Race and the Recession: Home Equity Trajectories Across the Boom & Bust

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During the past decade, housing markets throughout the United States experienced dramatic upheaval. Housing prices rose rapidly throughout much of the country from 2000 until the start of 2007 and then fell sharply during the next two years. Many households lost substantial amounts of their equity during this downturn; in aggregate, U.S. homeowners lost $7 trillion in equity from 2006 to 2009. These massive, collective losses followed a period of substantial gain, and aggregate home equity holdings had fallen back to 2000 levels by early 2009 (Board of Governors of the Federal Reserve, 2013). While this tremendous volatility has been well documented, there has been little rigorous examination of the variation in experiences across racial groups. Did this housing market upheaval widen the already large racial and ethnic gaps in housing wealth? Using the American Housing Survey, we analyze differences in the changes in home equity experienced by homeowners of different races and ethnicities between 2003 and 2009. We focus on homeowners who remained in their homes over this period. We explore whether any differences found were driven by the distribution of racial groups across metropolitan areas that saw different price trends, or whether they were explained instead by variation in the experiences of racial groups living *within* the very same metropolitan areas. Finally, we examine whether the magnitude of racial differences in equity gains within a metropolitan area is associated with the level of racial segregation in that metropolitan area.

Background and Literature Review

Scholars of urban disadvantage have long argued that minorities suffer disproportionately in economic downturns due to their overrepresentation in vulnerable industries, occupations, and communities (Wilson 1987; 1996; Massey and Denton 1993). Wacquant (2008) adds that not only are socially and geographically isolated minorities disparately harmed by recessions, but that segregation limits the ability of minorities to benefit from economic expansions as well. Most of this work has focused on the impacts of employment growth and decline; there has been far less analysis of the racially disparate consequences of the housing boom and bust.

Much of the literature on the housing crisis has understandably focused on borrowers going through foreclosure. We look instead at the homeowners who bought their homes before the peak years of the boom and who managed to stay in their homes during the crisis. By doing so, we are surely understating the total losses suffered during this period, but the experience of these homeowners remains highly relevant. While they demonstrated more resilience than other homeowners, many of them still suffered considerable losses in equity. Such losses – or even reductions in expected gains – may have had significant impacts on their well-being. They may have led them to reduce their spending, cut back on investments in education and training, delay their retirement decisions, and diminish or even eradicate the bequests that they hoped to pass on to their children (Case, Quigley, and Shiller, 2005; Chan, Ellen, and Dastrup, 2013; Engelhardt, 1996). Further, the racial disparities in equity gains during this volatile period might have

widened the already substantial gaps in wealth across racial groups (Conley 1999; Shapiro 2004; Spilerman 2000; Taylor, Kochhar, Fry, Velasco, and Motel 2011).

In the first part of our paper, we compare the equity changes experienced by homeowners of different races between 2003 and 2009, and explore several alternative drivers of racial disparities. First, and most simply, differences in equity gains might stem from the fact that the distribution of households across metropolitan areas in the United States differs sharply across racial and ethnic groups. Black households are disproportionately concentrated in the South, while Asians and Hispanics tend to be concentrated in the West. Thus, one explanation for why households belonging to a particular racial or ethnic group may have fared better than others is simply that they were concentrated in cities that experienced more favorable price trends.

Figure 1 shows the pattern of housing price changes in the 20 large metropolitan areas tracked by the Case Shiller Index between 2000 and 2009. On average, prices rose until around early 2007 and then fell sharply, so that by the middle of 2009, home prices had fallen back to about their 2003 levels. This average conceals considerable variation across cities, however, at least in terms of the magnitude of the boom and bust. By March of 2009, housing prices had fallen to more than 10 percent below March 2003 levels in five of the 20 cities tracked by the Case Shiller index, while they remained at least 10 percent above 2003 levels in five others. The geographic patterns are fairly striking: seven of the eight cities that had experienced peak to trough declines of more than 30 percent as of 2009 were in the West or in Florida: Las Vegas, Los Angeles, Miami, Phoenix, San Diego, San Francisco, and Tampa. (The only city outside of the sand states to fall into this group was Detroit, which continued to suffer long-term decline largely unrelated to the foreclosure crisis.) Given the disproportionate concentration of Asians and Latinos in the Western United States (and the additional concentration of Latinos in Florida), these groups may have experienced greater price volatility over the cycle, and perhaps smaller net gains in equity.

It is also possible that homeowners belonging to different racial and ethnic groups may have seen varying levels of appreciation, even when living within the very same metropolitan area. For example, in some markets, lower-priced homes, which minority homeowners are more likely to own, experienced greater volatility than higher priced homes (Cohen, Coughlin, and Lopez, 2012). Further, even controlling for the initial price of their home, minority homeowners may live in neighborhoods within cities that experienced greater losses and/or greater volatility in prices, perhaps because lenders – and brokers – marketed these neighborhoods more aggressively during the boom and withdrew credit more sharply the bust.[1] Similarly, the higher foreclosure rates that have been found in minority neighborhoods (Edmiston 2009; Hernandez 2009; Immergluck 2008) may have intensified price declines in those neighborhoods. Many studies have documented the home price declines that are associated with proximity to concentrations of foreclosure (Immergluck and Smith, 2006; Schuetz et al., 2008; Harding et al., 2009; Haughwout et al., 2009; Lin et al., 2009; Rogers and Winter, 2009; Hartley, 2010; Wassmer, 2010; Campbell et al., 2011; Gerardi et al., 2012).

Finally, as has been the case in previous downturns (Wilson 1986; 1997), the incomes of

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[1] Flippen (2004) argues that appreciation is lower over long-run in neighborhoods with larger minority concentrations and higher poverty rates.

minority workers were hit harder than those of whites during the recession, as more lost their jobs and suffered wage declines. As a result, demand may have fallen even more sharply for homes located in largely minority neighborhoods (Economic Policy Institute, 2012; Hout et al 2011).

While price trends surely affect the amount of equity one holds in a home, so too do borrowing patterns. If households take on more debt, their home equity may fall, even if prices are rising. Numerous studies have documented historical discrimination in the mortgage lending process (Ross & Yinger, 2002; Schafer & Ladd, 1981; Turner & Skidmore, 1999; Yinger, 1997), and more recent research has spotlighted racial disparities in subprime lending. Minority homeowners may have been more likely to take on second mortgages or to refinance to loans with higher loan-to-value ratios, even within the same city, perhaps because their neighborhoods were targeted more aggressively by subprime lenders. While the reasons are disputed, considerable evidence shows that subprime lending rates were higher in minority neighborhoods and among minority borrowers (Avery et al, 2008; Faber 2013; U.S. Department of Housing and Urban Development, 2000).

In the second part of our paper, we tackle the question of whether racial segregation exacerbates racial disparities in equity gains. Intuitively, minority and white homeowners are more likely to live in different neighborhoods in more segregated cities, and therefore would be more likely to experience different trends in house prices. When minority and white households are living in different neighborhoods, it may also mean that they participate in different social networks and have access to a different set of lenders. As a result, they may obtain very different information about available mortgage channels and products. Finally, segregation might invite or facilitate targeting by lenders and realtors, which will lead to more segmented markets. Although the mechanism is unclear, past research shows that residential racial segregation is strongly associated with racial disparities in lending. Been, Ellen, and Madar (2009) for example, show a significant correlation between the gap in the share of black and white borrowers who obtain subprime loans in a metropolitan area and the degree of black-white segregation in that metropolitan area.[2] The authors find a similar link between Hispanic-white segregation levels and gaps in the share of Hispanic and white borrowers who receive subprime loans.

Data

Our core data set is the national American Housing Survey (AHS). Administered by the U.S. Census Bureau, the AHS is a longitudinal dataset following housing units over time. Every two years, the Census gathers data from the household head about both the housing unit and all the people living in the unit. We naturally limit our analysis to homeowners, and as noted, we focus on homeowners who stay in their housing units over time. For a household to qualify as staying in its home across waves of the survey, a respondent must indicate that at least one household member has lived in the unit for two years and that household member's age and gender must be in line with what at least one household member reported two years ago.[3]

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[2] Rugh and Massey (2010) rely on this association in using racial gaps in subprime lending in a metropolitan area as an instrument for segregation.

[3] There is a variable in the AHS, which indicates whether the people living in the unit were also living in that unit in the previous survey wave, but we found that the variable had substantial error.

We focus on the years that capture the housing bubble and subsequent market collapse in the United States. As shown in Figure 1, the timing of these phenomena varied slightly across different metropolitan areas, but consistent with average trends, we mark the start of the housing boom as 2003 and the peak of the market as early 2007.

Our key variable of interest is home equity, or the difference between the value of a home and the outstanding principal on associated mortgages. To capture home values, we rely on self-reported assessments of the current market value of the unit.[4] To remove outliers, we trim the top and bottom one percent of self-reported values. We also discard the top and bottom one percent of changes in self-reported values across survey waves (e.g. a home with a value that drops from $500,000 to $50,000 in two years).

We estimate outstanding principal as the balance of the initial mortgage together with the balance of any second mortgage yet to be paid off. Since the AHS survey does not ask directly about mortgage balance, we follow Chan et al (2013) to estimate the outstanding principal from other mortgage information included in the survey (i.e. interest rate, years since origination, and amount of mortgage debt at origination). We calculate outstanding balance for the first and second mortgages only, but very few households have additional liens.[5] We then estimate home equity in each wave as self-reported value net of outstanding principal.

We code race and ethnicity as non-Hispanic white, non-Hispanic black, non-Hispanic Asian/Other (referred to as "Asian" for the remainder of the paper as the bulk of households in this group self-identify as Asian), and Hispanic. We include demographic characteristics potentially related to change in home equity: household income (logged) and educational attainment for the head of household (dummy variables for less than high school, high school, less than college, and college). Similarly, our models control for the decade in which the housing unit was built, the year in which the unit was purchased (differenced from 2005), and a dummy variable for whether the unit has had a major remodel.[6]

Metropolitan area characteristics

One of our key aims is to test whether racial gaps are largest in more racially segregated metropolitan areas. As segregation is correlated with other metropolitan area attributes, we also need to control for a number of metropolitan-level characteristics, such as median home value, logged population, poverty rate, percent black, percent Asian, percent Hispanic, homeownership rate, and vacancy rate, which we obtain from the 2005 American Community Survey. To capture segregation, we calculate the most commonly-used measures of racial segregation for blacks and Hispanics—the dissimilarity and isolation from white residents—using tract-level data from the 2000 Census. The dissimilarity index captures the extent to which two races (e.g. blacks and

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[4] The Census Bureau top codes home values using different methodologies each year.
[5] Information about the mortgage terms for mortgages beyond the first two is insufficient to estimate remaining debt.
[6] Although AHS collects information about the cost of replacement and additions, it does not identify housing units that have undergone major remodeling that might impact the value of the home. We define major remodels as replacement/additions made to the unit of a cost greater than 2% of the self-reported value of the home.

whites) are evenly (or not so evenly) distributed across an area by comparing the racial makeup of each census tract within that area to the area's overall racial makeup. The isolation index describes the typical neighborhood in which a person of a particular race lives. More technically, the isolation index is a weighted average of the percentage of same race residents in census tracts lived in by a particular racial group (Massey and Denton 1993).

Sampling

We limit the sample to owner-occupied structures in metropolitan areas, which have 1-4 units. We exclude mobile homes. Because the AHS follows housing units – and not households – over time, we also we restrict our analysis to a balanced sample of households who stayed in the same unit from 2003 to 2009. In this way, we can track changes in home equity for these households.[7] This restriction also ensures that any unobserved bias in reporting home values that is particular to a given household is consistent over time – and therefore does not affect our estimate of changes.

Our final sample consists of 2,324 homeowners across 128 metropolitan areas. Table 1 displays the baseline characteristics of this sample. The large majority of included households (1,629) are white, while 305 are Hispanic, 294 are black, and 98 are Asian. Most black and Asian households live in central cities, while Whites and Hispanics tend to be in suburbs. White incomes are the highest, followed by Asian, Hispanic, and black households. There are stark disparities in starting home equity across race, with whites having more than twice the home equity as black households ($68,588 versus $32,650). Asian homeowners also have relatively high levels of equity ($60,655) while the typical Hispanic homeowner falls in the middle ($47,370). Homeowners in the sample typically purchased their homes in the early 1990s and units were around 40 years old at the start of the housing boom.

White and black homeowners, on average, live in metropolitan areas with higher levels of white-black segregation, while Asian and Hispanic households tend to live in areas with higher Hispanic-white segregation. Asians/Others and Hispanics also live in MSAs that are larger and have higher starting home values. This regional variation can be partially explained by the disproportionate concentrations of Hispanic and Asian households in the West and black households in the South (Figure 3).

As noted, we focus exclusively on households who bought their home before the peak of the housing boom and stayed there throughout the collapse of the market. Specifically, we restrict our analysis to the 2,324 homeowners who remained owners of their homes between 2003 and 2009 of the 5,792 homeowners in the sample who owned homes in 2003. By construction, we are thus likely focusing on those who fared better during the downturn, as those forced to foreclose were dropped from the sample. (Of course, some homeowners simply choose to sell their homes.) Given the structure of the AHS, we have little choice, though we do replicate all of our analyses for the larger sample of homeowners (3,452) who remain in place between 2005 and 2009 – and our results are identical. Further we also estimate changes in equity for 2003-2007 and 2007-2009 on the sample of homeowners who remain in place just for

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[7] When households move out of their homes, we have no way of knowing what has happened to their equity or wealth holdings.

those years and once again obtain highly similar results. More fundamentally, as we argue above, we believe it is useful and important to study racial and ethnic differences in the experience of these resilient homeowners too. They represent roughly 40 percent of homeowners – and thus their experience captures an important segment of the market.

Another potential problem is the inaccuracy of self-reported home values. As mentioned above, we trim outliers in the distributions of both self-reported value and changes in these values, which eliminates some of this measurement error. Further, we have little reason to believe that there are racial differences in reporting error, which would be particularly troubling While Chan et al (2013) demonstrate that homeowners consistently report that their homes are worth more than market estimates suggest, they find little difference across racial and ethnic groups in the degree to which self-reported values exceed market estimates.

Methods

Our primary variable of interest is the change in home equity, which is measured as self-reported value net of outstanding principal. We estimate a series of regression models to analyze how this value changed over time across racial groups both nationally and within metropolitan areas. We begin with naïve OLS models regressing change in home equity on dummy variables for black, Asian, and Hispanic household head (with white as the reference category), which give national average changes for each racial group. Our second model specification adds baseline (2003) equity[8], which allows us to examine race/ethnicity differences among homeowners who initially hold similar levels of equity. This is arguably a more meaningful comparison, as a $10,000 decrease in equity is surely a more meaningful change for someone who initially holds only $10,000 in equity than it is for someone who initially holds $1,000,000.

We next include a number of additional covariates to control for housing unit and household head characteristics potentially related to changes in home equity and an interaction between the four Census regions and a dummy variable for whether the unit is in a central city (e.g. Northeast central city, Northeast suburb, etc.), which captures both regional differences and city-suburban differences across regions. Finally, we estimate models with MSA fixed effects,[9] which allow us to analyze racial differences in home equity trajectories within sub-metropolitan areas. We estimate each of the OLS and fixed effects models for several time periods: the housing boom (2003-2007), the collapse of the market (2007-2009), and the net change (2003-2009). The dependent variable in each time period is the earlier value subtracted from the later, which gives us the dollar value change in home equity. (Because many households had negative equity and/or experienced declines in equity, we are unable to transform the equity changes with a log. As noted, however, we do estimate models with initial levels of equity.) Observations are weighted in all regression models using pure weights provided by AHS, which weight by the inverse probability of selection. We also cluster standard errors at the metropolitan area level.

Our second aim is to test whether segregation levels are associated with racial disparities in equity gains. To do so we estimate a series of regression models of equity gains for black and Hispanic subsamples, which include a measure of black-white or Hispanic-white segregation

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[8] Patterns are the same when we control for initial self-reported value instead of equity.
[9] We also estimated MSA-by-city fixed effects models, which had the same results.

(either the dissimilarity or isolation index), while controlling the characteristics of the housing unit, householder, and metropolitan area. We also include a variable measuring the average change in white home equity in the household's metropolitan area in order to capture overall equity changes in the area. This allows us to test whether segregation has an association with changes in home equity for blacks and Hispanics net of what was happening among white households.[10] The samples in these models are restricted to households in metropolitan areas with at least 10,000 people belonging to the racial group within which the model was being estimated.

Results

Figure 2 shows changes in average home equity across race and ethnicity for the time period studied. On average, homeowners from each of the four racial groups enjoyed a gain in equity from 2003 to 2009, but there were notable differences in trajectories. Hispanic homeowners saw a dramatic increase in equity from 2003 to 2007, reaching parity with whites in the sample. While much of that increase was then wiped out between 2007 and 2009, the average Hispanic homeowner still enjoyed a net gain of $30,582 over the six-year period. Asian homeowners also experienced large home equity gains during the housing boom, and they did not see as large a decline during the downturn. On average, Asians were left with a net gain of $61,127. Compared to Hispanics and Asians, home equity trajectories were much flatter for white and black homeowners. On net, white homeowners enjoyed an average gain of $38,282, and black homeowners enjoyed an average gain of $31,609. Thus, in raw dollar amounts, it appears that Asians and whites enjoyed larger equity gains over the cycle than blacks and Hispanics.

Although the average homeowner in each of these racial groups experienced a gain in equity during this period, a substantial minority also saw losses. Figure 4 shows the share of homeowners, by race, who actually lost home equity between 2003 and 2009. We see some evidence of racial disparities here too. Approximately 20 percent of white homeowners saw reduction in their home equity over this cycle, as compared to 24 percent for non-white homeowners.

As noted earlier, some of the racial/ethnic variation in experience may have been due to the concentration of certain groups in different regional markets. Figure 1 shows that MSAs in the West experienced the most dramatic up and down swings in the housing market. The Northeast experienced a significant increase in home equity during the boom, but did not lose much of what had been gained. Homeowners in the South, on the other hand, saw less of an accumulation of home equity and a larger decline during the crash. The Midwest saw relatively little change in average equity.

We explore the degree to which geographic concentration explains racial disparities in our regressions. Our first set of regression models of changes in home equity analyze net changes over both the boom and bust (i.e. equity in 2009 minus equity in 2003). The first column in Table 2 shows estimated coefficients on race dummy variables for a very simple regression

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[10] We estimated additional model specifications using both black-white and Hispanic-white samples in which the dummy variable for the non-white racial/ethnic category was fully interacted with metropolitan area characteristics. These models resulted in substantively similar findings as the single-race models.

that controls only for the initial equity held by the homeowner in 2003. The results are consistent with the story in Figure 2: both black and Hispanic households gained significantly less equity than white households (omitted) who held similar levels of equity in 2003. Changes experienced by Asians are statistically indistinguishable from whites. These same patterns hold after adding in additional covariates describing housing unit and household head characteristics as well as an interaction between census region and whether the unit was within a central city. On average, across the country, black and Hispanic households gained $10,739 and $16,101 less than white homeowners with otherwise similar attributes who owned similar homes from 2003 to 2009, respectively.

The last column shows the results of an MSA fixed effects model (FE), which allows us to estimate racial differences in home equity trajectories *within* local housing markets. This model shows that racial disparities in price changes were even larger within metropolitan statistical areas than they were in the country as a whole. The results suggest black and Hispanic homeowners gained over $20,000 less between 2003 and 2009 than white and Asian owners with similar attributes and who own similar homes in the same metropolitan area. In other words, it appears that if anything, racial disparities in the distribution of homeowners across metropolitan areas actually favored black and Hispanic homeowners, as they were disproportionately located in metropolitan areas where households experienced greater gains in equity.

We next break down changes in home equity into what occurred during the housing market's boom (2003-2007) and what occurred during the bust (2007-2009). Table 3 displays estimates from the first period. Across metropolitan areas, Asian households gained significantly more during this boom period than households in other racial/ethnic groups. However, this relative advantage appears to be almost completely explained by market dynamics in the metropolitan areas in which Asians live. In the fixed effects model, the coefficient for Asian falls dramatically and is indistinguishable from zero. The opposite is true for Hispanics. When we look across MSAs, Hispanics appear to gain as much as white households, but it appears that they benefited from owning homes in metropolitan areas that experienced greater price appreciation during the boom. For within MSAs, we find that the average Hispanic homeowner enjoyed a home equity increase that was $11,241 less than that enjoyed by comparable whites. Finally, black borrowers appear to have gained less during the boom, and the disparities are particularly large when we look within the same metropolitan areas. Black households appear to have gained less equity than similarly situated households of all other races during the housing boom—and specifically $26,769 less than comparable white households.

Table 4 shows similar models for the collapse of the housing market (2007 to 2009), which suggest smaller racial differences in equity changes during the bust years than during the boom years. Estimated changes in black households' home equity between 2007 and 2009, for example, are statistically indistinguishable from changes experienced by whites both across and within metropolitan areas. We do find that Hispanic homeowners lost more equity than white owners on average, but that difference disappears once MSA fixed effects are included in the model. In other words, Hispanic owners appear to have lost more than white owners because they owned homes in metropolitan areas where prices fell more sharply. The coefficient for Asian is only statistically significant (and negative) in the second column, before unit and household characteristics are included.

We also estimate models for each of the components of the change in home equity: change in self-reported value of the unit and change in outstanding principal from 2003 to 2009 (Table 5). These models suggest that the racial disparities in changes in home equity were largely driven by racial differences in changes in home values rather than by racial differences in changes in outstanding debt. In the models of changes in outstanding principal, the only coefficient that is statistically significant is the coefficient on the black race dummy in the fixed effects model. It suggests that blacks saw larger increases in mortgage debt during this period than whites. The coefficients are consistently larger and more likely to be statistically significant in the regressions of self-reported values. Once again, differences between blacks and Hispanics on the one hand and whites on the other appear larger within metropolitan areas than across. During the 2003-2009 period, self-reported value among black households grew by $13,795 less than it grew for comparable white households living in the same metropolitan area. Hispanic borrowers meanwhile saw a change in self-reported value that was $15,444 less than comparable white borrowers in the same metropolitan area. The one statistically significant result in the outstanding principal regressions suggests that the black-white difference in the growth in outstanding principal during this period was $7,647

We identify several, important stylized facts here. First, black and Hispanic homeowners enjoyed less equity gain on average between 2003 and 2009 than similarly situated white borrowers. Second, the disparities between blacks and Hispanics on the one hand, and whites on the other were larger within than they are across metropolitan areas, suggesting that black and Hispanic households were more concentrated in MSAs that enjoyed greater appreciation. Third, the racial disparities in home equity trends from 2003-2009 were driven mostly by differences in equity gains enjoyed during the housing boom, with black and Hispanic homeowners gaining less than comparable white homeowners. We find no statistically significant difference in the amount of home equity lost during the bust. Finally, these differences in equity growth appear driven more by changes in values than by changes in debt.

Segregation and Home Equity Changes

So far, we have only captured racial differences in equity gains in the average metropolitan area. To investigate the relationship between segregation and racial differences in home equity trajectories, we consider how equity changes enjoyed by blacks and Hispanics vary across metropolitan areas with different levels of racial segregation. Specifically, we restrict our sample to black homeowners and regress their 2003-2009 equity changes on black-white segregation (as captured by either the dissimilarity or isolation index), controlling for characteristics of the housing unit, householder, and metropolitan area. We also include the average change in home equity experienced by white homeowners in the household's metropolitan area, to capture unobserved differences across metropolitan areas that might drive house price appreciation and that are associated with segregation. With this control included, the coefficients on segregation can be interpreted as indicating the association between racial segregation and black-white *disparities* in home equity growth in the metropolitan area. We estimate the same regressions for a sample of Hispanic homeowners as well, using measures of Hispanic-white segregation.

Table 6 displays estimates from the models using the sample of black households and measures of black segregation. Higher levels of both white-black dissimilarity and black isolation are both significantly associated with greater white-black disparities in home equity changes, net of other covariates. A ten-point increase in white-black dissimilarity, for example, corresponds with a home equity gain deficit for blacks relative to the average white of $14,295. A similar increase in the isolation index was associated with a slightly smaller penalty ($8,874). Table 7 shows that no relationship between segregation and home equity changes among Hispanics. Unfortunately, there are not enough Asian households in our sample to estimate similar models for that racial group.

As for mechanisms, further results provide some suggestive evidence. Model estimates not shown indicate that racial segregation was associated with smaller gains during the boom and larger declines during the bust for black homeowners. These disparities were driven both by differences in house price appreciation and debt accumulation. Specifically, black-white dissimilarity was negatively associated with change in self-reported value among blacks, while black isolation was positively associated with change in outstanding principal during the housing boom (2003-2007). During the collapse of the housing market (2007-2009), both measures of segregation were negatively correlated with change in black home value. This relationship did not appear to be present among Hispanic homeowners in the sample.

Discussion

This paper investigates racial differences in home equity changes over the boom and bust of the American housing market. On average, homeowners of all races who bought before 2003 and were able to keep their home through 2009 accumulated home equity. However, black and Hispanic households experienced significantly smaller increases, even after controlling for unit and household head characteristics. These racial disparities were even larger *within* metropolitan statistical areas than they were across the country. Further analyses show these gaps were largely driven by black and Hispanic households' reduced ability to benefit from the 2003-2007 housing boom. The value of homes owned by both black and Hispanic homeowners appears to have risen at a significantly slower pace than the value of homes owned by white households. Relative to other households, blacks also increased their mortgage debt burden, which further reduced their home equity values.

Importantly, segregation appears to exacerbate these racial disparities, or at least the disparities between black and white homeowners. Specifically, the gap in the equity gain enjoyed by black and white homeowners was larger in the metropolitan areas in which blacks were more segregated. Black homeowners in more segregated metropolitan areas experienced less growth in self-reported home value and more growth in outstanding principal than comparable white homeowners. We find no such relationship among Hispanic households.

We acknowledge again that this study has a number of limitations. First, we have a relatively small number of observations given our model specifications, so some of our estimates are imprecise. Most fundamentally, our sample allows us to only make inferences about a specific population: the set of households who bought their homes before the housing boom and managed to keep them through the collapse of the market. The focus on "survivors" of the Great

Recession ignores the equity losses incurred by households who lost their homes to foreclosure and the equity losses and gains of households who sold their homes between 2003 and 2009. It is possible that these sampling issues may mute racial differences in home equity trajectory, leading to conservative estimates of racial disparities. That said, further empirical work suggests the experiences of these resilient homeowners were consistent with those of the larger set of homeowners. For one thing, we find no differences across racial groups in the proportion of homeowners leaving their homes between 2003 and 2009. Further, when we estimate models of house price appreciation that include all homes owned in 2003, regardless of whether the occupant remained there over time, we obtain qualitatively similar results.

We believe our results are thus reflective of patterns in the broader population and suggest that the housing crash helped to widen the already gaping distance in wealth between minority and white households. Other work has powerfully shown that family wealth is a powerful predictor of individual educational and economic outcomes. Thus, the long-run consequences of these wealth gaps are significant and difficult to overcome (Conley 1999; Shapiro 2004; Spilerman 2000).

In future work, we hope to learn more about the precise mechanisms through which these disparities occurred. Why did black and Hispanic homeowners enjoy less appreciation and equity gain than similar white homeowners with comparable homes in the very same metropolitan areas? Our results suggest that residential segregation is associated with larger disparities in experiences between blacks and whites. But more work is needed to draw out why this relationship exists. It could be that segregation creates racially identifiable submarkets, and the continued unwillingness of white households to buy in black areas – together with the smaller size and lower wealth of the minority population – means that these neighborhoods inherently enjoy less demand. It might also be that lenders treat borrowers differently when they own homes in largely minority areas because of implicit biases about the reliability of the borrower or the long-run value of the homes in the neighborhood.

Even without certainty about mechanisms, our results have implications for policy. For one thing, they underscore the importance of continuing to monitor lending patterns, and to police any discriminatory behavior. For another, they suggest that segregation may impose costs on black homeowners. Finally and most fundamentally, the results remind us that homeownership is a risky investment, and not all homeowners enjoy similar levels of appreciation. While these resilient homeowners appear to have weathered the storm, many of them – especially minority owners – lost significant amounts of equity.

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Appendix: Figures and Tables

Figure 1: Changes in home price indicies across 20 major metropolitan areas in the U.S.
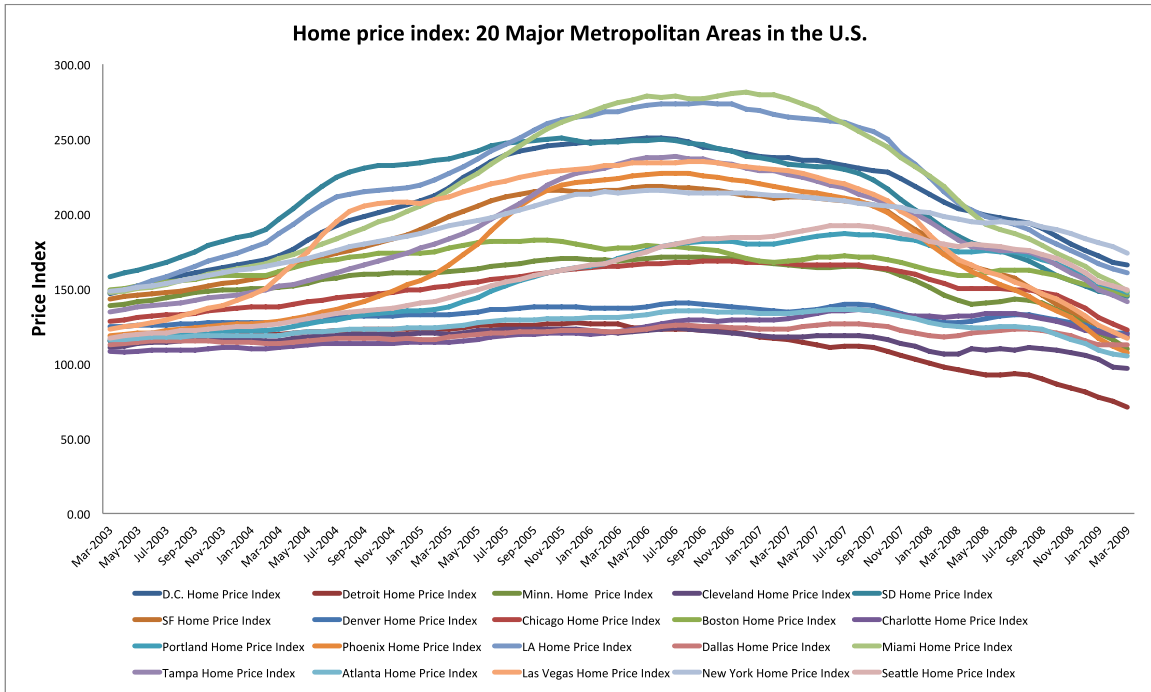
Figure 2: Changes in average equity by race
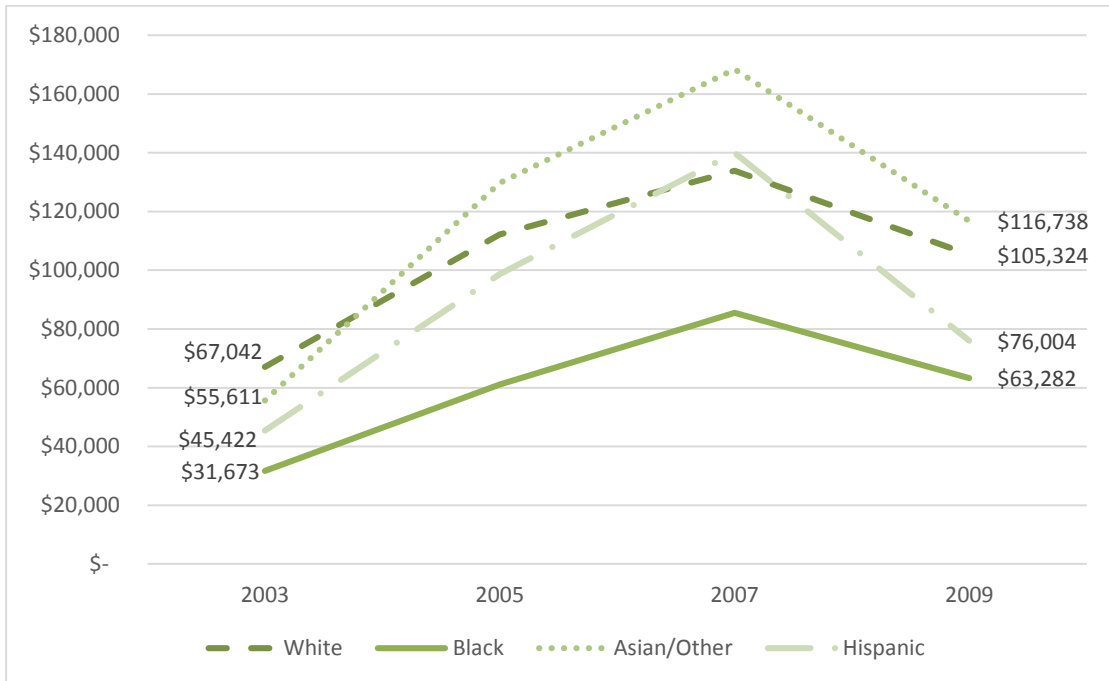
Figure 3 : Regional distribution of households by race at baseline (2003)

Race	Northeast	Midwest	South	West
Hispanic	10.2	13.4	41.6	34.8
Asian/Other	18.4	28.6	24.5	28.6
Black	13.6	25.2	53.7	7.5
White	22.7	33.3	29.4	14.7

■ Northeast ■ Midwest ■ South ■ West
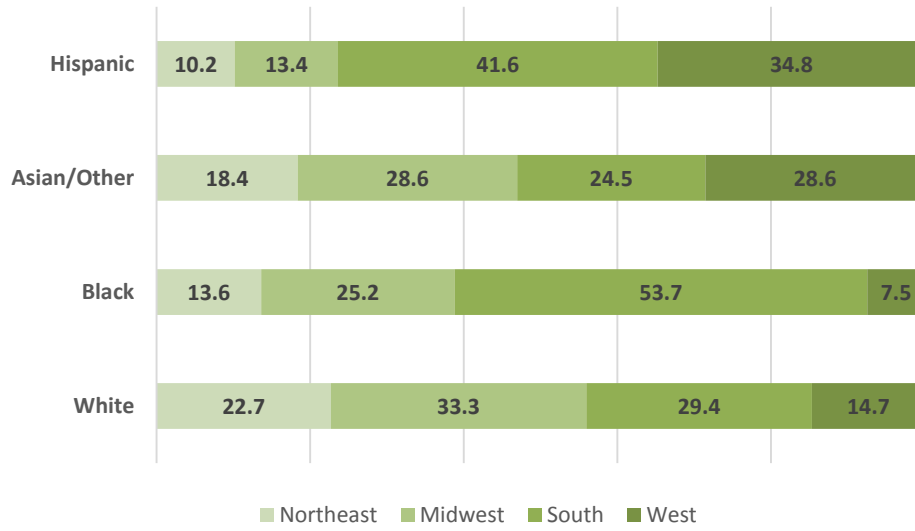
Figure 3: Changes in average equity by region

- - - Northeast ——— Midwest ·-·-· South ······ West

Figure 4: Percent of homeowners in the sample who lost equity from 2003-2009
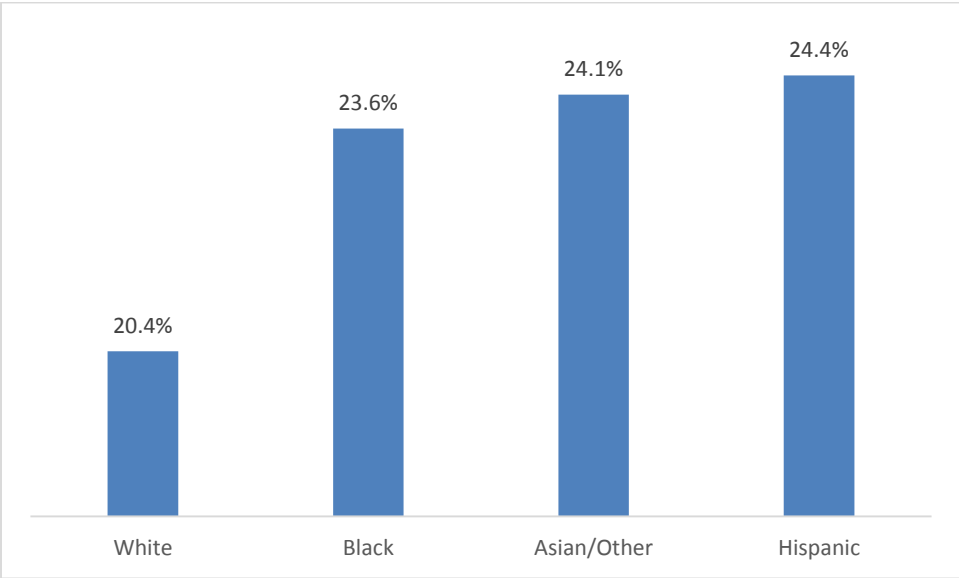
Table 1: Baseline (2003) characteristics for the sample of homeowners

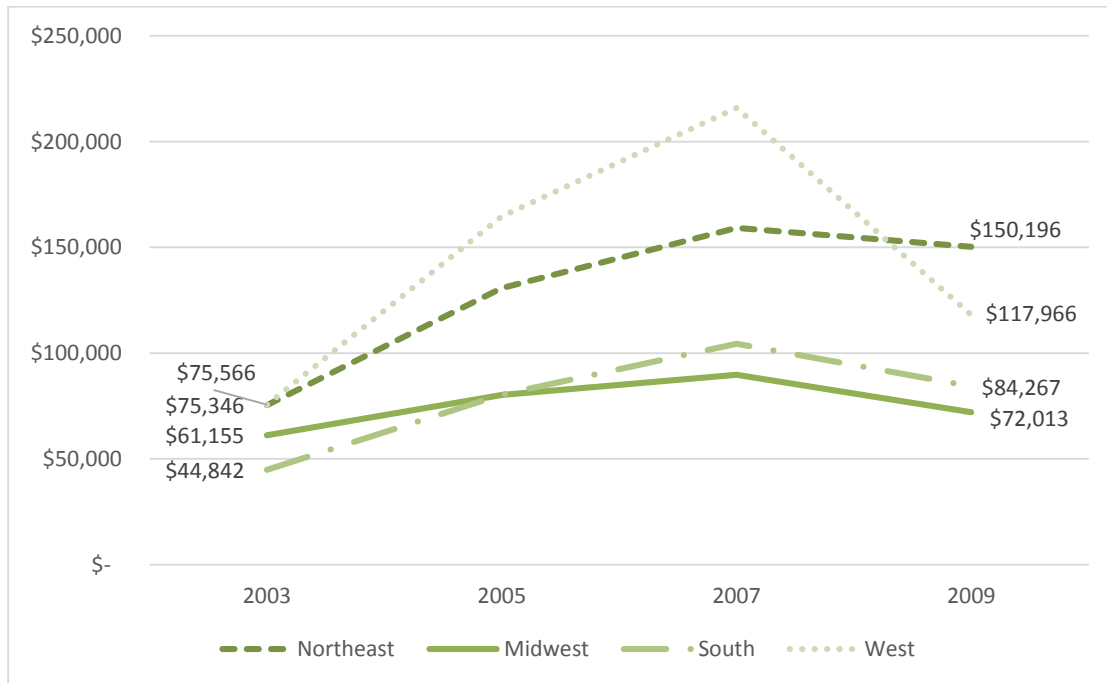|	All	White	Black	Asian	Hispanic
Household Characteristics					
Total Households	2324	1629	294	98	305
In Central City	40.1%	35.4%	54.4%	53.1%	47.5%
Household Income (1000s)	$82,367	$89,055	$64,195	$81,193	$64,585
Equity	60,877	68,588	32,650	60,655	47,370
Year Unit Built	1962	1962	1958	1968	1960
Year Bought	1993	1993	1992	1994	1994
MSA-Level Segregation					
White-Black Dissimilarity	0.65	0.66	0.67	0.64	0.62
Black Isolation	0.46	0.46	0.57	0.40	0.37
White-Hispanic Dissimilarity	0.49	0.49	0.47	0.50	0.51
Hispanic Isolation	0.28	0.25	0.23	0.33	0.48
Other MSA Characteristics					
Total MSAs	128	122	69	47	68
Ownership Rate	66.4%	67.3%	66.3%	64.5%	62.1%
Vacancy Rate	10.1%	10.2%	10.7%	9.4%	9.6%
Subprime Lending Rate (2006)	5.0%	5.0%	5.3%	4.8%	5.2%
% With College Degree	36.5%	36.7%	36.7%	37.9%	35.0%
Median Home Price	221,565	211,595	215,279	280,096	262,226
Population	2,838,355	2,593,774	2,864,889	3,489,932	3,895,356
Poverty Rate	12.9%	12.5%	12.9%	12.8%	14.9%
% White	61.8%	65.3%	59.2%	58.2%	46.7%
% Black	15.8%	15.7%	21.9%	12.5%	11.6%
% Asian	4.3%	4.0%	4.0%	7.0%	5.6%
% Hispanic	15.9%	12.8%	13.0%	19.8%	34.0%

Table 2: Model estimates of changes in home equity from 2003-2009

	OLS 1	OLS 2	FE
Black	-13673[**]	-10739[*]	-20671[***]
	(6597)	(6180)	(5339)
Asian	19664	19447	3483
	(18374)	(16938)	(16029)
Hispanic	-14226[*]	-16101[***]	-22846[***]
	(7524)	(6060)	(6054)
Constant	50843[***]	18871	4969
	(5188)	(30524)	(22639)
Observations	2324	2324	2324
R^2	0.023	0.097	0.248
MSA Fixed Effects			X
Baseline equity (2003)	X	X	X
Unit & Household Chars.		X	X
Region*City Interactions		X	

Table 3: Model estimates of changes in home equity from 2003-2007

	OLS 1	OLS 2	FE
Black	-14157[*]	-6881	-24489[***]
	(7292)	(5615)	(5703)
Asian	38634[*]	30513[*]	-609
	(20718)	(15631)	(11500)
Hispanic	25450	6747	-12797[***]
	(19385)	(8963)	(4718)
Constant	67632[***]	66300	-18261
	(7947)	(45888)	(36267)
Observations	2324	2324	2324
R^2	0.017	0.196	0.423
MSA Fixed Effects			X
Baseline equity (2003)	X	X	X
Unit & Household Chars.		X	X
Region*City Interactions		X	

Table 4: Model estimates of changes in home equity from 2007-2009

	OLS 1	OLS 2	FE
Black	-1511	-6069	1244
	(4878)	(4304)	(5718)
Asian	-21143*	-8547	6560
	(11903)	(9152)	(10510)
Hispanic	-39217**	-19587*	-8918
	(15423)	(10438)	(5923)
Constant	-14777***	2691	-7273
	(4467)	(25244)	(23028)
Observations	2324	2324	2324
R^2	0.045	0.178	0.350
MSA Fixed Effects			X
Baseline equity (2003)	X	X	X
Unit & Household Chars.		X	X
Region*City Interactions		X	

Table 5: Model estimates of changes in self-reported value and outstanding principal from 2003-2009

	Changes in self-reported value		Changes in outstanding principal	
	OLS	FE	OLS	FE
Black	-4702	-12895***	6037	7776**
	(6873)	(4427)	(4009)	(3908)
Asian	20831	8105	1384	4622
	(13272)	(13404)	(7595)	(7460)
Hispanic	-10287*	-15962***	5814	6884
	(5585)	(4909)	(4655)	(4882)
Constant	-2396	-21294	-21267	-26263*
	(26351)	(15559)	(14229)	(15266)
Observations	2324	2324	2324	2324
R^2	0.095	0.277	0.071	0.128

Note: Standard errors in parentheses. All models include unit and household head characteristics. OLS models include an interaction between region and whether the unit was in a city. Covariate output omitted. *p<0.1; **p<0.05; ***p<0.01

Table 6: Model estimates of changes in home equity from 2003-2009 for black households

	White-Black Dissimilarity	Black Isolation
Segregation index	-142949**	-88738**
	(54776)	(44430)
Average change in white equity	.41682***	.4163***
	(.096148)	(.096237)
Constant	-410806***	-357981**
	(134244)	(140738)
Observations	281	281
R^2	0.445	0.441

Note: Standard errors in parentheses. Models includes unit, householder, and MSA characteristics. *p<0.1; **p<0.05; ***p<0.01

Table 7: Model estimates of changes in home equity from 2003-2009 for Hispanic households

	White-Hispanic Dissimilarity	Hispanic Isolation
Segregation index	-4498.2	-32929
	(76318)	(71112)
Average change in white equity	.50441***	.50375***
	(.1037)	(.10421)
Constant	99831	95458
	(168721)	(166524)
Observations	298	298
R^2	0.211	0.211

Note: Standard errors in parentheses. Models includes unit, householder, and MSA characteristics. *p<0.1; **p<0.05; ***p<0.01