Race and Uneven Recovery:
Neighborhood Home Value Trajectories in Atlanta before and after the Housing Crisis

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Abstract

We use zip-code-level home value data and cluster analysis to define three different types of neighborhood housing markets in the Atlanta metropolitan area based on their levels of volatility and stability before, during, and after the housing crisis. We identify the demographic and housing market characteristics of each of these three clusters and use multivariate analysis to measure their predictive association with the three neighborhood types. We also examine the factors that predict long-term price appreciation over the 2001 to 2014 period. Consistently strong relationships that suggest that many black neighborhoods – even those with lower degrees of poverty – exhibited steep rates of price decline with only modest or essentially no recovery following the crisis. Meanwhile, many predominantly white, middle- and upper-income neighborhoods experienced less volatility during the boom and bust, and have generally more than recovered from the modest housing price declines that they did face. The reasons behind these patterns are complex and not directly addressed here. However, it is important to understand that such variations occurred and that they were associated with racial differences.

During the U.S. housing boom and bust, U.S. home prices rose to unprecedented heights, lifted by poorly underwritten mortgages. When the U.S. housing crisis began in late 2006 and 2007, home values crashed and foreclosures and vacancies skyrocketed. In 2011, a modest recovery began. However, this national story obscures a great deal of variation underlying the averages. The bubble and housing deflation hit some regions, states, and cities hard, while others were left almost unscathed. In particular, there have been substantial differences in the degree to which different neighborhoods have rebounded from the crisis. How can we characterize the neighborhood-level unevenness of this crisis, and why have some neighborhoods recovered more than others have?

Some research has investigated metropolitan-level variations in outcomes during the bubble and foreclosure crisis, focusing on institutional factors leading to the density of subprime lending (Williams, McConnell, & Nesiba, 2001), variation in state foreclosure law (Immergluck, 2010; Mian, Sufi, and Trebbi, 2011), or patterns in new home construction (Saiz, 2010) as a key factors differentiating home price bubbles and recovery from others. However, there has been little work to date on intrametropolitan – or neighborhood-level - variations in home prices up through the recovery period. There is no clear evidence which types of neighborhoods have fared better than others within a metropolitan area.

In this analysis of intrametropolitan variation in housing values, we use zip-code-level home value data and cluster analysis to define three different types of neighborhood housing markets in the Atlanta metropolitan area based on their levels of volatility and stability before, during, and after the crisis. We then analyze a variety of factors pertaining to housing stock and demographic factors as to their predictive association with the three neighborhood types. We also

examine the factors – as of 2000 - that predict long-term price appreciation over the 2001 to 2014 period.

This paper aims at understanding the factors that predicted whether a neighborhood experienced extreme volatility in housing prices during the boom and bust and the extent to which housing price recovery occurs. It develops a method of categorizing and understanding types of uneven housing market recovery, and identifies fundamental demographic and housing market characteristics associated with different housing market trajectories within a region hit hard by the subprime and foreclosure crises.

The Housing Crisis and Home Value Trajectories

Several studies investigating home price volatility at the city or state level identify financial institution characteristics and practices as a prime factor. Dell' Arricia *et al*. (2012) investigated deterioration of lending standards in a panel of metropolitan areas during the lead up to the bubble. They revealed that metropolitan areas with multiple subprime lenders were more likely to see declining underwriting standards in the presence of a rise of applications. They confirmed the importance of the structure of secondary market in maintaining lending standards. Other analyses found that poor underwriting – and home price bubbles – were strongest in places that lacked formal connections to mortgage lending prior to the emergence of risk based pricing in the 1990s (Williams, Nesiba, & McConnell, 2005). The lack of formal relationships with traditional mortgage lenders has been documented as one reason why minority borrowers were receptive to subprime lenders in the 1990s, while some authors emphasized a lack of familiarity or existing networks and experience to integrate borrowers with trustworthy borrowers

Other metropolitan-level studies have examined housing supply factors and constraints, such as geography and land use law. According to this line of research, the potential for price declines is in part determined by the characteristics of local housing markets. Houses are supplied more elastically in some cities than others, and there is a strain of research on how national credit cycles – independent of underwriting standards – interact with different cities based on supply elasticities. Krugman (2005) described this phenomenon by comparing 'flatland' and 'zoned zone', describing how credit-driven booms result in increased starts in places with forgiving geography and zoning and home price spikes in geographically constrained, heavily regulated cities. Saiz (2010) confirmed this phenomenon between cities, though with notable exceptions: places like Phoenix experienced both home price bubbles and an explosion in starts, in contradiction to theory. Roy (2012) attempted to identify the characteristics of housing recovery area – as measured by foreclosure rate - at the county level from 2000 to 2009. He found that the common characteristics of recovery are a more diversified workforce, more small business activities, less dependence on housing construction, and a higher number of housing submarkets.

A good deal of research has examined intrametropolitan patterns of housing market differences before and during the mortgage crisis. A particularly large amount of literature has looked at neighborhood-level factors that drove concentrations of subprime lending and foreclosures. Kingsley & Pettit (2009) found that the density of subprime loans was highest in black and Hispanic neighborhoods during the 2004 to 2006 subprime boom period. They also found that the highest subprime densities were in relatively low-poverty, but high-minority neighborhoods. Mayer & Pence (2008) also focused on the spatial distribution of subprime lending in 2005 and, using loan data from the firm Loan Performance (now known as

CoreLogic), found that predominantly black and Hispanic zip codes received much higher levels of subprime lending than other areas. Even after controlling for credit scores and other economic characteristics of zip codes, they showed that subprime lending at the peak of the boom was especially prevalent in predominantly minority zip codes. Calem *et al*. (2010) analyzed home loans in seven major cities in 1997 and 2002 and found that blacks were more likely than whites to receive subprime versus prime loans, even after controlling for borrower income and a variety of neighborhood characteristics including educational levels and average credit score. Gruenstein-Bocian*et al.* (2008) were among the first to combine publicly available Home Mortgage Disclosure Act (HMDA) data (including data on the race and income of borrowers) with private data from a major loan data vendor (including information on loan terms and credit quality), and calculated that black homebuyers were 31 percent more likely to receive a high-rate (versus a low-rate), fixed-rate mortgage with a prepayment penalty than white borrowers with similar characteristics.

Researchers at the Federal Reserve Bank of Philadelphia combined data from HMDA with data from a national proprietary data set on loan and borrower characteristics from 1999 through 2007 for three states – Pennsylvania, New Jersey, and Delaware (Smith & Hevener 2011). Smith & Hevener (2011) found that blacks had a high probability of receiving a subprime versus a prime loan for all years of the study. They also estimated the difference in the propensity of whites and blacks to receive subprime loans due to factors other than race, including income, credit score, and neighborhood and loan characteristics, but found that these characteristics explained at most only two-thirds of the higher propensity of blacks to receive subprime loans in 2005. This left one-third of the difference explained solely by race, providing

substantial evidence for the existence of discriminatory forces in the mortgage market. Similar results have been obtained by researchers in other locations (Courchane, 2007).

Due especially to the racial concentration of subprime lending, minority homeowners were disproportionately impacted by foreclosures, especially in the early years of the crisis when subprime loans accounted for the bulk of the foreclosure problem. After merging HMDA data with industry data from Lender Processing Services, a major provider of loan-level data, Gruenstein-Bocian *et al*. (2010) analyzed foreclosures between 2007 and 2009 at the height of the subprime phase of the foreclosure crisis, and found that blacks and Hispanics were disproportionately impacted. Almost 8 percent of first mortgages to black homeowners originated between 2005 and 2008 went into foreclosure between 2007 and 2009. This compares to only 4.5 percent for white homeowners; the black foreclosure rate was 76 percent greater than the white rate.

Immergluck (2010) examined between-city variation in the accumulation and duration of bank-owned properties. He developed a typology of metropolitan areas using the density of real estate owned (REO) properties at an initial period (August 2006) and home value appreciation from August 2006 to August 2008. Metropolitan housing markets were classified into "modest," "weak," and "boom-bust" markets. Using this topology, he employed three different geographical scales (state, metropolitan area, and neighborhood) to identify factors that resulted in greater growth in REO properties. He found that the degree of subprime lending in a zip code during the boom was a strong predictor of REO growth during the study period, even after controlling for a wide variety of other neighborhood characteristics.

Much less recent research has looked at neighborhood-level housing price trajectories, especially during and after the depths of the crisis. Research on changes in neighborhood quality

of life or economic distress – especially in response to broader economic shocks -- are somewhat relevant here, especially when they use home values as indictors of neighborhood well being. Ong *et al*. (2003) examined the effects of the economic changes on neighborhood dynamics. They measured the quality of life of six neighborhoods in the Los Angeles Metro region during the recession in the 1990s. They found that households in low-income neighborhoods were more vulnerable to economic recession in terms of relative incomes, jobs, and home values. Williams *et al.* (2013) had similar these results in examining the disparate impacts of the 2000–2009 economic cycles on neighborhoods in the city of Chicago. They found that lower-income and minority neighborhoods were susceptible to the Great Recession in terms of jobs, home values, and home foreclosures.

Although policy related factors such as the density of subprime lending, the state foreclosure process, the penetration of loan modifications, code enforcement and blight remediation efforts, and types of private investment are all likely to be important mechanisms of neighborhood housing market recovery, the goal here is not to identify the causal factors that determine whether a neighborhood is likely to recover from housing market distress. The goal, more simply, is to identify and describe clusters of housing market trajectories, and to describe initial housing and demographic characteristics that predict whether a neighborhood is likely to fall into one cluster versus another. Of course, these basic demographic and housing characteristics, in turn, were likely associated with whether a neighborhood was subject to high levels of subprime lending (and resulting foreclosure), speculative real estate investment, spikes in unemployment, and other proximate drivers of booms or busts in home values.

Data and Methods

The objective of this research is to identify different neighborhood housing price trajectories during the 2001 to 2014 period and to identify predictors of recovery. We assembled a dataset composed of housing market and demographic variables for 137 zip codes in metropolitan Atlanta. We draw on Zillow (2014a) zip-code-level home value index data for 3-bedroom homes for 16 counties in the Atlanta metropolitan area from January 2001 through August of 2014 (see Zillow [2014b] for a detailed discussion of the generation of the Zillow home value index). The three-bedroom home index was chosen to control for differences in housing type across zip codes and because 3-bedroom homes constitute the largest segment of the single-family housing stock. The remainder of housing and demographic data comes from the 2000 decennial census. To control for aspects relating to the quality of the housing stock, we obtained measures of vacant units, owner occupancy rates, as well as median age of housing stock. We control for the initial value of homes in 2001 using the Zillow data. Finally, we measure the percent of the population in poverty, and the percent of residents who are black or Hispanic.

Cluster analysis is used to identify three distinct submarkets with different growth and decline trajectories over the 2001 to 2014 period. Using the Zillow home value indices for entire 16-county data set, we identified the peak of the market to be in November 2006 and the trough of the decline to be in March 2012. For each of the 137 zip codes in the region, we then measured the percent change in the price index from January 2001 to November 2006 (the growth period), the change from November 2006 to March 2012 (the decline period), and the change from March 2012 until August 2014, the latest data available (the recovery period).

These three percent change variables were then used to run a two-step cluster analysis. We then analyze demographic differences among the clusters using ANOVA.

To understand the basic demographic and housing market characteristics predicting housing market recovery, we then perform two predictive regressions. First we perform a multinomial logistic regression predicting the likelihood of being in different clusters. Then, we use ordinary least squares (OLS) to predict home price change over the entire period, from 2001-2014.

Cluster Analysis Results

The cluster analysis resulted in the three clusters of zip codes described in Table 1. The clustering performed well, with the silhouette measure of cohesion and separation exceeding 0.5 (Norusis, 2012). The names of the clusters correspond to their value trajectories over the 2001 to 2014 period: Full Recovery; Bust-Partial Recovery; and Bust-No Recovery. Figure 1 illustrates the general price trajectories across these three different zip code clusters from 2001 to 2014.

[Table 1 about here.]

[Figure 1 about here.]

In the Full Recovery cluster values grew steadily, but not rapidly – at about 4 percent per year - during the national price boom, reflecting the general moderate growth rates reflected in Atlanta metropolitan home prices in indices such as those provided by S&P/Case-Shiller or the Federal Housing Finance Agency. Values did fall in this cluster during the national housing crisis, but only by an average of 21 percent over the five-and-one-half years of the housing bust.

Then in the national housing recovery period of early 2012 to late 2014, values in this cluster returned essentially to their 2006 peak values, and 20 percent over their 2001 values (not adjusting for inflation).

In the Bust-Partial Recovery cluster, values generally grew steadily as well over the 2001 to 2006 period, at a just slightly slower average rate than in the Full Recovery cluster. However, values fell much further in this cluster during the housing bust, declining an average of 47 percent, so that values were down to 65 percent of their 2001 values by 2012. These zip codes generally experienced some recovery, but not nearly a complete one, by 2014, with values reaching 88 percent of their 2001 values by 2014 (again, none of these number adjust for inflation or use constant dollars), but still at only about 72 percent of their 2006 peak levels. Because values fell so far during the national housing bust, the gains starting in 2012 have not been enough to call these areas fully recovered.

Zip codes in the Bust-No Recovery cluster tended to experience much greater appreciation rates than the typical Atlanta zip code. These thirteen zip codes saw values rise by an average of 45 percent from 2001 to late 2006, for an annual appreciation rate of about 8 percent. Four of these zip codes saw significantly greater rates of appreciation, with values rising over 60 percent over the boom period. Similar to the metro areas that saw the fastest appreciation rates during the subprime boom, this cluster experienced rapid depreciation during the housing bust, with values declining 45 percent on average over the 2006 to 2012 period, dropping to 56 percent of their peak values and to 80 percent of their 2001 values. The recent trajectories among these zip codes have generally been flat, calling into question the possibility of a very long time before values reach even their 2001 levels.

Demographic and Housing Market Differences among the Three Clusters

The three clusters, which exhibited distinct home price trajectories through the bubble, crisis and recovery, differ along an array of key demographic and housing market factors. The ANOVA results in Table 2 describe the differences between cluster means on these variables. For each of these variables, there is a statistically significant difference among the three clusters (with a maximum p-value of 0.038 and with five of seven p-values falling below 0.01). The magnitudes of the mean differences also suggest that the clusters are meaningfully distinct from one another along housing stock and demographic factors. Full Recovery neighborhoods had significantly higher initial home values (mean of 186,715) than either Bust-Partial Recovery neighborhoods (mean of 119,106), with Bust-No Recovery neighborhoods having the smallest initial value (mean of 91,323). Full Recovery and Bust-Partial Recovery neighborhoods both had high owner-occupancy rates (approximately 70 percent), especially compared to the Bust-No Recovery areas (mean of 51.6 percent). Bust-No Recovery neighborhoods have high initial black percentages (mean of 64.5 percent) compared to Bust-Partial Recovery (mean of 36.2 percent) and Full Recovery (mean of 13.7 percent) areas. Bust-Partial Recovery neighborhoods tend to have the largest Hispanic populations (mean of 21.6 percent), with Full Recovery and Bust-No Recovery neighborhoods having mean percent Hispanic rates of between 13 and 14 percent. Poverty rates were similar among Full Recovery and Bust-Partial Recovery neighborhoods (means of 7.92 and 8.76 percent, respectively) but were substantially higher in Bust-No Recovery neighborhoods (mean of 22.34 percent). Figure 2 illustrates the confidence intervals for these key housing and demographic variables for the three clusters.

One characteristic whose pattern across the clusters is perhaps not entirely anticipated is Percent Vacant in 2000. Bust-Partial Recovery neighborhoods actually had the lowest initial

vacancy rates (mean of 4.3 percent) with Bust-No Recovery zip codes having the highest initial rates (mean of 7.79 percent). Some of this difference may be due to there being less rental housing (which tends to have higher vacancy rates) in the Bust-Partial Recovery neighborhoods which tend to be moderate- and middle-income bedroom suburbs.

[Table 2 about here.]

[Figure 2 about here.]

Figure 3 shows spatial distribution of three neighborhood clusters across metropolitan Atlanta. Full Recovery neighborhoods tend to lie in the mostly affluent northern suburbs of the region, in what is often referred to as the "favored quarter" of the region, but also in the north and northeastern neighborhoods in the city of Atlanta and in some southwestern suburbs and other scattered areas. (It should be noted that some of the southwest and southeastern suburbs in the cluster are not very densely populated.) The Bust-Partial Recovery zip codes tend to lie in southern, eastern, and western suburbs, many of which are middle-income, bedroom communities with populations that are quite racially and ethnically diverse. The southern suburbs, especially, tend to have large African-American populations. This cluster forms somewhat of a u-shape around the southern half of in town Atlanta. The Bust-No Recovery cluster is concentrated in the historically black neighborhoods in southwest Atlanta, and in three zip codes in the southern and eastern suburbs.

[Figure 3 about here.]

Multivariate Models Predicting Housing Market Trajectories

We use multinomial logistic regression to predict the likelihood of being in the Bust-Partial Recovery cluster, or in the Bust-No Recovery cluster, rather than the Full Recovery cluster. Then, we use ordinary least squares (OLS) to predict home price change over the entire period, from 2001-2014. Table 3 provides the descriptive statistics for the variables used in the two regressions, and Table 4 provides the results of the multinomial logistic regression. Table 5 then provides OLS results.

[Tables 3 and 4 about here.]

The results in Table 4 show that the model correctly predicts the cluster for the 137 zip codes 87 percent of the time, with a proportional reduction in error of 71 percent. The left-hand column in Table 4 provides the exponentiated coefficients or the effects of a one-unit change in the independent variable on the relative risk of being in the cluster rather than in the reference cluster, which is the Full Recovery cluster. These exponentiated coefficients are sometimes referred to as "relative risk ratios (RRRs)." In comparing Bust-Partial Recovery cluster to the reference cluster (the top half of Table 4), the relative risk ratios are statistically significant at $p<0.01$ for the 2001 value of homes, percent vacant, percent black, percent Hispanic, and median age of housing. (Owner-occupied and poverty rate are not statistically significant.) When these ratios are above 1.0, higher levels of these variables lead to higher odds of being in the Bust-Partial Recovery cluster relative to the reference cluster (the Full Recovery cluster). This is the case for percent black and percent Hispanic. Higher levels in the other variables lead to lower risk of being in this cluster relative to the reference cluster.

The one potentially surprising finding, at least at first blush, is the fact that the relative risk ratios for the percent vacant variable are well under 1.0. Thus, higher vacancy rates in 2000 are associated with a lower chance of falling into the Bust-Partial Recovery or Bust-No Recovery cluster. It is important to keep in mind, however, that these findings control for poverty, race and other factors, and that many vacant units included in the census vacancy numbers are units that are actively being marketed for rent or sale (which can accompany higher housing demand and gentrification). Also included in this figure are units that have recently been constructed, suggesting potential increases in local housing demand. Therefore, total vacancy should not be viewed as a measure of long-term vacancy and abandonment, which, in most census tracts, constitute a very small share of overall vacant units.

The results in Table 4 indicate that zip codes with larger black or Hispanic populations are more likely to fall into the Bust-Partial Recovery cluster than the Full Recovery cluster. The results for the Bust-No Recovery cluster (the lower half of Table 4) are generally consistent with the results for the Bust-Partial Recovery cluster but are less likely to be statistically significant, in large part because the standard errors are large due to the smaller number of zip codes in this cluster. In particular, the housing age and percent Hispanic variables are not statistically significant at any reasonable p-value.

The results suggest that race and ethnicity are strong predictors of the housing market trajectory of a neighborhood, even after controlling for poverty rate, vacancy rate, initial median home value, owner-occupancy, and housing age. A one percentage-point increase in percent black, after controlling for these other variables, increases the odds of a neighborhood falling into the Bust-Partial Recovery cluster versus the Full Recovery cluster by 20 percent. A similar increase in percent Hispanic increases such odds by almost 16 percent. Similarly, a one

percentage-point increase in percent black is associated with a 15 percent increase in the odds of a neighborhood falling into the Bust-No Recovery cluster vs. the Full Recovery cluster. Importantly, race, even after controlling for poverty, is a major predictor of housing market trajectories.

Table 5 provides the results of the OLS regression of the percentage-point change in median home value in a zip code on the same independent variables used in the multinomial logistic regression in Table 4. These results are mostly consistent with the multinomial logistic results. After controlling for age of housing, vacancies, percent Hispanic, and concentrated poverty, a one percentage-point increase in percent black is associated with a 0.60 percentage points *smaller* increase in home values from 2001-2014. Therefore, ten percentage-point increase in percent black is therefore associated with a 6.2 percentage point *smaller* increase in home values over this period. A one percentage of Hispanic residents is associated with a 0.15% *smaller* increase; a ten percentage-point change in percent Hispanic is associated with 1.5 percent *smaller* increase in property values over this period. Unlike in the multinomial logistic results, the poverty coefficient is statistically significant. Moreover, it has perhaps an unanticipated sign. After controlling for race and ethnicity and the other variables, the coefficient is positive – an increase in the poverty rate of one percentage point corresponds to a one percent greater increase in home prices over the period. This may reflect some gentrification in the region over the study period.

We need to provide a critical caution here. These results are not aimed at identifying proximate causation. Just because higher black populations in these models are associated with subsequent weaker home value trajectories does not imply that an influx of black residents directly led to lower property values. Given what we know about the subprime crisis and the

Great Recession, it is likely that these patterns are the result of mediating factors not identified here, including the fact that black neighborhoods bore a disproportionate share of high-risk, reckless subprime lending and resulting foreclosures – as well as other hardships of the Great Recession, such as higher unemployment rates and greater declines in household wealth. It is important to understand, however, the extent to which disparate home value trajectories played out by neighborhood racial and ethnic composition – after controlling for poverty and fundamental differences in housing stock – during the greatest housing crisis since the Great Depression.

Conclusion

This research identifies three housing submarket trajectories in the Atlanta metropolitan area before, during and after the U.S. housing crisis. It shows that the neighborhoods falling into these different trajectories exhibit substantially distinct racial, ethnic, and housing market characteristics. When we investigate the direction and magnitude of the relationships between race, ethnicity, poverty, housing stock, and recovery, we find consistently strong relationships that suggest that many black neighborhoods – even those with lower degrees of poverty – exhibited steep rates of price decline with only modest or essentially no recovery following the crisis. Meanwhile, many predominantly white, middle- and upper-income neighborhoods experience less volatility during the boom and bust, and have generally more than recovered from the modest housing price declines that they did face. The reasons behind these patterns are complex and certainly not directly addressed here. However, it is important to understand that such variations occurred and that they were associated with racial differences.

The literature on racialized subprime lending and resulting foreclosures and the issues of the timing of policy remedies such as loan modifications suggest that predominantly black neighborhoods were disproportionately targeted and may have been less likely to receive effective remedies, especially during the earlier stages of the crisis when minority communities were hit especially hard (Immergluck, 2015). This research contributes to the literature in two key ways. First, it investigates the nature of uneven housing market decline within a large, diverse region hit hard by the U.S. housing crisis. Second, it demonstrates the racial and ethnic nature of the unevenness of housing market trajectories and recoveries. From the literature, we know that minority neighborhoods were targeted with poorly underwritten loans; and that the federal policy response to the crisis did not reach effective scale until much of the damage had already been done in many minority neighborhoods. Efforts to restore housing markets must take into account the uneven nature of crisis and recovery, and be particularly cognizant of the tendency of housing volatility and recovery to benefit certain neighborhoods and not others. Without understanding any tendencies of housing market recovery to bypass certain types of neighborhoods, it will be difficult to formulate policy responses in the future that can assist those communities most in need of intervention.

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Table 1. Results of Cluster Analysis of Atlanta Metropolitan Zip Codes by Changes in Housing Price Index for 3-Bedroom Homes (2001-2006; 2006-2012; 2012-2014)

		Percent Change 2001-2006		Percent Change 2006-2012		Percent Change 2012-2014		Percent Change 2001-2014	
Cluster	Number of Zip Codes	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Full Recovery	74	24.46%	4.68%	-21.33%	8.37%	22.59%	7.59%	20.25%	17.07%
Bust-Partial Recovery	50	22.22%	5.46%	-46.72%	11.22%	34.53%	6.57%	-12.70%	18.07%
Bust-No Recovery	13	44.49%	18.27%	-44.63%	13.16%	-1.87%	13.04%	-23.86%	11.80%
All Clusters	137	25.54%	9.54%	-32.81%	15.95%	24.63%	12.92%	4.04%	24.64%

Table 2. Descriptive Statistics and ANOVA Analysis of the Submarket Clusters

Zip Code Characteristic	Cluster	N	Mean	Std. Deviation	95% Confidence Interval for Mean		ANOVA Results	
					Lower Bound	Upper Bound	F	Sig.
Value Index, January 2001	Full Recovery	74	186,715	87,397	166,467	206,963	22.29	0.000
	Bust-Partial Recovery	50	119,106	17,075	114,253	123,959		
	Bust-No Recovery	13	91,323	14,117	82,792	99,854		
	Total	137	152,988	75,014	140,314	165,662		
Percent Vacant, 2000	Full Recovery	74	6.01	5.26	4.79	7.23	4.78	0.010
	Bust-Partial Recovery	50	4.30	1.28	3.93	4.66		
	Bust-No Recovery	13	7.79	3.33	5.78	9.81		
	Total	137	5.55	4.19	4.84	6.26		
Percent Owner-Occupancy, 2000	Full Recovery	74	70.01	20.28	65.32	74.71	5.33	0.006
	Bust-Partial Recovery	50	69.33	18.49	64.07	74.59		
	Bust-No Recovery	13	51.62	12.94	43.80	59.44		
	Total	137	68.02	19.68	64.69	71.34		
Percent Black, 2000	Full Recovery	74	13.65	15.54	10.05	17.25	37.02	0.000
	Bust-Partial Recovery	50	36.20	26.76	28.60	43.81		
	Bust-No Recovery	13	64.52	31.51	45.48	83.57		
	Total	137	26.71	27.16	22.12	31.30		
Percent Hispanic, 2000	Full Recovery	74	13.65	13.48	10.53	16.77	3.35	0.038
	Bust-Partial Recovery	50	21.60	22.95	15.08	28.12		
	Bust-No Recovery	13	13.20	12.37	5.72	20.67		
	Total	137	16.51	17.77	13.51	19.51		
Median Age of Housing, 2000	Full Recovery	74	18.50	11.67	15.80	21.20	11.43	0.000
	Bust-Partial Recovery	50	17.48	7.71	15.29	19.67		
	Bust-No Recovery	13	32.08	8.32	27.05	37.11		
	Total	137	19.42	10.85	17.58	21.25		
Percent Below Poverty, 1999	Full Recovery	74	7.92	7.10	6.28	9.57	25.90	0.000
	Bust-Partial Recovery	50	8.76	4.72	7.41	10.10		
	Bust-No Recovery	13	22.34	10.46	16.02	28.66		
	Total	137	9.60	7.88	8.26	10.93		

Table 3: Descriptive Statistics for Regression Models

Variable	Obs	Mean	Std. Dev.	Min	Max	Source
Cluster	137	1.55	0.66	1.00	3.00	Calculated
2001 Value	137	$ 152,988	$ 75,014	$ 66,500	$ 481,900	Zillow
2000 % Vacant	137	5.55	4.19	1.82	44.56	2000 Census
2000 % Owner-Occupied	137	68.02	19.68	17.59	95.13	2000 Census
2000 Median Age of Housing	137	19.42	10.85	4.00	55.00	2000 Census
2000 % Black	137	26.71	27.16	0.00	98.10	2000 Census
2000 % Hispanic	137	16.51	17.77	1.90	100.00	2000 Census
1999 % Below Poverty	137	9.60	7.88	0.80	41.20	2000 Census

Table 4. Multinomial Logistic Regression Results
(Full Recovery Cluster is Reference category)

	Exp(b)	Standard Error	Z	Sig.	
Bust-Partial Recovery					
2001 Median Home Value	0.9999	0.0000	- 4.56	0.000	**
2000 Percent Vacant	0.3971	0.1204	-3.05	0.002	**
2000 Median Age of Housing	0.7848	0.0654	-2.91	0.004	**
2000 Percent Owner-Occupied Units	1.0136	0.0473	0.29	0.771	
2000 Percent Black	1.1980	0.0652	3.32	0.001	**
2000 Percent Hispanic	1.1572	0.0538	3.14	0.002	**
1999 Percent Below Poverty	0.8908	0.0912	-1.13	0.259	
Bust-No Recovery					
2001 Median Home Value	0.9998	0.0000	-3.81	0.000	**
2000 Percent Vacant	0.4824	0.1964	-1.79	0.073	*
2000 Median Age of Housing	0.9552	0.1597	-0.27	0.784	
2000 Percent Owner-Occupied	1.0028	0.0725	0.04	0.969	
2000 Percent Black	1.1486	0.0819	1.94	0.052	*
2000 Percent Hispanic	1.0526	0.0849	0.64	0.525	
1999 Percent Below Poverty	0.9340	0.1513	-0.42	0.673	

**significant at less than 0.01

*significant at less than 0.10

N = 137

Pseudo R-square = 0.6522

Percent Correctly Predicted = 86.86%
Proportional Reduction in Error = 71.43%

Table 5. Results of OLS Model Predicting Percent Change in Median Home Value, 2001 to 2014

	b	Robust Standard Error	t	Sig.	
2001 Median Home Value	1.74 E-04	0.0000	4.58	0.000	**
2000 Percent Vacant	-0.6549	0.3545	-1.85	0.067	*
2000 Median Age of Housing	0.3232	0.2624	1.23	0.220	
2000 Percent Owner Occupied	0.0730	0.1489	0.49	0.625	
2000 Percent Black	-0.6009	0.0714	-8.42	0.000	**
2000 Percent Hispanic	-0.1543	0.0807	-1.91	0.058	*
1999 Percent Below Poverty	0.9939	0.3619	2.75	0.007	**
Constant	-21.1352	18.2658	-1.16	0.249	

**significant at less than 0.01
*significant at less than 0.10

N= 137

R-square = 0.6847

Figure 1: Three Clusters of Home Value Trajectory

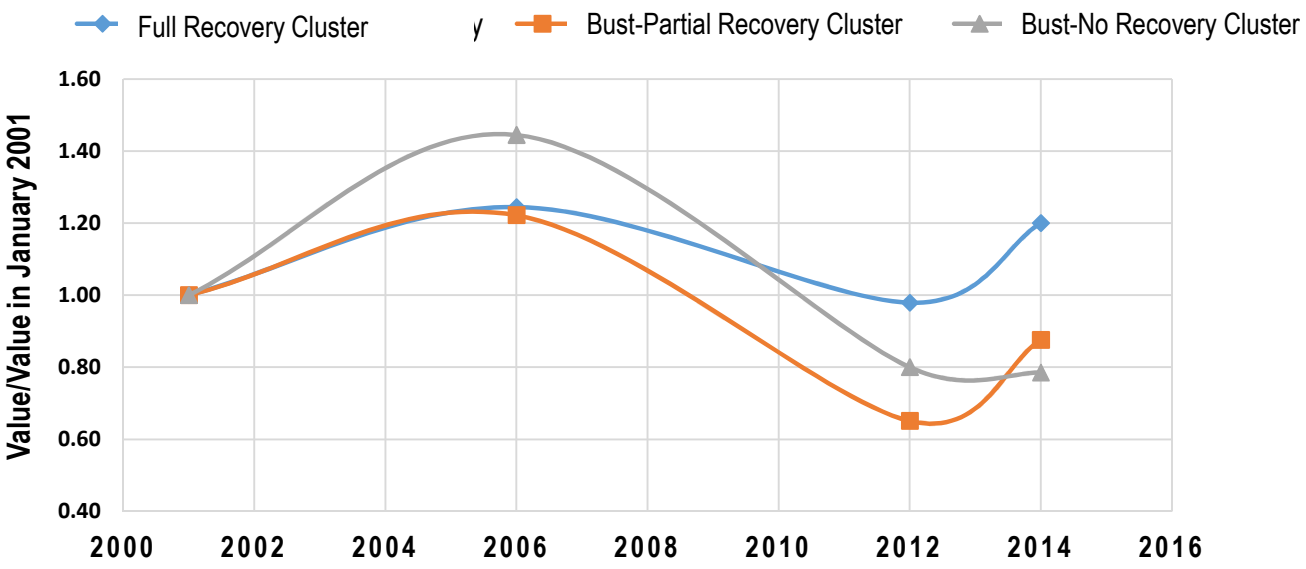

Figure 2. Confidence Intervals by Cluster for Four Key Housing Market and Demographic Characteristics

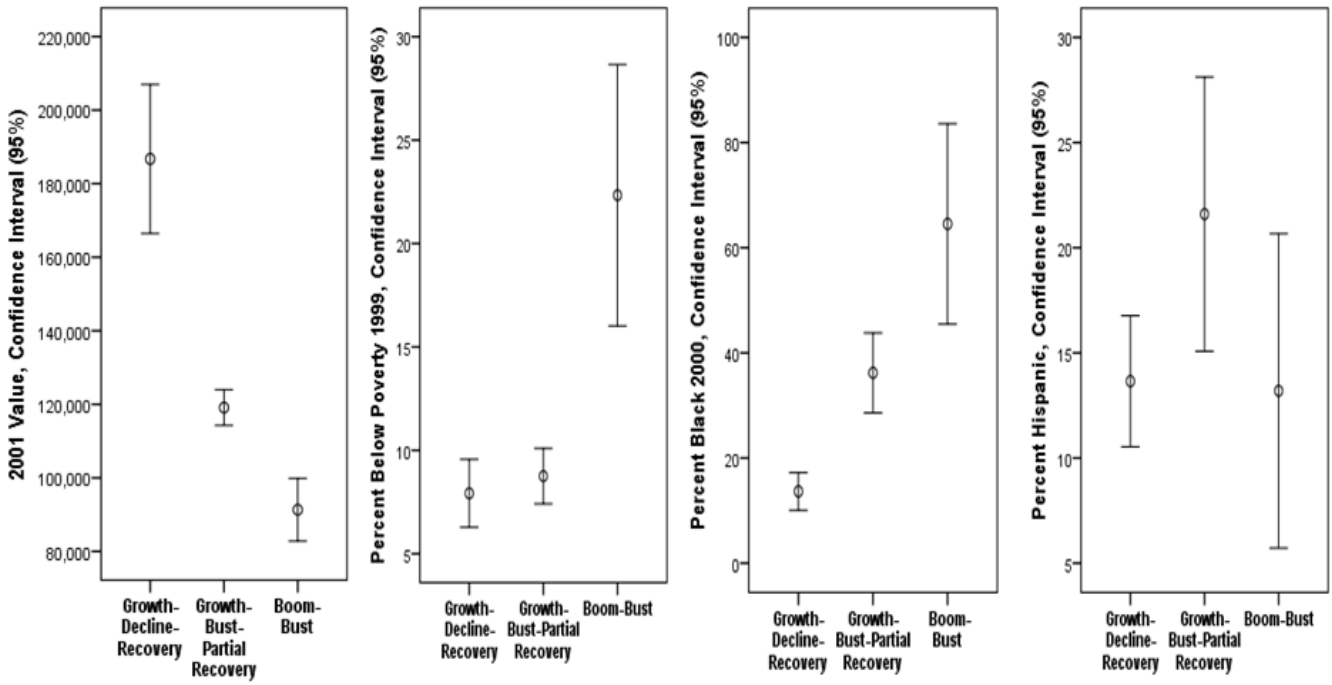

Figure 3. Map of Clusters