses, we distinguish the relationships associated with NTMs from those associated with subprime mortgages. As above, we consider whether any differences are robust to the cycle across geographies. Overall, the relationship between NTMs and homeownership is stronger than the relationship between subprime mortgages and homeownership during the boom and it is less negative during the bust, pointing to a distinction between product and borrower characteristics.

The paper proceeds as follows. Section II documents the evolution of NTMs and subprime mortgages to establish some stylized facts about each. Section III presents the empirical exploration of the relationship between NTMs and subprime mortgages and homeownership. Section IV discusses policy implications and concludes.

II. The Evolution of NTMs and Subprime Mortgages over Time

We begin by documenting trends in the volume and distribution of NTMs and subprime mortgages. For this paper, a loan is classified as an NTM if it is a mortgage to purchase an individual unit (condo, co-op, single family) and has any of the following characteristics: (i) interest only, (ii) Option-ARM with negative amortization, (iii) balloon payment, (iv) teaser rate, (v) low or no documentation, (vi) terms longer than 30 years[2], or (vii) combined loan to value ratio at origination above 100 percent.[3]

We use the proprietary BlackBox dataset on private label securities (PLS) to count the number of NTMs originated in a county in a given year.[4] We believe that the BlackBox data are representative of the universe of NTMs because most NTMs were securitized via PLS, although some mortgage originators kept NTM loans on portfolio. Moreover, estimates of NTM loan volumes using the BlackBox data conform to estimates using other data sources.[5]

The BlackBox data demonstrate that NTMs are a complex group of loans. While a mortgage could have any 1 of 7 distinct characteristics and be considered an NTM for this study, many loans originated during this period had multiple qualifying features. Table 1 shows how the mortgages are distributed along this metric for the period 2001-

[2] The threshold used is actually 365 months since mortgages with terms between 360 and 365 are not different by nature and may reflect reporting error.
[3] We also tried alternative definitions by including hybrid ARMs, mortgages with prepayment penalties and changing the threshold for CLTV to strictly above 100 percent CLTV or decreasing it to 97 percent. The results are broadly similar and available upon request.
[4] BlackBox has detailed information about more than 14 million first-lien loans originated between 1998 and 2013 that were securitized in PLS.
[5] For example, we estimate that 31 percent of mortgages issued in 2006 were NTMs, a figure close to the 30 percent reported in Sanders (2008) using CoreLogic data and to the 32 percent reported in Inside Mortgage Finance (2013). Further, there is no evidence suggesting that NTMs kept on portfolio have a different spatial distribution than those securitized in PLS.

2010 among counties in our sample. We see that a majority of the loans had at least two features and a significant fraction had more than four such features.

Table 2 provides a picture of which characteristics were most common among NTMs in our sample by reporting the fraction of NTMs in a given year that had a particular feature. We see that low or no documentation were common features among NTMs in every year. By contrast, between 2001 and 2006 we see large growth in the incidence of interest only mortgages, and mortgages with a high CLTV at origination. Option-ARMs with negative amortization were the least common feature.

For subprime lending, we use data collected pursuant to the Home Mortgage Disclosure Act (HMDA). Banking and other institutions that make decisions on whether to originate a mortgage are required to report annually on all mortgage applications they receive.[6] We use the number of loans issued by subprime lenders, which were identified by HUD, as our measure of the number of subprime mortgages. The HUD subprime lender list is publically available via the Urban Institute (Pettit and Droesch, 2009). Although this list is imperfect, it offers a reasonable picture of trends over time.

Figure 1 shows how NTM and subprime mortgage origination volumes evolved from 1997 through 2010 for NTMs and through 2006 for subprime mortgages in counties in our sample. After being a very minor product through 2000, never totaling more than 50,000 loans, NTM incidence exploded. NTM volume doubled each year from 2001 to 2004, and annual NTM origination volume doubled again between 2004 and 2006. Overall, NTMs increased from less than 100,000 to more than 1.7 million over this period. Similarly, while there were less than 300,000 subprime mortgage originations in

[6] Avery, et al. (2011) estimates that HMDA data cover more than 80 percent of the total mortgage origination market.

2000, there were more than 1.2 million of them in 2005.[7] After 2006, the prevalence of NTMs and subprime loans dropped precipitously, as the housing crisis resulted in a rapid change in the supply of these products across the nation. By the end of our study period, NTMs had not made a comeback.

The rise of NTMs and subprime mortgages during the early 2000s was coupled with an increase in their market share (figure 2). NTMs were a tiny fraction of all mortgages originated from 1997 and 2001, and only first exceeded a 5 percent market share in 2003. However, the mortgage market share for NTMs rose rapidly after 2003 and topped out at about 30 percent in 2006. This rise is all the more dramatic because total mortgage lending grew by more than 2 million loans (about 40 percent) between 2001 and 2005, meaning that much of the net increase took the form of NTMs. Subprime mortgages represented about 5 percent of the market going back to the late 1990s, their share also expanded. In 2005, they represented 18 percent of the market.

Figure 2 also shows the homeownership rate during that period. It increased from 66 percent in 1997 to 69 percent in 2004, remaining at this level until 2006. In aggregate, the homeownership rate did not increase between 2004 and 2006, the period of higher supply of NTM and subprime mortgages. It then decreased back to 65 percent by 2012. Although the homeownership rate did not increase during the 2004-2006 period, the number of homeowners kept rising by 0.9 million a year during that period, the pace slowed compared to the 1.2 million a year experienced in the 2000-2004 period (U.S. Census 2014).

[7] The way subprime loans are identified from HMDA changes after 2006, from relying on a list of subprime originators identified by HUD to being based on a spread of the mortgage rate at origination relative to prime (3 percentage points). In order to remain consistent and given our period of interest, the lender based definition is the only one used in this study.

When looking at the distribution of NTMs and subprime mortgages over time and across space, we observe substantial variations across counties (figure 3). In 2003, NTMs represented more than 20 percent of mortgages in only a few places, specifically California counties concentrated in the San Francisco and Los Angeles metropolitan areas (figure 3-A). This changed significantly during 2004 and 2005, when NTM origination grew significantly in the sand states – Florida, Arizona, Nevada, and California – as well as in high cost markets on the east and west coasts. As seen in the second panel of figure 3-A, by 2006 the NTM origination share exceeded 20 percent in many counties, with proportions exceeding 40 percent in nearly 20 counties. Several California counties even exceeded 60 percent NTM shares in 2006. Among the top 50 counties ranked by their NTM share of all purchase originations in 2006, 37 were located in California, 5 were in Florida, 4 were in the Washington, DC metropolitan area, 2 were in the New York City metropolitan area, and 1 each was located in Hawaii and Nevada. The median NTM share was less than 20 percent in 2006, and markets in the lowest NTM share decile had percentages of less than 10 percent. Thus we see that NTM incidence was not uniform across geographies during this period.

The final panel of figure 3-A shows NTM origination activity during 2008, after the NTM boom had effectively ended (2007 shows a sharp decline). By that point NTMs did not represent more than 10 percent of originations in any county, as the supply of NTMs having rapidly retracted with the crisis.

Figure 3-B shows a relatively similar pattern with regard to the spatial distribution of subprime mortgages in 2003 and 2006, with a concentration of subprime mortgages seen in the West and in Florida. Two differences are of note. First, in 2003 subprime

mortgages were more prevalent than NTMs, especially in a number of California counties. Second, the penetration of subprime mortgages in 2006 was higher than the penetration of NTMs in a number of counties in the Midwest and Northeast. In these counties, the rate of subprime mortgages was often above 30 percent.

Table 3 compares the geographic distribution of the features of NTMs and subprime mortgages. To create this table, we ranked counties according to the frequency of a given feature and then calculated the correlation coefficient of pairwise rankings. We find many product features are distributed similarly across counties. Correlation coefficients exceeding 0.9 were found between the distribution of mortgages with no and low documentation with the distributions of mortgages with teaser rates and with interest-only features; between the distribution of mortgages with teaser rates and interest-only loans; and between the distributions of loans with balloon payments and the distributions of loans with high CLTV and with long amortization periods. Among the NTM features, the geographic distributions of option ARMs and mortgages with high CLTVs were least alike, although a correlation coefficient of 0.55 is still high. The correlations between the geographic distributions of individual NTM features and the geographic distribution of subprime mortgages range between 0.36 and 0.54, with a correlation coefficient between the NTM and subprime mortgage geographic distributions of 0.58 overall.

Figure 4 shows the share of NTMs and subprime mortgages across counties broken down by quintiles on three characteristics as of 2000: median house value to median income ratio as a measure of affordability and share of Hispanic and black households. The graphs show that NTMs were much more prevalent in the 2001-2006 period in counties that had a higher house value to income ratio as of 2000, reflecting a lack of

affordability. NTMs represent more than twice the share of mortgages in the least affordable counties as compared with the most affordable counties (14.5 percent versus 6.6 percent). The same relationship exists for subprime mortgages, although it is less pronounced (22.9 percent versus 16.3 percent).

We observe a similar pattern as pertains lending to counties ranked according to the prevalence of Hispanic households. NTMs and subprime mortgages were both more prevalent in counties with a higher share of Hispanic households (14.5 percent versus 5.8 percent for NTMs and 25 percent versus 14.9 percent for subprime mortgages).

The pattern for lending in counties ranked by the presence of black households differs from the Hispanic pattern. While we again observe an increase in the share of subprime loans as the share of black households in a county increases, the relationship is less strong. Moreover, we see no discernable pattern in the prevalence of NTMs across counties that vary in the black population share. This suggests that the NTM and subprime mortgage dynamics may differ for the black population relative to others.

Since the use of NTMs and subprime mortgages by minority and low income households is higher than in the general population (Haughwout et al. 2009; Jaffee 2009; Mian and Sufi 2011; Bayer et al. 2016) it is also possible that the relationship with homeownership might be higher. As shown in Appendix A the correlation coefficients between the share of NTM and subprime mortgages and changes in number of homeowners in the entire population and among subgroups (young, Hispanic and black) at the local level are overall positive for the period 2000 and 2006 and negative for the period 2006-2012, but there are some substantial differences in the magnitude of the

coefficients across groups. We turn in the next section to examining the relationships between NTMs and subprime lending and homeownership further.

III. Results for NTMs, Subprime Lending, and Homeownership

Methodology

To explore these associations we estimate a series of models in which we regress the change in the number of homeowners and the change in the homeownership rate on a set of additional variables plus NTM and subprime mortgage prevalence, measured by the number of NTMs and subprime mortgages originated and their market share. The coefficients on these latter variables are our coefficients of interest. We examine these relationships from 2000 to 2012, and thus cover changes in homeownership during the housing boom, the housing bust, and the overall cycle.

The baseline models we estimate are:

$$\Delta HO_{it+1} = \alpha_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 NTM0106_i + \gamma_s + u_{ist} \quad (1)$$

$$\Delta HO_{it+1} = \alpha_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 Subprime0106_i + \gamma_s + u_{ist} \quad (2),$$

where ΔHO_{it+1} represents the change in the number of homeowners in county *i* over the period *t* to *t+1* (2000-2012, 2000-2006, and 2006-2012)[8], $X_{1it}$is the vector of housing market controls for county *i* at period t, $X_{2it}$is the vector of demographic controls, X_{3it} represents the vector of job market controls, $NTM0106_i$ is the number or the share of mortgage originated that were NTMs in county *i* over the period 2001-2006,

[8] These periods correspond to the boom and bust period. Based on data availability for the ACS, it is not possible to measure the change in homeownership on an annual basis for the period prior to 2005. We did also run an annual regression at the state level with lagged annual NTM and subprime numbers for the period 2000-2006 and results are similar to those found over the entire 2000-2006 period.

$Subprime0106_i$ is the number or share of subprime mortgages and γ_s represents state fixed effects that capture unobservable time-invariant state-level characteristics.[9]

We run alternate models with the change in the number of minority or young homeowners as the dependent variable or with the change in the homeownership rate and partition the data or introduce interaction terms as discussed further below.

For housing market factors, we include, from the ACS, median house value, the ratio of the median rent and median house value, and the ratio of the median house value and median income. We also use the MSA-level house price index from the Federal Housing Finance Agency to measure the change in median house value over the period *t* to *t*+1 and construct a variable measuring house price volatility over the last 5 years to account for past house price performance.[10] Together, these capture price and affordability considerations, which can both influence and be influenced by the use of NTMs and subprime mortgages.

We include a vector of county-level demographic variables collected from the ACS, including number of households, mean household size, percent of family with children, percent black, percent Hispanic, percent foreign born, percent with some college education. Regarding job market conditions, we include median household income from the ACS and the annual unemployment rate from the Bureau of Labor Statistics. Finally, we include dummy variables for the state the county is in, whether a county is in an MSA and whether it is suburban.[11] Table 4 reports sample statistics for these variables.

[9] Both population-weighted and non-weighted regressions were run with broadly similar results (Appendix B). The results discussed in the analysis are not weighted by population.
[10] For non-MSA counties, we use the state level index for non-MSA parts of the state produced by FHFA. House price volatility is calculated as "the variance of the five-year percentage change in the price index across 13 years of quarterly values" (Gabriel and Rosenthal, 2015: 11).
[11] As defined by the Office of Management and Budget.

Baseline results

Given the important change in the housing market that occurred in late 2006, we first divide the sample into two periods: 2000 to 2006 (the boom) and 2006 to 2012 (the bust). Table 5 shows the results for the boom and bust periods and the overall period.[12] The analyses in Table 5 and 6 include state fixed effects to control for variation in state circumstances that might bias estimates of the NTM and subprime mortgage relationships. Appendix B provides the full regression results, reporting the coefficients for all control variables. We also show in Appendix B that a likelihood ratio test indicates that inclusion of the fixed effects improves model fit but does not affect the sign and magnitude of the coefficients of interest. We cluster standard errors at the MSA level for all specifications to account for potential correlation of the error terms at the local level. We also show the result weighted by population in the appendix but use the unweighted results throughout.

During the boom period (Table 5, column 1-2), increased NTM and subprime mortgage activity is associated with more homeowners, whether NTM and subprime lending are measured in number or share of loans (although not a higher homeownership rate as discussed below). For the number of loans, we use an aggregate measure of the number of NTMs or subprime loans originated during the 2001 to 2006 period. The regression indicates that the origination of 10 additional NTMs in the 2001 to 2006

[12] We present results using the aggregate number of NTMs originated during 2001-2006 as the variable of interest. We also tested whether the effect changed by year, using annual lags for the number and share of NTM. We have run all the analyses for the 2006-2012 period using up to 8 period lags. We further re-estimated the relationships using the maximum NTM share in a county over the cycle as the independent variable. The results are robust to these alternative specifications.

period is associated with 7 additional homeowners between 2000 and 2006, while the origination of 10 additional subprime loans is associated with 4 additional homeowners, which is a smaller but a still significant increase. These results hold when we use the percentage of all mortgages in the county that were NTMs or subprime mortgages as an independent variable. The share results indicate that a 1 percentage point increase in the NTM share is associated with 731 more homeowners, and the estimate is statistically significant. A one percentage point increase in the subprime share is associated with 166 more homeowners, a substantially smaller estimate than for the share of NTM but the estimate is also statistically significant.

Table 6 reports the results of the same set of regressions with the change in the homeownership rate as the dependent variable. The coefficients associated with the number or share of NTMs and subprime mortgages are generally not significant when using the percent change in the homeownership rate as the dependent variable for that subperiod (or for any other period).

The findings showing NTM and subprime mortgage activity as positively associated with the change in the number of homeowners in the 2000 to 2006 period are consistent with the narrative that exists regarding the role of NTMs and subprime mortgages in housing markets over the recent cycle, while the lack of relationship between the change in the rate of homeownership and NTMs and subprime mortgages is not consistent with this narrative.

We next turn to the results of the analysis for the bust period, which are shown in columns 3 and 4 of table 5. While originations of NTMs and subprime mortgages were associated with an increase in the number of homeowners during the boom, they were

associated with a decline in the number of homeowners between 2006 and 2012. Starting with subprime mortgages, we find the origination of 10 additional subprime loans during the boom was associated with a loss of about one homeowner during the bust. Similarly, we find a one percentage point increase in the share of subprime mortgages in a county is associated with 139 fewer owners. For NTMs, the origination of additional 10 mortgages in a county from 2001 to 2006 was also associated with a reduction of one homeowner in that county from 2007-2012. When one looks at NTM penetration, we observe that a 1 percentage point increase in the share of NTMs among mortgages originated during the boom was associated with a decline of 84 homeowners during the bust. However, none of these results are statistically significant, indicating a weaker negative association between NTMs and homeownership during the bust than what was found for subprime mortgages. For both subprime mortgages and NTMs, the magnitude of this negative relationship is smaller than the magnitude of the positive relationship during the boom.

We also present estimates of the relationship between NTM and subprime mortgage activity and homeownership over the entire sample period (table 5, column 5-6). For the 2000-2012 period, 10 additional NTMs originated is associated with 7 additional homeowners while 10 additional subprime loans originated is associated with 4 additional homeowners.

The control variables are generally of the expected sign with areas with higher income, a higher share of families, and college graduates, and a higher rent to value experiencing a larger increase in the number of homeowners over the entire period and in each subperiod while areas with a higher share of black resident, higher rent and house value experience a smaller increase.

Results by subgroups of homeowners and by county characteristics

We next take these general results and explore whether they hold across demographic groups of homeowners and across counties grouped by population subgroup share. We examine three dimensions of demographic groups: age, race and ethnicity, and income.

We first explore the association of homeownership and the use of NTMs and subprime loans for the young, as a proxy for first time homeowners. The literature has shown that young homeowners are particularly subject to borrowing constraints (Haurin et al. 1997). If NTMs are associated with greater homeownership, through overcoming constraints to lending, the population most likely to reflect a positive relationship between homeownership and the use of NTMs and subprime loans would be first-time homebuyers. Young homeowners, defined as homeowners whose household head is less than 35, are a reasonable proxy for first-time homebuyers, as it is considerably less likely that such homeowners have bought multiple homes (Berson and Berson 1997).

The literature also suggests reasons that the relationships observed in the previous section might not hold across racial and ethnic subgroups. There is considerable evidence on deeper subprime mortgage penetration in communities with large minority populations than in the general population (Calem et al. 2004; Mayer and Spence 2008). There are competing arguments as to the implication of this for homeownership. On one hand, it could be that subprime mortgage (as well as NTM) products better match with the circumstances faced by minority borrowers, and so are more important for their access to homeownership (Cocco 2013). Alternatively, a deeper penetration could arise due to incomplete markets and predatory lending strategies that place minority households at greater risk, which ultimate manifests itself in the form of weaker or negative

homeownership relationships (Gramlich 2007; Calem et al. 2009; Agarwal and Evanoff 2013; Agarwal et al. 2014). An earlier literature focused on whether minority borrowers were differentially excluded from access to borrowing for homeownership due to mortgage lending discrimination based on minority status or redlining (Guttentag and Wachter 1980; Munnell et al. 1996; Bostic et al. 2005). Indeed, "greenlining," or the minimizing of rationing and a concomitant increase in homeownership with the introduction of nonprime mortgage has been associated with the use of NTMs and subprime lending.

A similar set of arguments could be made regarding income. Calem et al. (2009) provide evidence that a larger share of prime and subprime mortgages were originated to low income borrowers during the boom. Deeper penetration could reflect better product efficacy, resulting in stronger ownership relationships, or increased vulnerability to abuse, which could lead to weaker or even negative relationships between homeownership and NTM and subprime lending.

Because our data do not identify lower-income homeowners, we can only analyze the income relationships by using county wide characteristics. We use the indirect measure of the county median income as a proxy for the presence of low-income homeowners. We stratify counties based on median income with low income counties being those in the lowest quartile and high income counties the remained counties. We then compare trends between both sets of counties. Tables 7 and 8 report the key results for the young and minority homebuyer analyses.[13] These analyses reveal interesting findings. The

[13] We also conducted first-time homebuyer and racial group tests using two other approaches with similar results. Specifically, we create interaction terms involving the NTM and subprime mortgage metrics and the share of the county population that is either young (for the first-time homebuyer analysis) or black or Hispanic (for the racial group analysis). We also stratified our sample based on their share of young, black

homeowner relationships with both NTMs and subprime mortgages for both young and minority buyers during the boom are weaker than those for the entire population of homeowners.

First, Panel A shows the homeownership relationships for NTMs and subprime mortgages for young homeowners during the boom. Because the baseline homeownership numbers and rates differ for young households and the overall population, one cannot directly compare regression coefficients. Rather, one must standardize the coefficients to make them comparable. We do so by expressing the effects in terms of standard deviations.[14] For example, a one standard deviation increase in the share of NTMs is associated with a .31 standard deviation larger change in the number of homeowners in the overall population and a .26 standard deviation larger change in the number of young homebuyers. For the share of subprime mortgages, the associations are .12 and .07, respectively. Second, we see the opposite relationships during the bust. Here, the coefficients on NTM and subprime mortgage activity are negative, and the magnitude of the relationships is larger for young homeowners than for all homeowners together. A one standard deviation higher share of NTMs is associated with a 0.11 standard deviation larger decline for young homeowners compared to a 0.05 standard deviation larger decline for the overall population. A further difference from what was seen for the total population is that the NTM relationship is larger than the subprime relationship in the bust.

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or Hispanic households and compared the relationship in high and low young and minority counties. The results of these analyses, which yield qualitatively similar results to the analysis reported in the text, are available upon request.

[14] We adopt the same approach for all subgroups.

Panel B and C report the results of the analysis for minority homeowners. The results for Hispanic homeowners (Panel B) indicate largely the same pattern as shown for young homeowners. We see positive relationships during the boom period, and negative relationships during the bust, with the boom coefficients exceeding the bust coefficients. However, the coefficients are smaller. For instance, a one standard deviation higher share of NTM is associated with a .3 standard deviation higher change in the number of homeowners during the 2000-2006 period for the whole population, but with a .1 higher change in the number of Hispanic homeowners. Here again, the NTM relationships are stronger than the subprime mortgage relationships in both the boom and bust periods.

The results for black homeowners (Panel C) look generally similar to those for the young and Hispanic homeowners, with two important differences. First, unlike any of the other findings, the magnitude of the subprime mortgage relationship is statistically indistinguishable from the magnitude of the NTM relationship. This is consistent with results in other work showing that subprime mortgages played a larger role in black communities than in the general population. Second, we do not observe negative relationships in the bust period between homeownership for black households and either NTMs or subprime mortgages.[15]

Table 8 presents the findings for the county level income-based analysis. Here, low income counties are defined as those counties with median income in the lowest quartile, and we compare experiences between this grouping of counties and those counties with median incomes in the highest quartile. There is no substantial difference between low

[15] We also looked at the relationships between NTMs and subprime mortgages and changes in the young, Hispanic and black homeownership. As in the general population, the relationships are not significant, indicating that areas with a larger number or share of these products did not experience a larger increase or decrease in young and minority homeownership rate during the boom or bust.

and high income counties in the coefficients for the number of NTMs and subprime mortgages during the boom.

With regards to the share of NTMs and subprime mortgages, the positive relationship persists in counties with high median incomes, but is not seen in counties with low median incomes. For the low median income counties, the coefficients are negative, unlike in other cases, but they are not significant. This suggests that lower-income areas with higher levels of NTM and subprime mortgage activity did not experience disproportionate increases in the number of homeowners. Rather the positive relationship found between overall growth in number of homeowners and growth in NTM and subprime loans as a share of overall loans is stronger in high income counties and either non-existent or negative in low income counties. During the bust, the coefficients are actually slightly more negative in high income counties, although the differences are largely not statistically different.

III. Conclusion

This paper explores the relationship between the rise of non-traditional mortgage products (NTMs) and subprime mortgages and homeownership, looking at experiences during the 2000s when the prevalence of both subprime and non-traditional mortgages increased dramatically. We first document the evolution of both NTMs and subprime mortgages during this period, and establish some stylized facts about their volume and geographic distribution. Origination activity in both mortgage categories grew dramatically during the early 2000s and then abruptly ended after 2006. Activity for both

was concentrated in high cost markets and sand sates, though subprime mortgage activity was distributed more broadly across the United States.

Next, using a newly-constructed dataset including information on county homeownership and lending volumes for NTMs, subprime mortgages and all loan products, we conduct empirical tests to examine the relationship between NTMs and subprime mortgages and homeownership. We find that NTM and subprime activity was associated with an increase in the number of homeowners, but not in changes in the homeownership rate, during the boom period of 2000 to 2006, but was negatively associated with homeownership during the bust period of 2007-2012. There is no significant relationship between the prevalence of NTMs and subprime mortgages and changes in the homeownership rate at the local level during the bust.

Third, we explore the question of whether the observed relationships between homeownership and NTM and subprime mortgage activity, which were calculated over the entire population, differ when one considers groups most likely to face borrowing constraints. For all of these subgroups we find less of a relationship between increase in number of homeowners and use of NTMs and subprime loans then for the entire population.

For young homeowners who are thought to be most hampered by credit constraints, we see a significant positive relationship between NTM and subprime mortgage prevalence and homeownership during the boom. We see no significant relationship during the bust years. For racial minorities, another key group for whom credit constraints are particularly binding, we observe somewhat different patterns. The results for Hispanic homeowners indicate largely the same pattern (positive association during

the boom, negative but smaller relationship during the bust), but the coefficients are smaller than for young homeowners or the overall population. The results for black homeowners follow the same patterns but differ in two ways from what was observed for the other groups. First, the NTM and subprime mortgage relationships are similar in magnitude. Second, the relationships during the bust are positive and generally insignificant. Finally, the positive relationship during the boom is not higher in areas with lower income levels. Taken together, these results suggest that, while NTMs and subprime loans may be associated with increasing homeownership at the local level, these benefits vary across the population.

Fourth, we find that overall the relationship between NTMs and homeownership is stronger than the relationship between subprime mortgages and homeownership during the boom but it is less negative during the bust.

These results are informative for several areas of policy concern. First, the gap in homeownership outcomes across racial and ethnic groups has been a policy issue of longstanding concern. While the literature has addressed issues on the predatory aspects of nonprime loans, it is possible that a more general outcome of such lending is the closing of homeownership gaps, for low income and minority households and for low income and minority areas.

However, we find that there is no substantial difference between low and high income counties, and weaker NTM and subprime mortgage relationships for minority households. Thus, these findings do not support the conclusion that nontraditional lending products assisted in *decreasing* gaps in homeownership outcomes, geographically or by borrower racial or ethnic status.

Second, in response to the crisis, two strands of literature have taken opposite positions on the role of lending to low income households. Mian and Sufi (2011) point to disproportionate lending to low income communities while Adelino et al. (2015) point to expansion of credit across the board for households at all income levels although they do not focus on nonprime lending. Here we find that the relationship found by Mian and Sufi for lending does not hold for homeownership.

Taken together, these results call into question the view that an untargeted relaxation of borrowing constraints can result in the closing of persistent gaps across racial and ethnic groups and between groups stratified by income. Instead, they suggest that, in order to address existing homeownership gaps, more targeted measures are needed to improve access to mortgage credit in a sustainable manner. Such policies could potentially include education programs to increase financial literacy, pre-ownership counselling programs to improve consumer choice of context-appropriate mortgage products, post-homeownership counseling to ensure that the early years of homeownership are weathered smoothly, saving schemes to enable households to save for downpayments and overcome economic shocks that could threaten loan repayment, and enforcement of regulations that prevent the steering of consumers towards mortgage products that are not beneficial to them.

Finally, this research does not identify or validate specific mechanisms in this research. Rather, our goal was to establish some stylized facts that can guide further exploration in this area. With these facts in hand, there are many possible avenues researchers might pursue. For example, researchers might examine and compare the effectiveness of NTMs and subprime mortgages in alleviating constraints that prohibited

some from accessing credit markets. Similarly, researchers might evaluate the sustainability of homeownership achieved via NTMs and subprime mortgages in order to assess the long-term benefits of the availability of such products. A third research topic is why the homeownership mechanisms for black households appear to differ from Hispanic households or from those considering purchasing their first home. Answers to questions such as these would deepen our understanding of mortgage markets and permit the crafting of more effective policies. Finally, further work is needed to develop an identification approach to test the causal effect of the supply of NTMs and subprime mortgages on homeownership.

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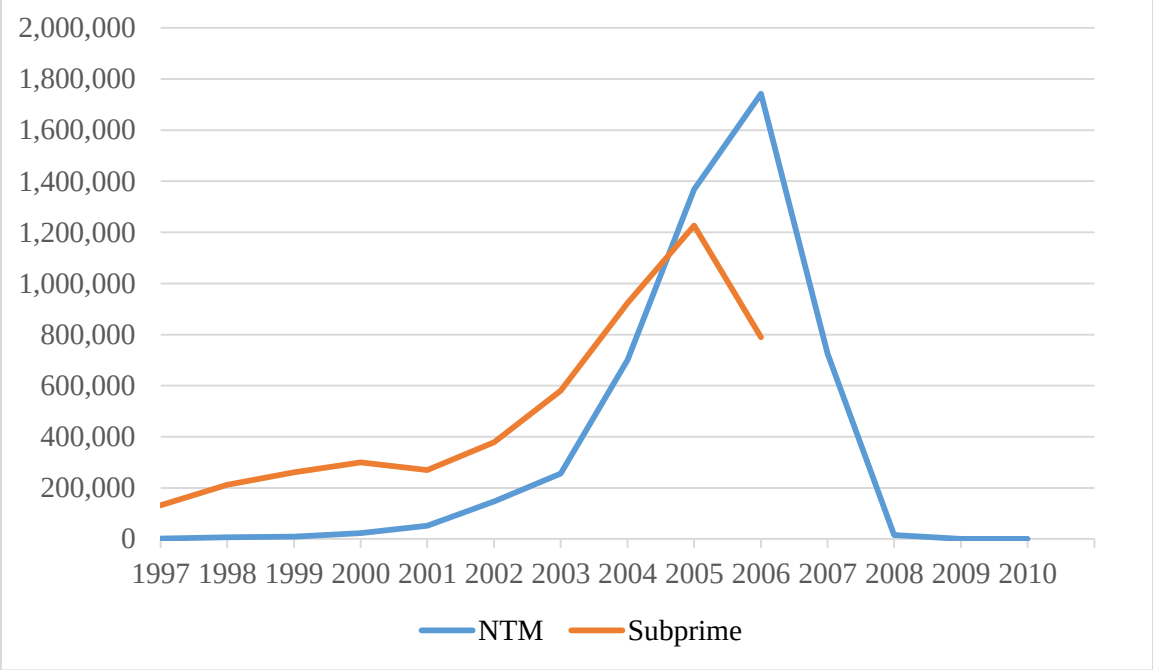
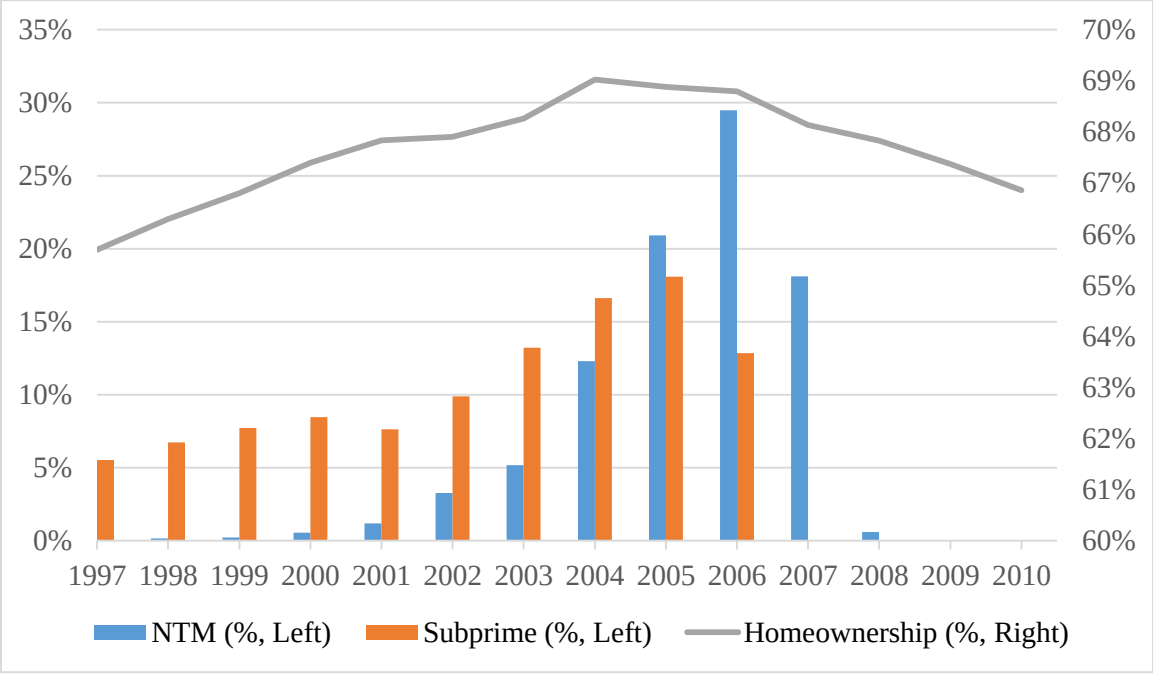
Figures and Tables

Figure 1. Non-traditional mortgage and subprime originations, 1997-2010



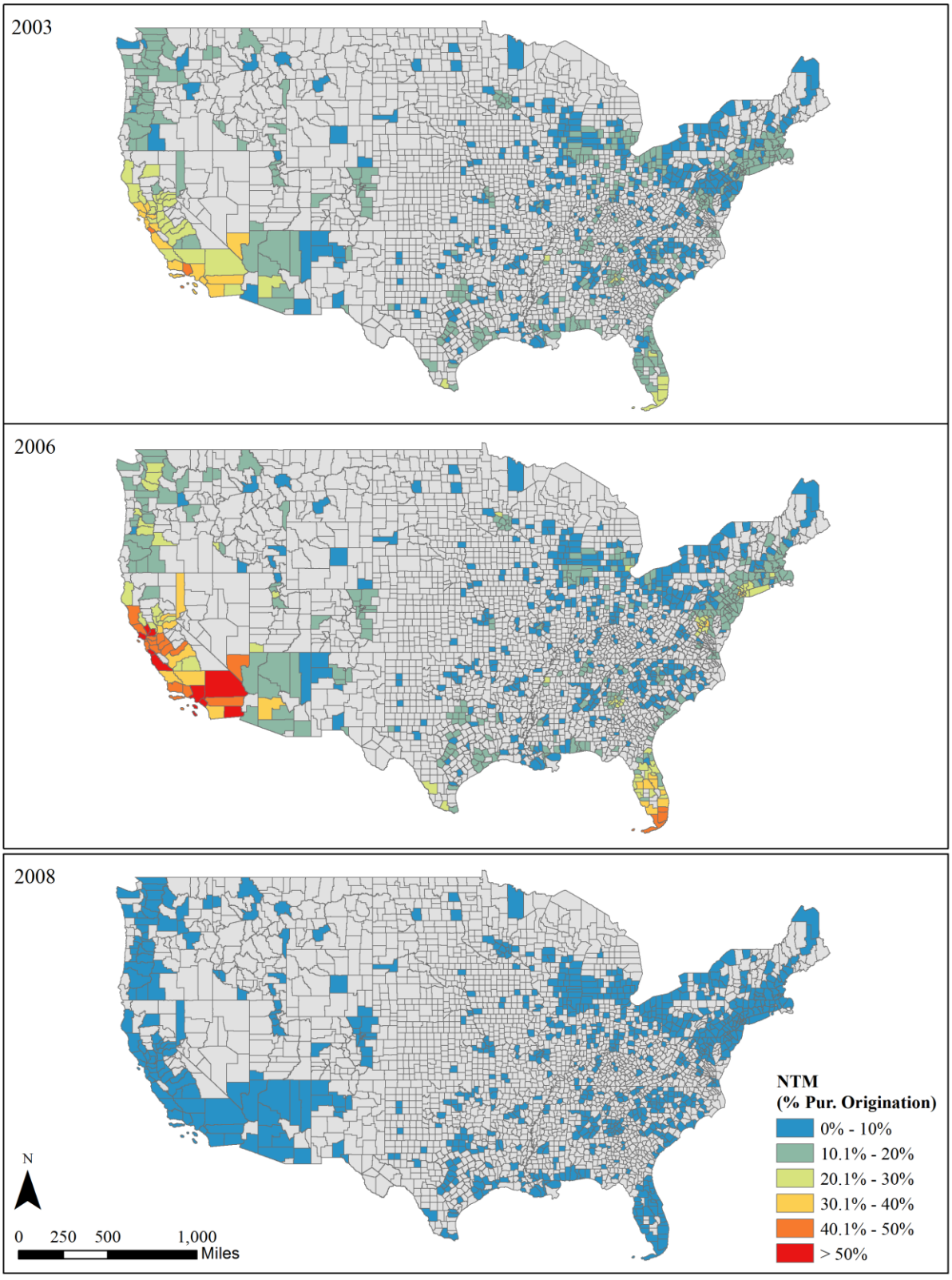
Source: BlackBox, Urban Institute calculation of HMDA. Subprime share is only shown up to 2006.

Figure 2. Non-traditional and subprime mortgages as a percentage of total purchase originations and homeownership rate, 1997-2010



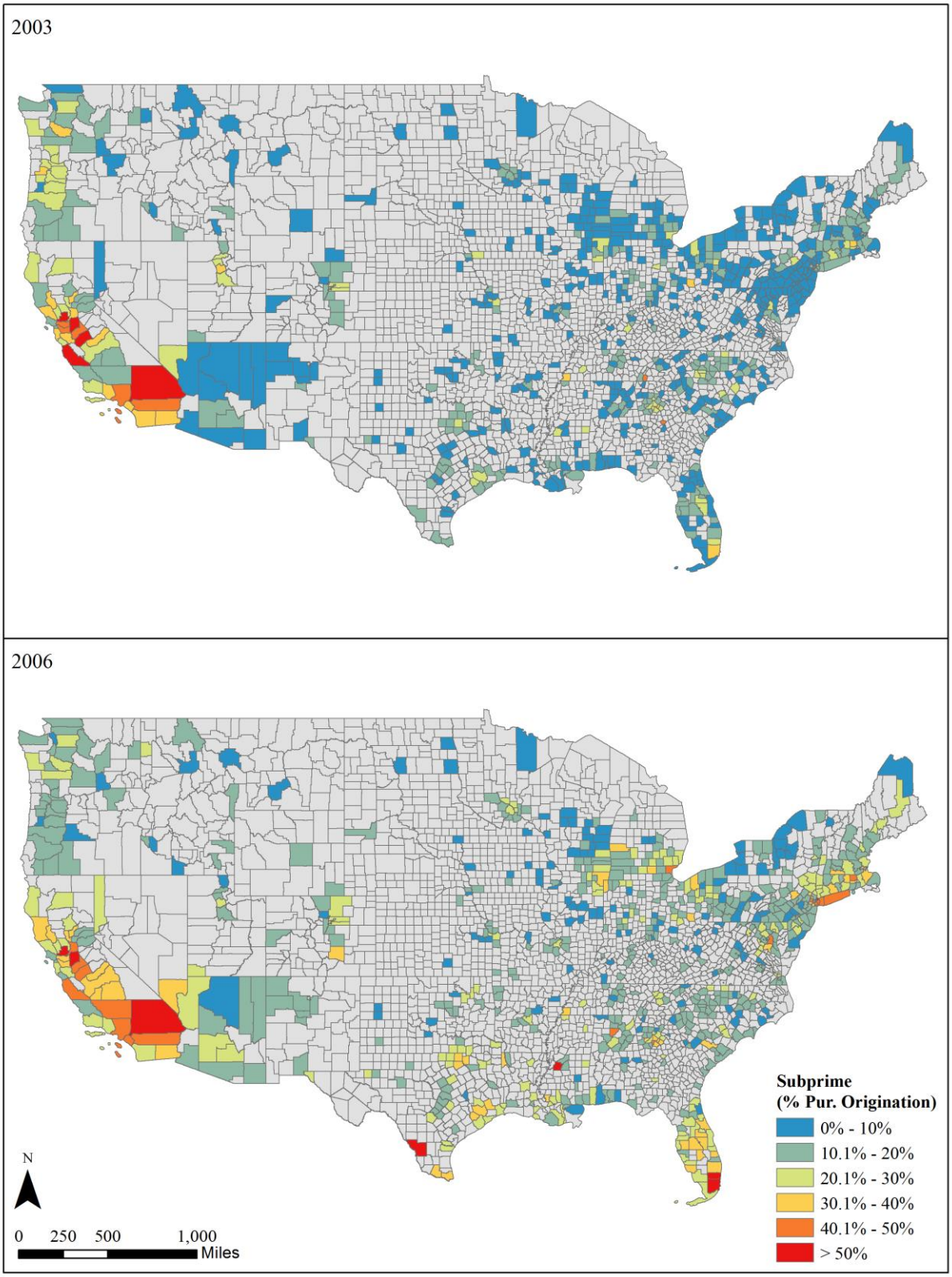
Source: HMDA, BlackBox, CPS/HVS. Subprime share is only shown up to 2006.

Figure 3. Geographic distribution of non-traditional and subprime mortgages
Panel A. Non-traditional mortgages, 2003, 2006 and 2008



Source: HMDA, BlackBox

Panel B. Distribution of subprime mortgages, 2003 and 2006

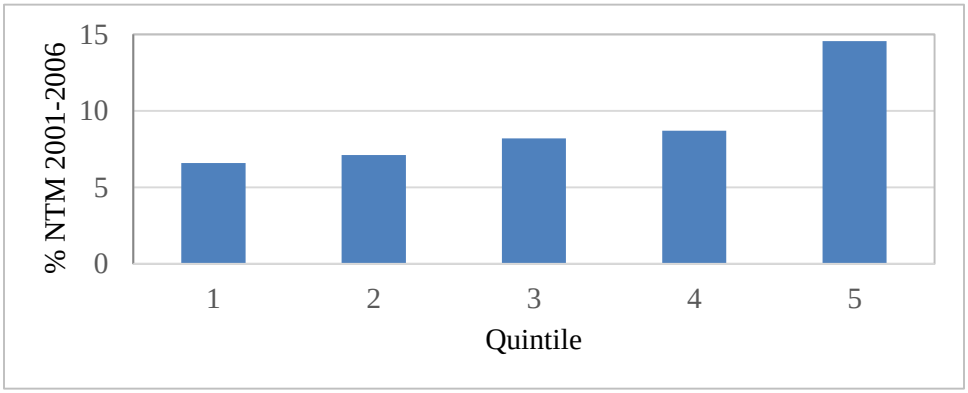


Source: HMDA, BlackBox. Subprime mortgages based on the originator definition are only available until 2006.

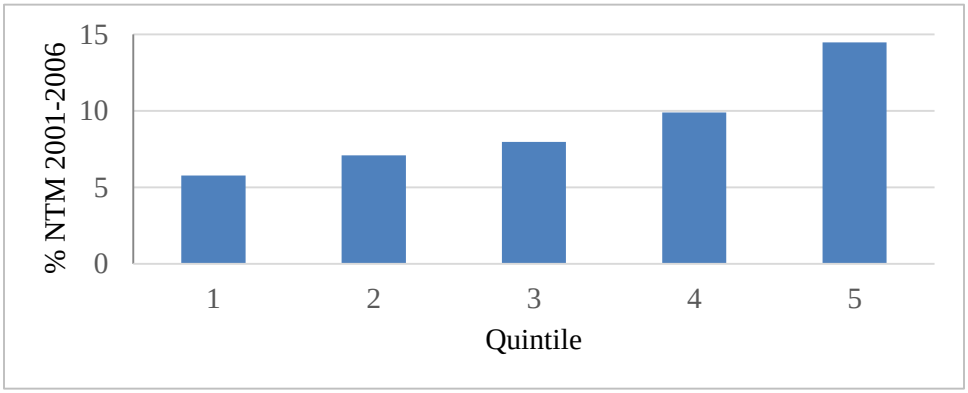
Figure 4. NTM and subprime mortgage share of all mortgage originated from 2001 to 2006, by county quintiles grouped by selected characteristics as of 2000

Panel A: NTM Share 2001-2006

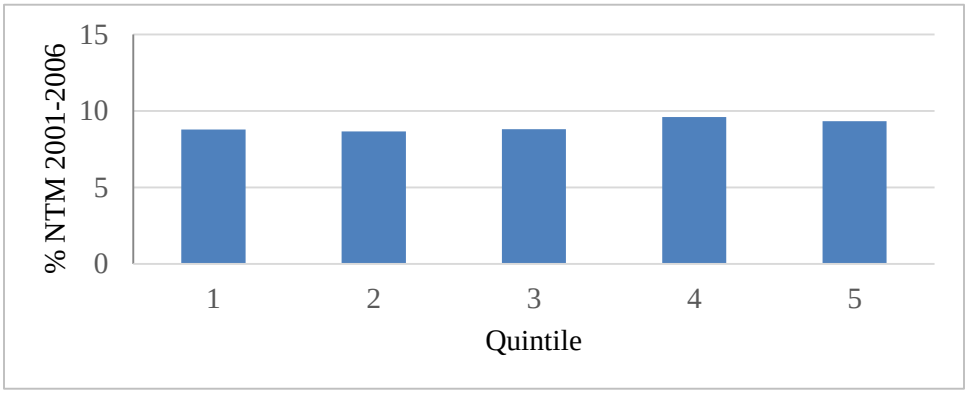
i. Median House Value to Median Income Ratio



ii. Percent Hispanic



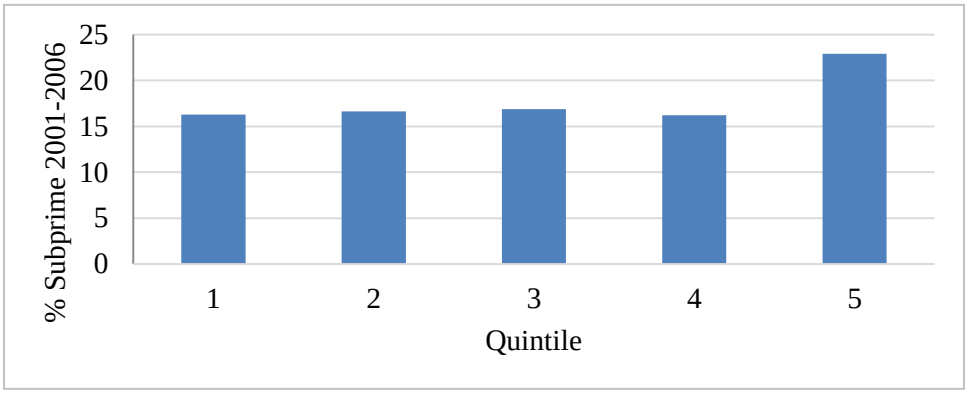
iii. Percent Black



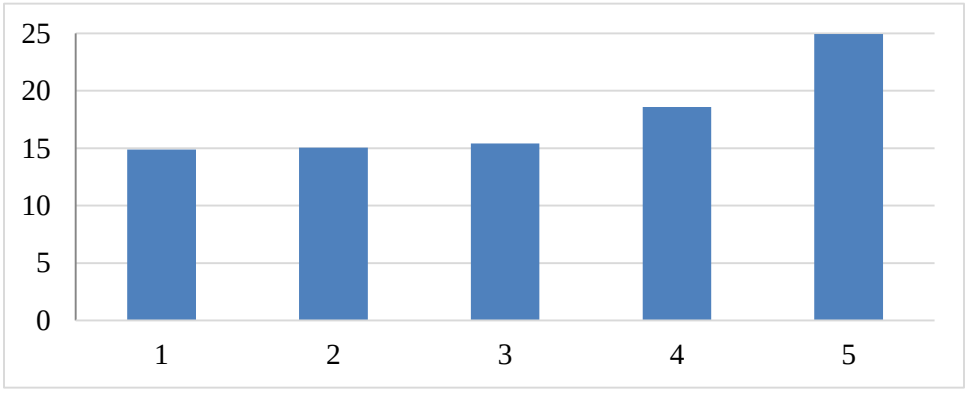
Source: HMDA, BlackBox, Census 2000. 1 = lowest quintile

Panel B. Share of Subprime 2001-2006

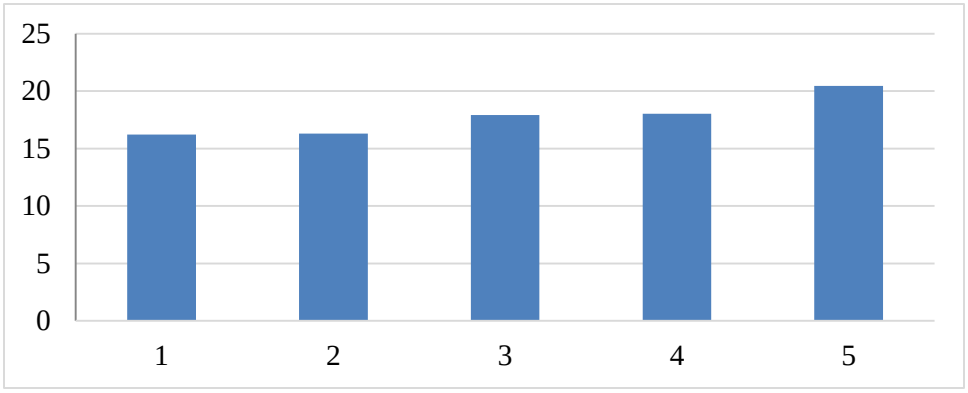
i. Median House Value to Median Income Ratio



ii. Percent Hispanic



iii. Percent Black



Source: HMDA, BlackBox, Census 2000

Table 1: Number of non-traditional features by mortgage

Number of Traits	Number of Loans	Share of Loans
One	2,193,571	43.8%
Two	1,680,978	33.6%
Three	863,153	17.2%
Four	242,456	4.8%
Five	25,595	0.5%
Six	2,612	0.1%
Seven	160	0.0%

Source: BlackBox

Table 2: Non-traditional and subprime mortgage volume, 2001-2008

	2001	2002	2003	2004	2005	2006	2007	2008
NTM	51,771	147,563	256,068	700,273	1,368,395	1,742,624	725,316	15,941
Interest Only	2.0%	2.8%	14.9%	30.1%	36.2%	30.5%	33.3%	28.4%
Option-ARM with negative amortization	1.6%	1.9%	0.1%	4.8%	9.5%	7.1%	7.4%	4.0%
Balloon payment	11.4%	25.9%	20.6%	18.4%	15.0%	28.7%	25.9%	21.3%
Teaser rate	2.5%	3.0%	10.3%	15.1%	19.7%	15.6%	18.4%	36.3%
Low or no documentation	75.8%	70.4%	57.9%	48.4%	55.8%	59.8%	70.3%	57.3%
Terms >365 months	14.8%	7.0%	9.6%	8.9%	8.1%	22.3%	20.0%	23.2%
CLTV at origination >= 100	11.0%	14.5%	23.0%	33.2%	30.4%	41.3%	38.4%	31.0%
Subprime	269,640	378,572	580,408	923,009	1,226,920	789,564	NA	NA

NOTE: Since many non-traditional mortgages have more than 1 non-traditional feature, the sum of the percentage adds up to more than 100%

Source: BlackBox, Urban Institute calculation of HMDA

Table 3: Correlation in penetration of different non-traditional mortgages across counties in 2006

	Interest Only	Option-ARM with negative amortization	Balloon payment	Teaser rate	Low or no documentation	Terms >365 months	CLTV at origination >= 100	NTM	Subprime
Interest Only	1								
Option-ARM with negative amortization	0.84	1							
Balloon payment	0.76	0.59	1						
Teaser rate	0.92	0.78	0.78	1					
Low or no documentation	0.91	0.82	0.87	0.92	1				
Terms >365 months	0.75	0.62	0.97	0.75	0.86	1			
CLTV at origination >= 100	0.77	0.55	0.93	0.83	0.86	0.90	1		
Subprime	0.46	0.38	0.46	0.54	0.52	0.36	0.54	0.58	1

Source: BlackBox, Urban Institute calculation of HMDA

Table 4. Descriptive Statistics

	2000			2006		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Change in number of homeowners						
2000-2006	6,425	-50,262	133,715			
2000-2012	5,186	-96,183	135,434			
2006-2012				-1,238	-86,762	46,872
NTM volume, 2001-2006						
Number	5,505	46	240,250	5,505	46	240,250
Share	9.0	1.5	28.4	9.0	1.5	28.4
Subprime mortgage volume, 2001-2006						
Number	9,910	126	436,165	9,910	126	436,165
Share	17.8	1.4	62.0	17.8	1.4	62.0
Number of Households	111,628	18,798	3,133,774	118,788	19,118	3,172,032
Owner Occ. 2000 (%)	63.5	18.4	84.5	63.5	18.4	84.5
Mean Household Size	2.66	2.07	3.81	2.66	2.14	3.83
College Educated (%)	51.3	27.1	83.8	53.7	29.7	82.1
Age share (%)						
25-34	13.6	7.6	25.4	13.3	8.2	19.6
35-44	16.0	10.6	21.7	14.3	9.6	20.6
45-54	13.6	7.9	18.4	14.5	8.2	19.6
55-64	8.8	4.8	15.1	10.7	5.8	16.7
Family with Child. (%)	29.9	15.2	48.8	31.4	13.8	48.3
Foreign Born (%)	6.3	0.4	50.9	7.5	0.3	50.3
Hispanic (%)	7.7	0.3	94.4	9.4	0.2	95.1
Black (%)	9.9	0.1	66.6	10.5	0.0	65.7
Unemployment (%)	3.9	1.4	17.4	4.7	2.0	15.4
Med. HH Income (000)	42.8	22.9	82.9	48.9	23.1	100.3
Med. Rent	568	320	1,185	723	401	1,442
Med. House Value (000)	113	39	493	195	54	902
Rent to Value (%)	6.5	2.6	11.2	6.4	2.0	15.5
Value to Income	2.60	1.37	7.68	3.83	1.34	13.23
HPI Variance	0.03	0.00	0.27	2.95	0.01	23.14
HPI Change (%)	57.5	9.6	176.3	-10.3	-62.9	44.8
MSA (%)	87.4			87.4		
Suburban County (%)	20.6			20.6		
N	732			732		

Table 5. Homeownership regression results, sample partitioned by boom and bust periods

Panel A. Non-traditional mortgages

	2000-2006		2006-2012		2000-2012	
	(1)	(2)	(3)	(4)	(5)	(6)
NTM 2001-2006 (#)	0.717***		-0.0758		0.693***	
	(0.121)		(0.0894)		(0.146)	
NTM 2001-2006 (%)		731.0***		-83.88		510.1**
		(197.1)		(99.62)		(206.9)
Observations	729	729	729	729	729	729
R-squared	0.724	0.617	0.636	0.634	0.506	0.415

Panel B. Subprime Mortgages

	2000-2006		2006-2012		2000-2012	
	(1)	(2)	(3)	(4)	(5)	(6)
Subprime 2001-2006 (#)	0.433***		-0.103**		0.375***	
	(0.0763)		(0.0446)		(0.0943)	
Subprime 2001-2006 (%)		165.8**		-139.2***		-14.70
		(73.85)		(43.60)		(78.16)
Observations	729	729	729	729	729	729
R-squared	0.706	0.610	0.645	0.639	0.476	0.410

NOTE: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parentheses. The dependent variable is the change in the number of homeowners in a county between 2000 and 2006 or 2006 and 2012. These regressions include state fixed effects, whether a county is in an MSA or not and is suburban or not and control for county household number, household size, age structure, share of family with children, college graduate, foreign born, black, Hispanic, median household income, median house value, median gross rent, rent to value ratio, value to income, HPI variance and HPI change, and 2000 homeownership rate.

Table 6. Homeownership rate regression results

Panel A. Non-traditional mortgages

	2000-2006		2006-2012		2000-2012	
	(1)	(2)	(3)	(4)	(5)	(6)
NTM 2001-2006 (#)	1.38e-05		-9.38e-06		-6.85e-06	
	(1.63e-05)		(2.01e-05)		(2.01e-05)	
NTM 2001-2006 (%)		0.00449		-0.0373		-0.0487
		(0.0705)		(0.105)		(0.103)
Observations	729	729	729	729	729	729
R-squared	0.410	0.409	0.273	0.273	0.388	0.388

Panel B. Subprime mortgages

	2000-2006		2006-2012		2000-2012	
	(1)	(2)	(3)	(4)	(5)	(6)
Subprime 2001-2006 (#)	2.03e-05*		-2.67e-06		4.57e-06	
	(1.05e-05)		(1.24e-05)		(1.26e-05)	
Subprime 2001-2006 (%)		0.0232		-0.0476		-0.0284
		(0.0306)		(0.0380)		(0.0300)
Observations	729	729	729	729	729	729
R-squared	0.411	0.410	0.273	0.275	0.388	0.388

NOTE: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parentheses. The dependent variable is the percent change in the homeownership rate in a county between 2000 and 2006, 2006 and 2012 and 2000 and 2012. Each coefficient represents the result of a separate regression estimated using the same specification as in tables 5

Table 7. Homeownership regression results, with change in the number of young and minority homeowners as the dependent variable

Panel A. Young Homeowners

i. Non-traditional mortgages

	2000-2006		2006-2012	
	(1)	(2)	(3)	(4)
NTM 2001-2006 (#)	0.166***		-0.143***	
	(0.0397)		(0.0363)	
NTM 2001-2006 (%)		128.1**		-69.94**
		(50.92)		(31.20)
Observations	729	729	729	729
R-squared	0.430	0.263	0.749	0.740

ii. Subprime mortgages

	2000-2006		2006-2012	
	(1)	(2)	(3)	(4)
Subprime 2001-2006 (#)	0.113***		-0.0993***	
	(0.0238)		(0.0182)	
Subprime 2001-2006 (%)		19.29		-36.91**
		(20.44)		(14.44)
Observations	729	729	729	729
R-squared	0.433	0.252	0.755	0.685

NOTE: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parentheses. Each coefficient represents the result of a separate regression estimated using the same specification as in tables 5. The dependent variable for each regression is the change in the number of young homeowners in a county between 2000 and 2006 or 2006 and 2012.

Panel B. Hispanic homeownership

i. Non-traditional mortgages

	2000-2006		2006-2012	
	(1)	(2)	(3)	(4)
NTM 2001-2006 (#)	0.284***		-0.116***	
	(0.053)		(0.032)	
NTM 2001-2006 (%)		181.2**		35.5
		(75.51)		(44.75)
Observations	637	637	618	618
R-squared	0.854	0.78	0.29	0.197

ii. Subprime mortgages

	2000-2006		2006-2012	
	(1)	(2)	(3)	(4)
NTM 2001-2006 (#)	0.215***		-0.0679***	
	(0.021)		(0.015)	
NTM 2001-2006 (%)		37.61		-2.76
		(33.26)		(19.69)
Observations	637	637	618	618
R-squared	0.875	0.778	0.268	0.196

NOTE: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parentheses. Each coefficient represents the result of a separate regression estimated using the same specification as in tables 5. The dependent variable for each regression is the change in the number of Hispanic homeowners in a county between 2000 and 2006 or 2006 and 2012.

Panel C. Black homeownership

i. Non-traditional mortgages

	2000-2006		2006-2012	
	(1)	(2)	(3)	(4)
NTM 2001-2006 (#)	0.0316*		0.0448*	
	(0.0190)		(0.0266)	
NTM 2001-2006 (%)		153.9***		29.57
		(53.28)		(49.07)
Observations	590	590	573	573
R-squared	0.224	0.234	0.229	0.208

ii. Subprime mortgages

	2000-2006		2006-2012	
	(1)	(2)	(3)	(4)
NTM 2001-2006 (#)	0.0294**		0.00326	
	(0.0129)		(0.00753)	
NTM 2001-2006 (%)		59.35***		-20.04
		(21.13)		(16.86)
Observations	590	590	573	573
R-squared	0.230	0.234	0.207	0.209

NOTE: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parentheses. Each coefficient represents the result of a separate regression estimated using the same specification as in table 5. The dependent variable for each regression is the change in the number of Hispanic homeowners in a county between 2000 and 2006 or 2006 and 2012.

Table 8. Homeownership regression results, stratified by county income level

Panel A. Non-traditional mortgages

	2000-2006				2006-2012			
	Low Inc.	High Inc.	Low Inc.	High Inc.	Low Inc.	High Inc.	Low Inc.	High Inc.
NTM 2001-2006 (#)	0.783**	0.705***			0.0691	-0.0677		
	(0.333)	(0.115)			(0.169)	(0.0919)		
NTM 2001-2006 (%)			-137.3	517.1**			-166.0**	-232.0**
			(156.2)	(218.4)			(80.65)	(92.79)
Observations	189	564	189	564	193	578	193	578
R-squared	0.502	0.703	0.479	0.568	0.506	0.569	0.516	0.570

Panel. B. Subprime mortgages

	2000-2006				2006-2012			
	Low Inc.	High Inc.	Low Inc.	High Inc.	Low Inc.	High Inc.	Low Inc.	High Inc.
Subprime 2001-2006 (#)	0.352*	0.414***			-0.005	-0.118***		
	(0.190)	(0.0777)			(0.0931)	(0.0437)		
Subprime 2001-2006 (%)			-80.31	56.69			-78.34***	-215.6***
			(56.71)	(95.08)			(24.95)	(50.95)
Observations	189	564	189	564	193	578	193	578
R-squared	0.498	0.666	0.483	0.560	0.505	0.582	0.524	0.581

NOTE: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parentheses. Each coefficient represents the result of a separate regression estimated using the same specification as in tables 5. The dependent variable for each regression is the change in the number of homeowners in a county between 2000 and 2006 or 2006 and 2012. "Low income counties" are those with median income below the 1st quartile; "High income counties" represent the remainder.

Appendix A: Pairwise Correlation Coefficients

	2000-2006	2006-2012	2000-2012
	Change in the Number of Homeowners		
# NTM 2001-2006	0.75***	-0.59***	0.32***
% NTM 2001-2006	0.43***	-0.28***	0.22***
# Subprime 2001-2006	0.71***	-0.63***	0.26***
% Subprime 2001-2006	0.30***	-0.33***	0.06*
	Change in the Homeownership Rate		
# NTM 2001-2006	0.13***	-0.21***	-0.10***
% NTM 2001-2006	0.10***	-0.25***	-0.18***
# Subprime 2001-2006	0.13***	-0.20***	-0.09*
% Subprime 2001-2006	0.01	-0.21***	-0.22***
	Change in the Number of Young Homeowners		
# NTM 2001-2006	0.005	-0.83***	-0.71***
% NTM 2001-2006	0.09**	-0.45***	-0.33***
# Subprime 2001-2006	-0.04	-0.83***	-0.74***
% Subprime 2001-2006	0.03	-0.41***	-0.34***
	Change in the Number of Hispanic Homeowners		
# NTM 2001-2006	0.88***	-0.24***	0.74***
% NTM 2001-2006	0.44***	-0.10*	0.38***
# Subprime 2001-2006	0.90***	-0.20***	0.78***
% Subprime 2001-2006	0.42***	-0.06	0.38***
	Change in the Number of Black Homeowners		
# NTM 2001-2006	0.18***	-0.15***	0.04
% NTM 2001-2006	0.23***	-0.06	0.14***
# Subprime 2001-2006	0.18***	-0.22***	-0.001
% Subprime 2001-2006	0.21***	-0.15***	0.05
	Change in the Homeownership Rate of Young Homeowners		
# NTM 2001-2006	0.09**	-0.15***	-0.09**
% NTM 2001-2006	0.11***	-0.27***	-0.24***
# Subprime 2001-2006	0.10***	-0.14***	-0.08**
% Subprime 2001-2006	0.06*	-0.18***	-0.17***
	Change in the Homeownership Rate of Hispanic Homeowners		
# NTM 2001-2006	0.01	-0.10**	-0.06*
% NTM 2001-2006	-0.004	-0.18***	-0.13***
# Subprime 2001-2006	0.01	-0.10**	-0.06*
% Subprime 2001-2006	-0.01	-0.13***	-0.08**
	Change in the Homeownership Rate of Black Homeowners		
# NTM 2001-2006	0.01	-0.05	-0.02
% NTM 2001-2006	0.03	-0.02	0.03
# Subprime 2001-2006	0.02	-0.05	-0.02
% Subprime 2001-2006	0.07	-0.07	-0.02

NOTE: *** p<0.01, ** p<0.05, * p<0.1.

Appendix B: Comparison between models with and without fixed effects and with population weights

	(1)	(2)	(3)	(4)	(5)	(6)
NTM 2001-2006 (#)	0.677***	0.656***	0.745***			
	(0.151)	(0.131)	(0.170)			
NTM 2001-2006 (%)				398.9**	242.9	1,267**
				(193.3)	(185.0)	(605.6)
Number of Households	-0.0441***	-0.0413***	-0.0600***	0.00183	0.00333	-0.0102*
	(0.0156)	(0.0141)	(0.0130)	(0.00986)	(0.0106)	(0.00554)
Owner Occupied 2000 (%)	-49.26	-161.7	-1,380*	-58.63	-166.3	-1,376*
	(122.4)	(108.2)	(776.2)	(123.1)	(104.4)	(753.9)
Mean Household Size	-17,945***	-11,751***	-24,853*	-16,365***	-9,318**	-21,865
	(4,623)	(4,281)	(14,175)	(4,760)	(4,186)	(14,718)
College Educated (%)	293.3***	350.1***	788.6***	250.1**	341.2***	805.1***
	(94.67)	(61.88)	(221.5)	(97.84)	(65.96)	(239.6)
25-34 (%)	787.4*	970.8**	2,071*	510.8	1,111**	3,137*
	(458.4)	(438.9)	(1,116)	(468.1)	(480.1)	(1,630)
35-44 (%)	95.44	246.6	-1,350	432.3	247.5	-844.7
	(760.3)	(668.3)	(2,973)	(856.3)	(705.2)	(3,289)
45-54 (%)	-792.9	-1,141	542.2	-1,494	-1,080	179.5
	(857.5)	(915.2)	(4,204)	(1,034)	(946.5)	(4,241)
55-64 (%)	492.7	2,273***	6,812***	245.9	2,291***	7,256***
	(699.6)	(511.7)	(1,890)	(687.8)	(554.6)	(2,057)
Family with Children (%)	1,027***	927.3***	2,992**	941.0***	1,089***	3,349***
	(239.6)	(228.6)	(1,161)	(239.8)	(225.7)	(1,109)
Foreign Born (%)	98.03	-7.126	387.4	64.61	-89.89	-39.56
	(300.7)	(285.9)	(620.6)	(277.9)	(281.0)	(620.8)
Hispanic (%)	63.72	170.5*	89.52	64.96	175.5**	132.5
	(133.2)	(95.18)	(272.3)	(124.8)	(87.48)	(261.6)
Black (%)	-165.0**	-158.4***	-640.3***	-231.7***	-203.4***	-839.9***
	(70.42)	(41.96)	(215.4)	(70.73)	(47.08)	(234.2)
Unemployment (%)	208.2	-333.3	-597.9	-695.7	-795.8**	-2,965**
	(498.3)	(316.9)	(1,289)	(607.9)	(358.3)	(1,244)
Median Household Income (000)	1.096***	1.262***	1.686***	0.863***	0.718***	1.421**
	(0.281)	(0.275)	(0.626)	(0.293)	(0.273)	(0.704)
Median Rent	-28.00*	-35.94**	-80.50**	-14.38	-5.356	-69.26
	(15.64)	(14.94)	(36.51)	(14.93)	(14.73)	(46.14)
Median House Value (000)	-256.3***	-266.0***	-261.1**	-220.8***	-212.3***	-309.3**
	(49.28)	(48.82)	(113.0)	(53.00)	(44.47)	(130.7)
Rent to Value	10,058	34,343***	85,548***	-3,023	12,028	61,886*
	(12,759)	(11,303)	(32,799)	(14,117)	(12,326)	(37,128)
Value to Income	14,889***	16,636***	15,127	8,384**	8,786***	11,127

	(3,954)	(3,783)	(9,911)	(3,852)	(3,353)	(9,418)
HPI Variance (5 years)	-2,625	7,296	-16,478	-11,909	-2,739	1,432
	(14,595)	(11,282)	(28,153)	(14,815)	(10,373)	(30,029)
Projected 1 Year HPI Change	255.8	-108.3	1,442	237.8	-156.3	702.7
	(245.3)	(239.2)	(1,167)	(243.5)	(242.2)	(1,153)
MSA (ref.=Not MSA)	-905.1	12.55	2,438	-1,748	-774.4	-2,510
	(956.9)	(1,013)	(3,486)	(1,081)	(1,057)	(4,387)
Suburban County (ref.=Central County)	-575.4	621.4	6.026	-239.0	986.4	570.0
	(782.4)	(928.5)	(1,962)	(855.4)	(940.3)	(2,421)
Constant	-44,037*	-86,238***	-130,437**	-4,869	-65,334***	-131,380*
	(24,382)	(23,030)	(64,718)	(26,458)	(24,478)	(70,114)
State FE	YES	NO	NO	YES	NO	NO
Population Weighted	NO	NO	YES	NO	NO	YES
Observations	746	746	746	746	746	746
R-squared	0.501	0.420	0.497	0.412	0.314	0.399
Likelihood-ratio test (Assumption: No fixed effect nested in fixed effect model)	LR chi2(49) = 117.84 Prob > chi2 = 0.000			LR chi2(49) = 115.71 Prob > chi2 = 0.000		

NOTE: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parentheses. The dependent variable for each regression is the change in the number of homeowners in a county between 2000 and 2012.