The Many Roads to Recovery: Assessing the Recoveries of US Metropolitan Housing Markets Following the Housing Bubble[1]

John Rezabek

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Abstract

This paper examines the changes in home prices in metropolitan statistical areas around the US from the end of the most recent mortgage crisis in 2009 through the point at which US home prices began to near pre-recession levels in 2014. The paper analyzes a number of economic, demographic, financial, climatological, and legal variables to improve our understanding of the the recovery that occurred from 2009 through 2014 and the factors that may have accounted for the large variations in the recoveries experienced by different areas. Its results show that underlying GDP growth and the rigidness of local zoning regulations in metro location had large and significant impacts on the annual change in housing prices within some areas. Additionally, the foreclosure laws dictating the state that a metro area resides in were also seen to have a significant impact on the recovery in housing prices. This may potentially be due to the differences between judicial and nonjudicial foreclosure processes, which vary in length and the opportunities that they afford the individual being foreclosed upon. Finally, the recoveries of various metropolitan housing markets are also studied in this paper on the basis of their durations. From this analysis, it was seen that economies with more pronounced Finance, Insurance, and Real Estate sectors saw their housing market recoveries impeded over time.

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1. Introduction

The devastating extent of the economic damage caused by the subprime mortgage crisis and ensuing Great Recession has been well documented over the past nine years through a variety of forms of media ranging from newspaper articles to Hollywood movies. In the worst US economic contraction since 1947, median house prices dropped by 30%, over $7 trillion in home equity disappeared (Ellen & Destrup 2012), and more than eight million Americans lost their jobs (Goodman & Mance 2011).

In the early 2000s, the US housing market experienced a period of rapid expansion as key economic indicators, including house prices; private-sector construction employment; and household mortgage debt, all rose together. This tremendous growth had at least four causes: 1) a low interest rate environment, 2) lax lending standards, 3) inadequate mortgage regulation, and 4) unmoderated growth in loan securitization (Glick, Lansing, & Molitor 2015). Together, these conditions allowed consumer borrowing to skyrocket and new homebuyers with easy access to plentiful mortgage credit relative to disposable income to run up housing prices to levels never seen before. This process spurred a positive feedback loop with homebuilders taking advantage of the booming housing prices in the largest building spree that America has ever seen (Ellen & Destrup 2012).

When housing market realities eventually began to stray from the lofty projections that the multi-year buildup had stimulated in December of 2007, America's housing price bubble finally burst and sent American home prices plummeting in housing markets across the country by as much as 30% (Glick, Lansing, & Molitor 2015). Additionally, the house of cards built on the pooled subprime mortgages came tumbling down, felling one of Wall Street's most storied

banks, Lehman Brothers; large insurance companies; metropolitan and state pension funds; the national economy; and the economies of many other countries around the world (Ricketts 2011).

Accordingly, in the view of many economists, the outlook for a swift recovery was dismal. For example, some saw the Great Recession as unique among American recessions due to the severity of the housing downturn and the self-reinforcing downward spiral that the US housing market found itself in. While previous recessions had brought with them large increases in unemployment, the crisis in 2007 and 2008 differed in that it also brought a severe housing downturn (Ellen & Destrup 2012). Similarly, although all recessions represent self-reinforcing cycles with declines in consumption and employment continuously compounding in a negative direction, the Great Recession was unique in that the housing market also entered into a distinct self-reinforcing fall. Here, decreases in consumption and rising unemployment levels led to decreases in housing demand and housing prices. Employment then fell as the housing industry was forced to shed jobs. Consumption fell as consumers could no longer draw upon the accumulated equity in their homes to make purchases (Ellen & Destrup 2012). Two other arguments made by economists to explain the slow, delayed recovery were that financial crises abroad dampened hopes for an immediate American economic resurgence and that the shift in economic policy toward more discretion, more intervention, and away from predictable rule-like decision making extended the recession (Dominguez & Shapiro 2013; Taylor 2014).

However, after hitting rock-bottom in November of 2011, median housing prices have rebounded strongly and were almost back to their pre-recession levels seven years after the bubble burst. Economists are also encouraged by the form that this resurgence has taken. While the housing boom in the early-2000s can clearly be described as a credit bubble in which housing

valuations and household leverage continuously pushed each other upward in a positive feedback loop, the more recent rise in housing prices has been slower, steadier, and completely independent of household leverage levels (which have actually declined) (Glick, Lansing, & Molitor 2015).

To improve our understanding of the 2008 mortgage crisis and the succeeding recovery, I analyze changes in home prices from 2009 through 2014 in US metropolitan areas whose housing markets endured a diversity of experiences during the Great Recession. I pay special attention to economic, demographic, financial, climatological, and legal factors that may potentially account for the large variations in the recoveries experienced across metro areas.

Results demonstrate that the most prominent determinants of US metropolitan housing market recoveries from the 2008 mortgage crisis include GDP growth, state laws dictating foreclosure proceedings, and zoning regulations. However, other variables show influence in when metro areas are sorted by their behavior during the Great Recession as well.

In the next section of this paper, I discuss related literature. Then, I describe the data and methodology employed in my analysis. Following that, I present and discuss my primary results. Finally, in the last section of the paper, I conclude my research process and findings.

2. Related Literature

Due to their aforementioned prominence in the national media spotlight, the subprime mortgage crisis, the Great Recession, and the housing recovery have inspired a library of studies. A first group analyzes the nature of housing bubbles and the more general interplay between policy and housing markets. Glaeser and Nathanson's 2014 piece, "Housing Bubbles", is particularly useful as it discusses housing bubbles at their most fundamental level. They examine how price volatility, short term price change momentum, and the long-run mean reversion of prices inherent in housing markets can sometimes lead to a classically shaped asset bubble in extreme cases. The basic equation describing the value of owning a home, or the Linear Asset Pricing Model, is also provided in this piece as:

$$R_t + \frac{E(P_{t+1})}{1+r} = P_t$$

in which the dependent variable, P_t, is the price of a home, the first independent variable, R_t, represents the net benefits of owning a home, the denominator of the final independent variable represents a discount factor, and "E" represents the more abstract "fundamental" value of a home. The benefits of owning a home (R_t) are specifically defined as being both the amenities and income associated with living in a particular area and the rent that one could potentially receive from one's home. Furthermore, potential causes of housing bubbles, including the availability of cheap credit and forms of "trend-chasing", are discussed and evaluated. Glaesar and Nathanson use the Linear Asset Pricing Model, as well as an array of other economic models that account for irrationality in the housing marketplace, to educate their audience on how housing bubbles might have functioned within the context of the 2000 to 2012 period. This

contribution helps to inform how the housing bubble of 2008 is evaluated within my own analysis.

Case and Shiller (2003) examine the status of the housing market in the early-2000s to determine whether a housing bubble was being created. Overall, Case and Shiller found that, although elements of a housing bubble were present in a handful of US cities at the time, a nationwide drop in real housing prices was unlikely and that potential drops in housing prices would not likely occur across different cities at the same time. Case and Shiller's analysis sheds light on a concept that is essential to understanding my own work: that individual metropolitan housing markets can experience price trends that are both extremely different and distinct from one another over the same time period.

Weiss (1991) and Naylor (1967) supplement this understanding of housing markets by discussing how fiscal and monetary policy measures can impact the behavior of housing markets in profound ways. Naylor comes to the conclusion that, while fiscal policy initiatives have been proven in the past to benefit the greater American economy, the relationship between fiscal stimulus and the US housing market is not a straightforward one. Naylor finds a more clear and positive relationship between monetary policy actions and housing starts. These findings bring up important considerations that must be remembered when examining the effects of government policy initiatives during the Great Recession on the US housing market.

Rosen (2011) focuses on the growth and development of the mortgage lending market during the period in the early 2000s. In "Competition in mortgage markets: The effect of lender type on loan characteristics", Rosen concludes that the general shift from local bank lenders to nonlocal, national lenders may have led to an increase in the issuance of risky loans.

The second subsection of relevant literature encompasses pieces from the late-2000s and early-2010s that attempted to predict what the path of the US economy's recovery would look like and how long it would take to return to pre-crisis levels.

Chinn, Smith, and Rajan (2012) argue against any grand government initiatives that may introduce a large shock into the national housing market in comparing the benefits of possible stimulus and reform measures that may be taken to alleviate the economic impact of the subprime mortgage crisis. However, they also admit that Western governments must be wary of their lofty, unaffordable promises or else run the risk of defaulting in the future or negatively impacting the savings rates of younger cohorts. Taylor (2014) and Dominguez and Shapiro (2013) also assess the form and length of the economic recovery and both generally predict that the recovery will be a lengthy, drawn-out process due to ongoing financial crises in Europe and the lack of a rules-based approach to monetary policy. Instead, they favor a "long-term reform-oriented fiscal policy, and a strong aversion to bailouts" (Taylor 2014). Keating and Lind (2012) concur with this finding based upon the results of their analysis of Cleveland's housing market during the Great Recession. In their work, they find a complete recovery of the metropolitan housing market to be many years away, but promising thanks to active civic leadership that helped to either demolish, acquire, rehab, or sell over 300 local homes. Meanwhile, Beracha and Hirschey (2009) may be found to disagree based upon their findings that nearly 34 states escaped the housing crisis reasonably unscathed and that 1.5 years of typical income growth should propel the national housing market back to its long-term average levels of affordability. Cumulatively, these studies offer a diverse array of outlooks for the performance of the US housing market going forward on both a national level and a metropolitan level. While some

have proven more providential by the passage of time, they, together, offer a lens through which to view the complicated nature of the recovery of the US housing market since 2008.

The third and slightly smaller division of relevant literature are those pieces discussing mortgage laws, debtor protections, and debt proceedings during the Great Depression. With mortgages, or subprime mortgages in particular, playing a pivotal role in inflating the destructive housing bubble that finally burst in 2008, it is important to understand how differences in mortgage debt proceedings between states might have influenced different recovery outcomes. In his piece, "How Do Case Law and Statute Differ? Lessons from the Evolution of Mortgage Law" (2014), Ghent discusses the history of foreclosure procedures in the United states by examining the evolution of various components of mortgage law, such as redemption periods, restrictions on deficiency judgements, non-judicial foreclosures, and foreclosure moratoria. He shows that case law, while normally lauded within common-law systems for its ability to adapt quickly to economic changes, has actually played an important role in shaping US mortgage law due to its rigidity over time. Ghent then reveals that when mortgage proceedings have changed from non-judicial to judicial processes in the US, it has usually been through statute law to benefit debtors due to populist pressures. This, therefore, suggests that judicial foreclosure proceedings have historically been perceived as beneficial to debtors and potentially detrimental to creditors. Ghent provides his audience with a greater understanding of the evolution of judicial and non-judicial foreclosures in the US, which would play an important role during the recovery from the subprime mortgage crisis. Additionally he helps to discredit the notion that case law has been more beneficial to economic development in the US due to its supposed flexibility.

Gerardi, Rosenblatt, Willen, and Yao also add to the literature exploring the effects of judicial and non-judicial foreclosure proceedings on homeowners and housing prices in their 2012 paper, “Foreclosure Externalities: Some New Evidence”. Using an extensive dataset with information concerning delinquent mortgages and foreclosed properties throughout the US, they come to two, key conclusions. First, they determine that mortgage distress has a negative impact on an individual home’s value and the value of surrounding homes. Secondly, they conclude that foreclosure policies that prolong a home’s evolution from delinquency to foreclosure actually magnify the negative effects of mortgage distress on home prices. This conclusion would seem to support the notion that non-foreclosure proceedings, which are usually more expedient processes than judicial foreclosures, would be quite beneficial for homes recovering from a price shock.

Gerardi, Lambie-Hanson, and Willen (2012) explore a similar end when they examine the effects of a Massachusetts right-to-cure law. Enacted in the heart of the housing crisis in 2008, this law was meant to aid borrowers who defaulted on their mortgage loans by preventing lenders from initiating foreclosure proceedings for a set period of time. In their analysis, Gerardi, Lambie-Hanson, and Willen determine that the right-to-cure law exacerbated the foreclosure process in Massachusetts and did not benefit borrowers. The researchers go even further in also comparing laws meant to protect borrowers from foreclosures in states requiring judicial permission for foreclosures and those that do not. They find that loan borrowers in states with judicial foreclosure proceedings are not any more likely to escape foreclosure or renegotiate their loans then borrowers in non-judicial states. Additionally, they see that states with judicial foreclosure proceedings experience “build-ups” of delinquent borrowers that frequently end up losing their homes.

Next, Dobbie and Goldmsmith-Pinkahm's 2015 paper, "Debtor Protections and the Great Recession", explores the impact of debtor protections on households and the larger macroeconomy during the Great Recession using data from over a million credit reports. Ultimately, Dobbie and Goldsmith-Pinkham find that debtor protection policies helped homeowners reduce their debt during the Great Recession.

In addition to the impact of differences in foreclosure proceedings between states, I also explore the effects of zoning regulations in determining changes in home prices during the recovery from the 2008 housing bubble burst. Quigley and Rosenthal provide some insights on this matter in their 2005 piece, "The Effects of Land Use Regulation on the Price of Housing: What Do We Know? What Can We Learn?". This educational work explains that more stringent zoning regulations and controls on housing growth in urban areas reduce the cumulative supply of the local housing stock. This lack of supply ultimately leads to increases in housing prices. In the context of the 2008 housing crisis, this might suggest that metropolitan areas with more restrictive zoning would have either seen their average housing prices decline or recover more quickly. Hwang and Quigley (2006) come to a similar conclusion when examining the effects of national and regional economic conditions on single-family home prices. They conclude that local housing regulations affect how housing markets respond to regional economic developments. Specifically, Hwang and Quigley note that housing markets with more stringent regulations see average prices climb and in response to economic shocks and persist at those higher levels over time.

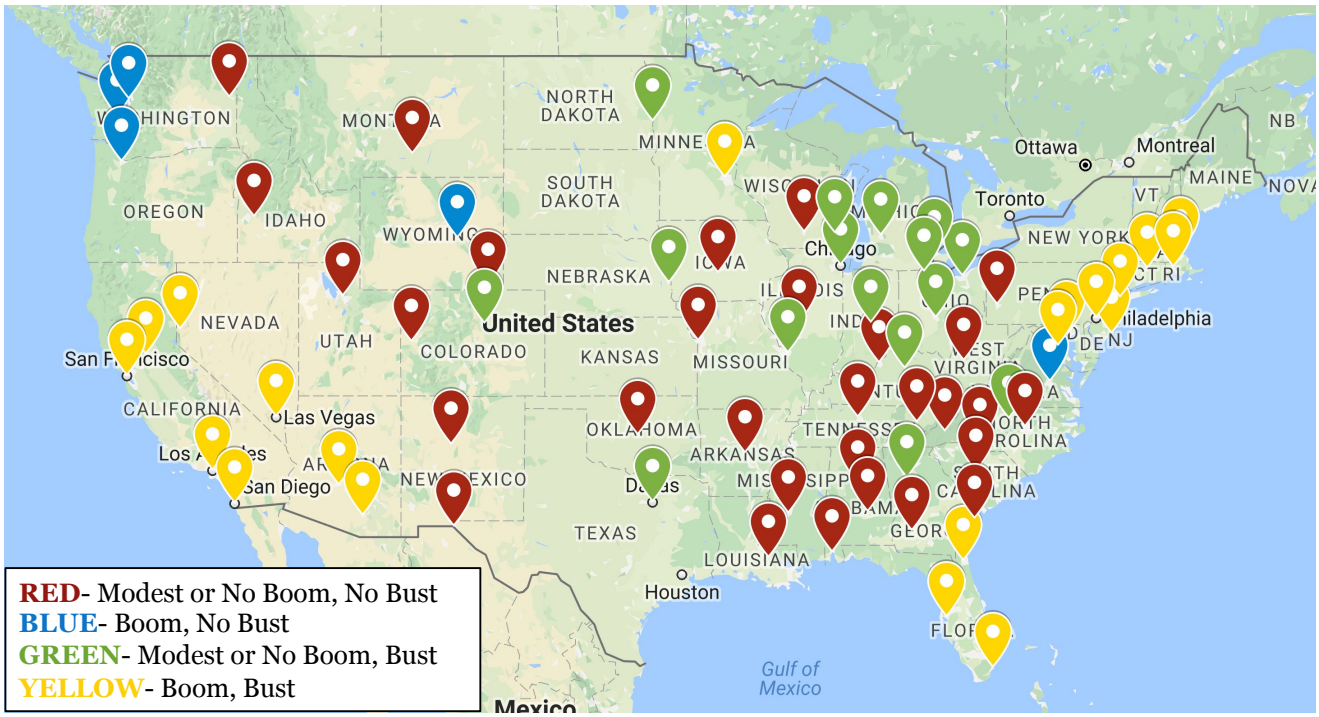
Finally, and most importantly, a subsection of literature specifically discusses the differences in the recoveries experienced in various housing markets following the burst. Richter

and Seo (2011) first discuss this in the context of the relationship between central city and suburban home prices in the Cleveland area during the foreclosure crisis. They build sales indices to examine home price dynamics over time in an area that did not experience a housing boom leading up to the crisis, but certainly saw a housing price bust following it. The study finds that the relationship between city and suburban home prices grows in importance as foreclosure rates increase. Similarly, Brocker and Hanes (2013) analyze changes in home values, homeownership rates, and mortgage foreclosure rates over time. However, instead of focusing on one city in the recent past, they examine a collection of booming American cities in the 1920s into the advent of the Great Depression in the 1930s. Overall, they come to the relatively intuitive conclusion that those cities that had experienced relatively high rates of house construction in the residential real-estate boom of the mid-1920s saw the worst outcomes in the 1930s in terms of declining home values, declining homeownership rates, and increasing mortgage foreclosure rates. I look for a similar effect in the 2008 era. Pertinently, this paper also suggests that the patterns observed during the 1920s were very similar to those cross-sectional patterns seen across American metropolitan areas in 2006 and 2007.

In 2014, Arestis and Gonzalez-Martinez examine the recoveries of 17 OECD countries to various housing bubble bursts between 1970 and 2013 are examined. The paper concludes by finding that real residential investment is positively correlated with real disposable income, housing prices, and the volume of banking credit. Additionally, Arestis and Gonzalez-Martinez also find that disposable income is the key variable in determining real estate investment levels. Public policy should, therefore, focus on the creation of employment to allow for income growth. The coordination of fiscal and monetary policies is extremely important in housing recoveries. It

would then follow that, within individual metropolitan housing markets across the US, local levels of disposable income and employment are key determinants of the health of the regional housing market.

However, the piece of literature that is most relevant to what I hope to analyze predates these last three papers. Abel and Deitz's 2010 paper from the Federal Reserve Bank of New York, "Bypassing the Bust: The Stability of Upstate New York's Housing Markets during the Recession", helps provide the framework from my work. Abel and Deitz examine the changes in home prices, foreclosure rates, subprime lending, and economic growth that occurred in the cities of upstate New York before and after the housing bubble burst in order to determine the relationships between the four variables. Importantly, the study finds that metropolitan areas that experienced the most significant house price increases prior to the bubble burst tended to suffer the most significant declines afterwards. The "boom, then bust" patterns tended to be concentrated in California and Florida. The higher incidences of nonprime lending activity are correlated with the "boom, then bust" housing market pattern. By labeling America's major metropolitan housing markets as either "Boom, Bust", "Modest or No Boom, Bust", "Boom, No Bust", and "Modest or No Boom, No Bust" based on housing price changes before and after the bubble burst, Abel and Deitz created a framework that I use in researching the longer-term recoveries of the metropolitan areas implicated in their paper. A visual representation of this classification system may be seen on the map at the top of the following page:



3. Data

The data for this project relates to housing market, demographic, financial, climate, and public policy measures associated with a cross-section of major American cities. Metro areas fall into one of four groups: “Boom, Bust”, “Modest or No Boom, Bust”, “Boom, No Bust”, or “Modest or No Boom, No Bust” according to their housing market patterns before and after the bubble burst. I attempt to explain the differences in the rates of home price growth experienced during the recovery among various US metropolitan areas.

The first variable is the Average Annual Percentage Change in Housing Prices by Metropolitan Statistical Area, or MSA. The online real estate database company, Zillow, provides an extensive time series dataset of single-family home prices from 1996 through 2016 for over 450 cities. By averaging the annual changes in single-family home prices for each MSA from

2009 through 2014 (the period that spans between the end of Abel and Deitz's definition of the housing market bust through the year in which housing prices began to reach their pre-recession levels), I was able to develop the Average Annual Percentage Change in Housing Prices variable. This is the dependent variable in my analysis of the forces impacting metro housing market recoveries.

The US Department of Commerce's Bureau of Economic Analysis, or BEA, provides the Average Yearly GDP Growth by MSA. I calculate the annual GDP growth rates for hundreds of US metro areas. I compute the Average Yearly GDP Growth by MSA to examine the relationship between general economic growth and housing price changes.

A third variable is the Finance, Real Estate, and Insurance Sectors, or FIRE, as a Percentage of Total GDP by MSA. This data, which allowed me to focus exclusively on the finance; insurance; and real estate industries, is in real dollars from 2009 through 2014 in each MSA (in the "Interactive Data" section of the BEA's website, I was able to filter the Gross Domestic Product (GDP) By Metropolitan Area dataset by industry to find the value of the finance, insurance, real estate, rental, and leasing industry). Finally, to calculate FIRE as a Percentage of Total GDP by MSA, I divided the value of the industry in each MSA by the total GDP of each MSA for every year in the relevant time period and averaged the six resulting values. Because firms and employees within the FIRE industry were hit especially hard by the fallout of the 2008 mortgage crisis, I hypothesized that the FIRE industry's presence within an MSA might impede its recovery.

To evaluate the effects of the highly-publicized government fiscal stimulus programs on the housing market recoveries in various metropolitan areas around the country, I also wanted to

construct a variable that would look at how much money was injected into the economies of each metro area during the crisis and ensuing recovery. The independent, nonprofit news website, ProPublica, was extremely helpful in this pursuit because it offers an extensive database that documents who each recipient of government restructuring money is, what type of organization they are, where they are located, and how much money they received. Unfortunately, however, this data was only able to be filtered by state and, therefore, could not be looked at by MSA. Regardless, I believe that the data gleaned was still valuable. To ultimately calculate to my variable, I organized the government restructuring disbursements by state and summed them to come to a total dollar value given to each state.

Outside of financial and economic factors, I also wished to include a variable in my regression analyses that incorporated the inherent climatological differences between each MSA, since I imagined these are very important in determining the strengths of housing markets. Average Yearly Temperature is a proxy variable for climatological differences between metro areas. The National Oceanic and Atmospheric Administration (NOAA) provides temperature and precipitation differences for cities throughout the US. I use the average yearly temperatures for each large US cities. I predicted that cities with warmer Average Yearly Temperatures would see quicker housing market recoveries due to a general preference among home buyers for warm environments.

The final variable that I wished to construct for my analysis dealt with the legal and public policy differences between the housing markets in different metropolitan areas. The laws dictating foreclosure proceedings across different states can play large roles in determining how dynamic the housing markets within those states can be, especially following the unravelling of a

national housing bubble. The two primary modes of foreclosure are judicial and nonjudicial foreclosures. The differences between these mainly dictate how quick and how severe the outcomes of foreclosure proceedings can be. I use Judicial Foreclosure as a dummy variable to capture whether the state that a MSA resides in relies upon judicial or nonjudicial foreclosures. Data concerning which states use which could easily be found on the website of NOLO, a publisher of legal books based in Berkeley, California.

In addition to the data used to construct the variables in my primary regression analyses, I also wished to examine the effects of zoning regulation restrictiveness on housing price changes during the recovery from the 2008 housing crisis. I use the Wharton Residential Land Use Regulation Index, or WRLURI. Developed in Gyourko, Said, and Summers' 2007 paper, "A New Measure of the Local Regulatory Environment for Housing Markets: The Wharton Residential Land Use Regulatory Index", to do this. The index aggregates elven subindexes that contain information regarding the state and local regulatory environments surrounding a metropolitan statistical area. Specifically, nine of the eleven reflect local characteristics, such as the extensiveness of local bureaucracies and the number of bodies with veto power over local housing decisions, while the other two pertain to state legislative and executive branch behavior. The index was designed to have a mean of zero and a standard deviation of one. Lower values indicate a less restrictive zoning environment, while a higher value indicates the opposite.

While I was compiling my data, I noticed that, as I added more variables to my analysis, the number of MSAs that I was able to maintain a full range of data for went down. This acted as the main limiting factor in my data collection process. Therefore, I went from using a dataset of over 100 MSAs to a dataset of just over 80 MSAs due to the fact that the data necessary to

construct each variable was not always available for each metropolitan area that I originally intended to examine. The number of MSAs available for analysis decreased to 56 when I added the zoning regulation variable.

4. Research Methods

To examine the factors that influenced the varied metropolitan housing market recoveries that occurred following the subprime mortgage crisis between 2009 and 2014, I ran a series of cross-sectional regression analyses. First, I constructed regressions for each "type" of metropolitan housing market experience outlined by Abel and Deitz (2010) in which Average Annual Percentage Change in Housing Prices is the dependent variable. Independent variables for these equations included Average Yearly GDP Growth, FIRE as a Percentage of Total GDP, Government Restructuring Payments (By State), Average Yearly Temperature, and Judicial Foreclosure (By State). After compiling the regression results for the groups of cities that qualified to fit, respectively, within the "Boom, Bust", "Modest or No Boom, Bust", "Boom, No Bust", and "Modest or No Boom, No Bust" archetypes[2], I pooled all of the MSAs together and ran the regression equation again to find results reflective of the entire dataset. The primary regression equation ultimately resembled the following:

$$HPpc = B0 + B1*GDPpc + B2*FIREp + B3*GOV + B4*TEMP + B5*JUD + e$$

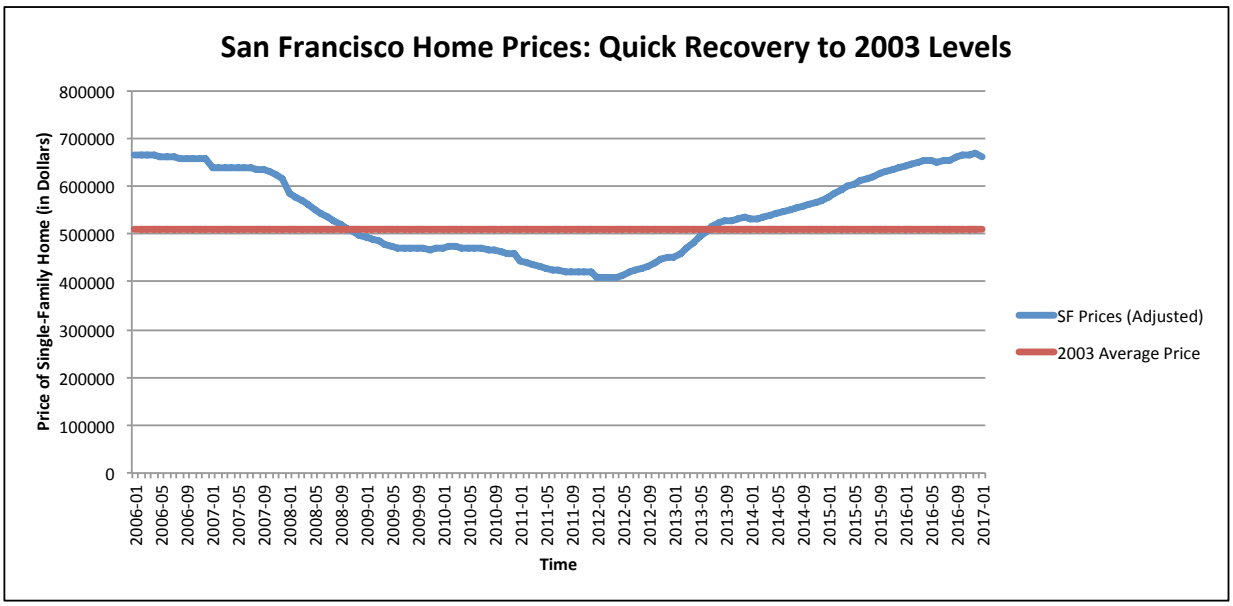
[2] Results for the "Boom, No Bust" archetype were not included due to a lack of data points.

From this exercise, I hoped to discover what factors influence housing market recoveries for the four groups of metropolitan statistical areas that each had very different experiences before and after the subprime mortgage crisis and what the magnitude of the effects of these factors have been over the last few years of the recovery.

In addition to the variables used in the primary regression equation, two other elements of MSA housing market recoveries from 2009 through 2014 were also studied: the duration of the recoveries and the effects of zoning regulations. From examining the duration of MSA housing market recoveries, I aimed to gain a more wholistic understanding of how the the variables in the primary regression equation impacted MSA home prices temporally. By studying of the effects of zoning regulations, I hoped to expand upon my primary regression equation to examine the impact of another potential housing price determinant.

To conduct the recovery time analysis, I first determined the number of months it took average home prices in each MSA to return to their inflation-adjusted 2003 price levels following the bubble burst[3]. The year 2003 was chosen because it was a point in the early stages of the development of the housing bubble. A graphical representation of the results of this process may be seen here:

[3] Results for the "Boom, No Bust" Archetype were not included due to a lack of data points



To reflect this data in a regression equation, I created a new dependent variable: Recovery Time (In Months), or RECOVmnths[4]. I then conducted two regression analyses using the following equation:

$$RECOVmnths = B0 + B1*GDPpc + B2*FIREp + B3*GOV + B4*TEMP + B5*JUD + e$$

The first of the two regressions excluded MSAs that never saw their average home prices dip below their adjusted 2003 prices. The second regression included these MSAs. To further my analysis, I looked to the "Boom, Bust", "Modest or No Boom, Bust", "Boom, No Bust", and "Modest or No Boom, No Bust" archetypes once again.[5] For each category, I calculated the average recovery time needed to return to adjusted 2003 home price levels, the number of MSAs

[4] MSAs that never returned to 2003 levels were not included in the construction of this variable

[5] Results for the "Boom, No Bust" Archetype were not included due to a lack of data points

still yet to recover to 2003 levels, the average time spent with prices below 2003 levels, and the number of MSAs that never dipped below 2003 levels. Regressions were not run for each of the four Abel and Deitz archetypes due to the low number of available data points for each.

To study the effects of zoning regulations on the change in MSA home prices following the bubble burst, I used Gyourko, Said, and Summers' Wharton Residential Land Use Regulation Index to construct a new variable: Regulation Index (REG). I then added to this variable to the original regression equation to come to the following new equation:

$$HPpc = B0 + B1*GDPpc + B2*FIREp + B3*GOV + B4*TEMP + B5*REG + B6\ JUD + e$$

Five regression analyses were then completed to examine the MSAs within each of the "Boom, Bust", "Modest or No Boom, Bust", "Boom, No Bust", and "Modest or No Boom, No Bust" archetypes, as well as a pooled MSA dataset.[6]

As I constructed my variables and regression equations, I realized that the issue of simultaneity may potentially arise. Simultaneity is a type of endogeneity problem in which an explanatory variable is jointly determined with a dependent variable. In this case, there may potentially be some interactions between the Average Annual Percentage Change in Housing Prices, Average Yearly GDP Growth, FIRE as a Percentage of Total GDP, and Government Restructuring Payments (By State) variables. This may impact my results slightly within these reduced form regression analyses.

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[6] Results for the "Boom, No Bust" archetype were not included due to a lack of data points

5. Primary Regression Equation Results

5.1 Primary Regression Equation: "Boom, Bust"

The first types of MSAs from the dataset that were analyzed were those that fit into Abel and Deitz's "Boom, Bust" archetype. These are metropolitan areas from the data that saw their home prices increase faster than the average US annual rate of 8.1% between 2000 and 2006 (during the inflation of the national housing bubble) and then saw those prices decrease more rapidly than the national average rate of -0.3% between 2006 and 2008. The descriptive statistics from this specific dataset that reflect their experiences from 2009 through 2014 may be observed in the table below:

Variable	Obs	Mean	Std. Dev.	Min	Max
HPpc	20	.5909869	1.92036	-3.051237	4.165669
GDPpc	20	2.02405	1.126239	-.3951143	3.380454
FIREp	20	22.64444	4.08156	15.8465	31.96569
GOV	20	2.28e+10	4.35e+10	1.10e+08	1.68e+11
TEMP	20	59.86	8.985388	45.4	76.575
JUD	20	.35	.4893605	0	1

Here, one may see that the Average Annual Percentage Change in Housing Prices was positive at 0.59% per year between 2009 and 2014 for those metropolitan areas that experienced a boom, then bust during the mortgage crisis. Average Yearly GDP Growth was also very strong at 2.02% per year. It is also notable that the FIRE industry accounts for an average of about 23% of these areas' economies, which is rather high, and that the average yearly temperature is right around a pleasant 60 degrees Fahrenheit. Perhaps these numbers indicate that metropolitan areas that experienced a boom, then bust during the mortgage crisis experienced fairly strong GDP

growth following the depths of the recession, are rely substantially upon the wellbeing of the FIRE industry, and are, in general, fairly warm.

The results from the regression analysis for the 20 metropolitan areas that fit within this category may be found in the table below:

	HPpc
GDPpc	0.271
	(0.73)
FIREp	0.157
	(1.44)
GOV	−0.000
	(0.18)
TEMP	0.089
	(2.28)*
JUD	−2.719
	(3.30)**
_cons	−7.851
	(2.29)*
R2	0.57
N	20

* p<0.05; ** p<0.01

From this outcome, many conclusions may be drawn. Firstly, one sees that the Average Yearly Temperature and Judicial Foreclosure variables are both statistically significant to the 5% and 1% levels, respectively. The first of these would indicate that a one unit increase in average yearly temperature in a metro area would lead there to be a 0.08% increase in home prices per year. The result of the Judicial Foreclosure variable would appear to indicate that the presence of judicial foreclosure proceedings would cause a decrease in home prices of nearly 2.7% per year on average. This is fairly significant and may indicate that nonjudicial foreclosure proceedings, which are generally quicker, may enable metropolitan housing markets to recover more quickly from broad downturns. What is also surprising is the lack of an effect from the Government

Restructuring Payments variable. Perhaps this is due to the fact that the effects of fiscal stimulus funding may take a long time to materialize in a given city or may be hard to directly recognize.

5.2 Primary Regression Equation: "Modest or No Boom, Bust"

The second types of MSAs that were analyzed were those that fit into Abel and Deitz's "Modest or No Boom, Bust" archetype. These are metropolitan areas from the data that saw their home prices increase slower than the average US annual rate of 8.1% between 2000 and 2006 (during the inflation of the national housing bubble) and then saw those prices decrease more rapidly than the national average rate of -0.3% between 2006 and 2008. The descriptive statistics from this specific dataset that reflect their experiences from 2009 through 2014 may be observed in the table below:

Variable	Obs	Mean	Std. Dev.	Min	Max
HPpc	16	.6957843	1.610377	-1.754635	4.001958
GDPpc	16	3.354388	1.093731	2.083099	6.435648
FIREp	16	21.18406	3.459305	14.74425	26.26996
GOV	16	1.30e+10	2.65e+10	1091000	8.05e+10
TEMP	16	51.37656	5.939293	41.55	65.325
JUD	16	.5	.5163978	0	1

It is interesting with this group of metro areas that their Average Annual Percentage Change in Housing Prices is actually more positive than the "Boom, Bust" group. Additionally, the mean Government Restructuring Payments variable is much lower within this group and the Average Yearly Temperature number is also down somewhat. Perhaps these outcomes indicate these areas were able to grow more quickly following the 2008 mortgage crisis because they had

more opportunities for expansion, since they had not recently experienced a housing boom prior to the crisis. Additionally, one may hypothesize that the bust experienced in these areas might not have been as severe in magnitude due to the fact that they received significantly less fiscal stimulus money from the government.

The results from the regression analysis for the 16 metropolitan areas that fit within this category may be found in the table below:

	HPpc
GDPpc	**0.815**
	(2.18)
FIREp	**0.029**
	(0.24)
GOV	**0.000**
	(0.27)
TEMP	**0.003**
	(0.04)
JUD	**−1.123**
	(1.33)
_cons	**−2.317**
	(0.36)
R2	**0.54**
N	**16**

* p<0.05; ** p<0.01

The results in this analysis do not yield any statistically significant results. Additionally, it is interesting that, although not significant, the presence of judicial foreclosure proceedings is correlated with a negative Average Annual Percentage Change in Housing Prices once again.

5.3 Primary Regression Equation: "Modest or No Boom, No Bust"

The fourth types of MSAs that were analyzed were those that fit into Abel and Deitz's "Modest or No Boom, No Bust" archetype. These are metropolitan areas from the data that saw

their home prices increase slower than the average US annual rate of 8.1% between 2000 and 2006 (during the inflation of the national housing bubble) and then saw those prices decrease less rapidly than the national average rate of -0.3% between 2006 and 2008. The descriptive statistics from this specific dataset that reflect their experiences from 2009 through 2014 may be observed in the table below:

Variable	Obs	Mean	Std. Dev.	Min	Max
HPpc	32	-.1232364	1.410057	-2.768118	2.665587
GDPpc	32	2.582733	1.09333	.2377674	4.483552
FIREp	32	18.4886	5.834622	9.522533	40.91643
GOV	32	1.16e+10	3.19e+10	1657000	1.68e+11
TEMP	32	54.91328	8.945185	26.975	66.625
JUD	32	.28125	.4568034	0	1

The descriptive statistics from this group of MSAs shows that there is quite a lot of economic, financial, and climatological diversity. While, on average, home prices decreased slightly for these areas between 2009 and 2014, the Min and Max outputs are quite distant. This is the same for Average Yearly Temperature, Government Restructuring Payments, and FIRE as a Percentage of Total GDP. However, overall, we can say that the FIRE industry has less of a presence in these cities than it did in the first two archetypes and that most of the cities belong to states that do not have judicial foreclosure proceedings.

The results from the regression analysis for the 32 metropolitan areas that fit within this category may be found in the table below:

	HPpc
GDPpc	0.773
	(3.20)**
FIREp	0.019
	(0.46)
GOV	−0.000
	(0.72)
TEMP	−0.009
	(0.34)
JUD	−0.034
	(0.07)
_cons	−1.923
	(1.28)
R2	0.37
N	32

* p<0.05; ** p<0.01

The results of this regression analysis indicate that the fairly positive relationship between Average Yearly GDP Growth and Average Annual Percentage Change in Housing Prices is fairly large at nearly 1% per year and statistically significant at the 1% level. Additionally, although not statistically significant, the negative relationship between Average Yearly Temperature and Average Annual Percentage Change in Housing Prices is unique. Perhaps this is due to the fact that the metro areas represented in this grouping are very geographically diverse and come from all over the US. It is also important to note that, while also not significant, there is a negative relationship between the presence of judicial foreclosure proceedings and home price growth.

5.4 Primary Regression Equation: Pooled Data

Finally, all of the MSAs from the four different archetypes were analyzed together in one, cumulative group. The descriptive statistics from this analysis may be observed in the table below:

Variable	Obs	Mean	Std. Dev.	Min	Max
HPpc	80	.5127651	1.930923	-3.051237	8.054639
GDPpc	80	2.683421	1.508935	-3.466836	8.027073
FIREp	80	19.62543	5.454224	0	40.91644
GOV	80	1.62e+10	3.70e+10	1091000	1.68e+11
TEMP	80	55.70938	8.88441	26.975	76.575
JUD	80	.325	.4713299	0	1

As one would expect, the descriptive statistics from the pooled dataset represent a great diversity of experiences that different MSAs had from 2009 through 2014 as the national housing market recovered as a whole. Overall, it appears that the Average Annual Percentage Change in Housing Prices was positive at about 0.51% per year, Government Restructuring Payments were quite varied, and most states tended to use nonjudicial foreclosure proceedings.

The results from the regression analysis for the 32 metropolitan areas that fit within this category may be found in the table below:

	HPpc
GDPpc	**0.760**
	(6.62)**
FIREp	**-0.019**
	(0.59)
GOV	**0.000**
	(0.33)
TEMP	**0.026**
	(1.33)
JUD	**-0.842**
	(2.24)*
_cons	**-2.352**
	(1.87)
R2	**0.41**
N	**80**

* p<0.05; ** p<0.01

The result from this cumulative regression analysis demonstrates that the Average Yearly GDP Growth variable is statistically significant to the 1% level and holds a positive relationship with the Average Annual Percentage Change in Housing Prices variable. The other statistically significant variable was the Judicial Foreclosure variable, which accounted for the presence of judicial foreclosure proceedings in the states where each MSA was located. This was significant to the 5% level and showed that the presence of judicial foreclosure proceedings in a metro area is associated with a 0.84% decline in home prices per year during a broader housing market recovery. As hypothesized earlier, this may be due to the fact that judicial foreclosure proceedings tend to take longer, potentially delaying the recovery process within an area's housing market. Although the variable was not measured to be significant, it was also interesting that the FIRE as a Percentage of Total GDP holds a negative relationship with Average Annual Percentage Change in Housing Prices. Perhaps this is due to the fact that the FIRE industry

suffered so much during the recession. Therefore, the presence of the industry in a metro area might detract from the perceived value of the homes of that city.

6. Recovery Time Analysis

6.1 Recovery Time Analysis: "Boom, Bust"

In the recovery time analysis, nineteen metropolitan areas, including the sprawling coastal hubs of New York City, San Francisco, and Miami, exhibited the "Boom, Bust" archetype. While a few of these metros saw their housing markets rebound quickly to 2003 price levels following the bubble burst, their experiences were mainly split between longer recoveries and or no full recovery at all. Relevant statistics regarding the experiences of these areas may be found in the table below:

Boom, Bust	
Average Recovery to 2003 Levels (Years):	5.19
Number of MSAs Still Yet to Recover:	9
Average Time Spent Below 2003 Levels (Years):	6.87
Number of MSAs that Never Dipped Below 2003 Levels:	1

As one can see, while the average recovery time for these "Boom, Bust" MSAs was 5.19 years, those MSAs still yet to recover to adjusted 2003 price levels have remained under that threshold for nearly 7 years.

6.2 Recovery Time Analysis: "Modest or No Boom, Bust"

The sixteen metropolitan areas that fit the "Modest or No Boom, Bust" mold include urban centers like Atlanta, GA; Chicago, IL; and Omaha, NE. In general, very few of these MSAs fully recovered to adjusted 2003 price levels. Those that did experienced long-winded recoveries compared to cities within the other groups. The recovery statistics concerning the "Modest or No Boom, Bust" MSAs may be found in the table below:

Modest or No Boom, Bust	
Average Recovery to 2003 Levels (Years):	5.38
Number of MSAs Still Yet to Recover:	13
Average Time Spent Below 2003 Levels (Years):	7.26
Number of MSAs that Never Dipped Below 2003 Levels:	1

While the average recovery time for these urban areas was about the same as those in the "Boom, Bust" classification, a much larger share of them are still yet to recover to 2003 price levels and have remained below those levels for a longer period of time.

6.3 Recovery Time Analysis: "Modest or No Boom, No Bust"

The "Modest or No Boom, No Bust" archetype included the largest number of metropolitan areas within the Recovery Time Analysis exercise. A diverse assortment of 31 MSAs, including Anchorage, AK; Jackson, MS; and Nashville, TN. Although the experiences of these areas were quite varied, many experienced quick dips both above and below their adjusted 2003 price levels during the Great Recession. The recovery statistics concerning the "Modest or

No Boom, Bust" MSAs may be found in the table below:

Modest or No Boom, No Bust	
Average Recovery to 2003 Levels (Years):	3.09
Number of MSAs Still Yet to Recover:	10
Average Time Spent Below 2003 Levels (Years):	6.03
Number of MSAs that Never Dipped Below 2003 Levels:	10

The MSAs in the "Modest or No Boom, No Bust" group definitively had the shortest average recovery time. It is also significant that roughly one-third of these cities never saw their average home prices fall below their adjusted 2003 levels.

6.4 Recovery Time Analysis: Pooled Data

The pooled dataset encompasses the information from all of the MSAs within the "Boom, Bust", "Modest or No Boom, Bust", "Boom, No Bust", and "Modest or No Boom, No Bust" archetypes that is pertinent to the Recovery Time Analysis. The recovery statistics concerning this pooled dataset may be found in the table below:

Pooled Data	
Average Recovery to 2003 Levels (Years):	3.79
Number of MSAs Still Yet to Recover:	32
Average Time Spent Below 2003 Levels (Years):	6.77
Number of MSAs that Never Dipped Below 2003 Levels:	12

A little less than half of all of the MSAs being studied in the Recovery Time Analysis have not recovered to their inflation-adjusted 2003 price levels. The average recovery time of the metro areas that did return to their 2003 levels was a little under 4 years.

6.5 Recovery Time Analysis: Pooled Data Regression Analysis (Including MSAs That Never Dipped Below 2003 Levels)

In addition to calculating the statistics featured in the table above for the pooled dataset, two regression analyses were also completed to examine how the variables from the primary regression equation affected the recovery time of the MSAs to their inflation-adjusted 2003 price levels. In order to run both of these regressions, data concerning metropolitan areas that are still yet to recover to their 2003 price levels was omitted. This is because the recovery time for the MSAs in this group is effectively infinity and, therefore, not usable in a regression analysis. The first of these regression analyses includes those MSAs that dipped below their adjusted 2003 price levels and then later recovered and those MSAs that never dipped below their adjusted 2003 levels throughout the Great Recession. The descriptive statistics from this analysis may be observed in the following table:

Variable	Obs	Mean	Std. Dev.	Min	Max
RECOVmnths	39	30.28205	27.21933	0	82
GDPpc	39	2.454848	1.580457	-3.466836	6.435648
FIREp	39	19.21518	5.386822	9.522532	40.91644
GOV	39	1.13e+10	2.44e+10	1657000	1.17e+11
TEMP	39	55.91603	10.05198	26.975	76.575
JUD	39	.1538462	.3655178	0	1

The average recovery period for the 39 metro areas included in this analysis was just over 30 months, or 2.5 years. These urban areas also experienced positive annual GDP growth of just over 2% during their recoveries and are predominantly located in states practicing non-judicial foreclosure proceedings.

The results from the regression analysis for the metropolitan areas included in this regression analysis may be found in the table below:

	RECOVmnths
GDPpc	-5.101
	(1.94)
FIREp	1.764
	(2.20)*
GOV	0.000
	(1.41)
TEMP	0.838
	(1.87)
JUD	2.797
	(0.23)
_cons	-40.979
	(1.68)
R2	0.34
N	39

* p<0.05; ** p<0.01

The regression results for the pooled dataset that includes MSAs that never dipped below their inflation-adjusted 2003 levels reveal that the FIRE as a Percentage of Total GDP variable is significant to the 5% level. This signifies that a one percentage point increase in the presence of the FIRE sector in a local economy leads to a housing market recovery that is approximately 1.76 months longer.

6.6 Recovery Time Analysis: Pooled Data Regression Analysis (Excluding MSAs That Never Dipped Below 2003 Levels)

The second analysis examining the pooled dataset within the Recovery Time Analysis excludes MSAs whose average home price never dipped below its adjusted 2003 price level during the Great Recession. This was done in order to highlight the recoveries of the housing

markets in MSAs that actually felt the negative forces associated with the economic downturn. The descriptive statistics from this analysis may be observed in the following table:

Variable	Obs	Mean	Std. Dev.	Min	Max
RECOVmnths	26	45.42308	20.27052	13	82
GDPpc	26	2.344051	1.114756	.0877032	4.483552
FIREp	26	20.51268	5.634707	9.522532	40.91644
GOV	26	1.62e+10	2.87e+10	6381000	1.17e+11
TEMP	26	57.41442	10.29269	26.975	76.575
JUD	26	.1153846	.3258126	0	1

The mean of the Recovery Time in Months variable is over 15 months larger when MSAs that never dipped below their adjusted 2003 price levels are removed from the regression analysis.

The results from the regression analysis for the 26 metropolitan areas included in this regression analysis may be found in the table below:

	RECOVmnths
GDPpc	−2.898
	(0.73)
FIREp	0.368
	(0.46)
GOV	0.000
	(0.78)
TEMP	0.483
	(1.04)
JUD	23.211
	(1.64)
_cons	12.593
	(0.52)
R2	0.35
N	26

* p<0.05; ** p<0.01

Although it is interesting to note that the presence of judicial foreclosure proceedings in these MSAs appears to add over 23 months of housing market recovery time, none of the results are statistically significant to the 5% level.

7. Zoning Regulation Analysis

7.1 Zoning Regulation Analysis: "Boom, Bust"

The first step in the Zoning Regulation Analysis was to examine those MSAs within the "Boom, Bust" archetype with whom zoning regulation data from the Wharton Residential Land Use Regulation Index could be matched. 16 metro areas fit this criteria and were analyzed. The descriptive statistics from this analysis may be observed in the following table:

Variable	Obs	Mean	Std. Dev.	Min	Max
HPpc	16	.5991794	2.01457	-3.051237	4.165669
GDPpc	16	1.982057	1.144369	-.3951143	3.380454
FIREp	16	22.33725	4.004713	15.8465	31.96569
GOV	16	1.85e+10	4.17e+10	1.10e+08	1.68e+11
TEMP	16	61.45313	8.86689	50.9	76.575
REG	16	.5776086	.8531217	-.4872942	2.10283
JUD	16	.375	.5	0	1

These statistics reveal that the MSAs in the "Boom, Bust" archetype that are being analyzed have more stringent zoning regulations than the average metro area, since the mean of the WRLURI was designed to be zero. Additionally, the majority of these metropolitan statistical areas reside in states that practice non-judicial foreclosure proceedings since the mean of the Judicial Foreclosure (By State) variable is below 0.5.

The results from the regression analysis for the 16 metropolitan areas included in this regression analysis may be found in the table below:

	HPpc
GDPpc	−0.161
	(0.40)
FIREp	0.273
	(1.80)
GOV	−0.000
	(1.22)
TEMP	0.009
	(0.22)
REG	1.316
	(3.14)*
JUD	−1.912
	(2.72)*
_cons	−5.506
	(1.63)
R2	0.80
N	16

* p<0.05; ** p<0.01

This regression table shows that there is a positive, statistically significant relationship between the restrictiveness of zoning regulations in a metro area and changes in home prices in that same area. Therefore, housing prices will increase more as zoning regulations become more stringent. This follows from the conclusions drawn in previous literature published regarding the effects of zoning regulations on housing markets. The table also reveals a negative, statistically significant relationship between the presence of judicial foreclosures and changes in home prices. This indicates that the practice of judicial foreclosure proceedings will lead to lower home prices.

7.2 Zoning Regulation Analysis: "Modest or No Boom, Bust"

Next, metropolitan statistical areas fitting the "Modest or No Boom, Bust" archetype that could be matched with data from the Wharton Residential Land Use Regulation Index were analyzed in the same manner. The descriptive statistics for the 12 urban areas included in this analysis may be observed in the following table:

Variable	Obs	Mean	Std. Dev.	Min	Max
HPpc	12	.6329803	1.574607	-1.754635	4.001958
GDPpc	12	3.21136	.7724865	2.296974	4.325375
FIREp	12	21.30184	3.479137	14.74425	25.48722
GOV	12	1.72e+10	2.97e+10	4.60e+07	8.05e+10
TEMP	12	52.04375	5.648875	47.325	65.325
REG	12	-.4635999	.8018922	-1.697393	.7073329
JUD	12	.5	.522233	0	1

Unlike the previous group of MSAs that was analyzed, these urban centers typically have fewer zoning regulations than the average US city. It is interesting to note that exactly half of the MSAs being examined practice judicial foreclosure proceedings, while the other half uses non-judicial foreclosures.

The results from the regression analysis for the 12 metropolitan areas included in this regression analysis may be found in the following table:

	HPpc
GDPpc	0.346
	(0.39)
FIREp	−0.138
	(0.50)
GOV	−0.000
	(0.29)
TEMP	−0.058
	(0.56)
REG	1.191
	(1.04)
JUD	−0.717
	(0.41)
_cons	6.479
	(0.60)
R2	0.62
N	12

* p<0.05; ** p<0.01

The results from this regression analysis yielded no statistically significant results.

7.3 Zoning Regulation Analysis: "Modest or No Boom, No Bust"

Metropolitan areas fitting the criteria of the "Modest or No Boom, No Bust" group that also had matches in the Wharton Residential Land Use Regulation Index dataset were then analyzed. The descriptive statistics for the 19 urban areas included in this analysis may be

observed in the following table:

Variable	Obs	Mean	Std. Dev.	Min	Max
HPpc	19	.0182369	1.510551	-2.64819	2.665587
GDPpc	19	2.67969	.9271701	1.085531	4.354418
FIREp	19	19.95947	6.329121	12.45819	40.91644
GOV	19	1.82e+10	4.04e+10	1657000	1.68e+11
TEMP	19	55.55921	7.529484	36.15	66.35
REG	19	-.1891829	.8532642	-1.942003	1.035115
JUD	19	.2631579	.4524139	0	1

This data table of descriptive statistics shows that housing price growth was relatively slow during the time period following the housing bubble burst. Additionally, the MSAs in this analysis have relatively fewer zoning regulations compared to other urban areas and mostly rely upon non-judicial foreclosure proceedings.

The results from the regression analysis for the 19 metropolitan areas included in this regression analysis may be found in the following table:

	HPpc
GDPpc	0.605
	(1.30)
FIREp	0.019
	(0.28)
GOV	−0.000
	(0.59)
TEMP	−0.043
	(0.76)
REG	−0.231
	(0.44)
JUD	0.204
	(0.21)
_cons	0.425
	(0.12)
R2	0.22
N	19

* p<0.05; ** p<0.01

The results from this regression analysis yielded no statistically significant results.

7.4 Zoning Regulation Analysis: Pooled Data

Finally, all of the metropolitan areas from the four Abel and Deitz archetypes that also had matches in the Wharton Residential Land Use Regulation Index dataset were analyzed together in a pooled dataset. The descriptive statistics for the 56 urban areas included in this analysis may be observed in the following table:

Variable	Obs	Mean	Std. Dev.	Min	Max
HPpc	56	.6887119	2.073818	-3.051237	8.054639
GDPpc	56	2.680234	1.546938	-3.466836	8.027073
FIREp	56	20.07238	5.659724	0	40.91644
GOV	56	1.84e+10	4.04e+10	1657000	1.68e+11
TEMP	56	56.35223	8.568018	36.15	76.575
REG	56	.0647183	.9961177	-1.942003	2.387464
JUD	56	.3392857	.4777518	0	1

This table reveals that most of the MSAs observed in the Zoning Regulation Analysis have slightly more stringent zoning regulations than the average US metro area. Additionally, the majority of them utilize non-judicial foreclosures.

The results from the regression analysis for the 56 metropolitan areas included in this regression analysis may be found in the following table:

	HPpc
GDPpc	0.700
	(4.75)**
FIREp	-0.050
	(1.21)
GOV	0.000
	(0.36)
TEMP	0.022
	(0.79)
REG	0.393
	(1.64)
JUD	-0.961
	(1.93)
_cons	-1.169
	(0.67)
R2	0.43
N	56

* p<0.05; ** p<0.01

It is interesting to note that, here, there is only a statistically significant relationship between increases in GDP and increases in MSA housing prices. Meanwhile, zoning regulations do not prove statistically significant in the pooled dataset.

8. Conclusion

This paper analyzed changes in home prices within metropolitan housing markets located throughout the US following the 2008 mortgage crisis in order to help improve our understanding of the succeeding the recovery that occurred from 2009 through 2014 and the factors that may have accounted for the large variations in the recoveries experienced by different areas. Specifically, the Average Annual Percentage Change in Housing Prices variable is examined against Average Yearly GDP Growth, FIRE as a Percentage of Total GDP, Government Restructuring Payments, Average Yearly Temperature, Judicial Foreclosure, and Regulation Index variables for each MSA in the dataset.

Once data was collected for each variable for as many US MSAs as possible, this dataset was then organized through the criteria used in Abel and Deitz's 2010 paper, "Bypassing the Bust: The Stability of Upstate New York's Housing Markets during the Recession". Just as in Able and Deitz's work, four categories of MSAs were created depending on whether an MSA saw its home prices increase faster or slower than the average US annual rate of 8.1% between 2000 and 2006 (during the inflation of the national housing bubble) and then saw those prices decrease more or less rapidly than the national average rate of -0.3% between 2006 and 2008. These groups were named "Boom, Bust", "Modest or No Boom, Bust", "Boom, No Bust", and

"Modest or No Boom, No Bust". Descriptive statistics and regression analysis results were gathered for each group and for a pooled dataset to gain more insights on the recovery of various metro housing markets based upon what their experience was during the heart of the 2008 mortgage crisis.

From the analysis conducted in this paper, it was found that housing prices in the "Boom, Bust" MSAs were associated with the Average Yearly Temperature variable, the Judicial Foreclosure variable, and the Regulation Index variable during the 2009 to 2014 recovery period. "Modest or No Boom, Bust" metropolitan markets saw no statistically significant variables when the complete regression equation was analyzed, but experienced very long recoveries in the Recovery Time Analysis. Areas in the "Boom, No Bust" category saw no statistically significant variables following the complete regression equation analysis as well. However, "Modest or No Boom, No Bust" MSAs were noted to feel the impact of Average Yearly GDP Growth during the recovery phase and the pooled dataset was effected by the Average Yearly GDP Growth variable and Judicial Foreclosure variable.

Overall, it appeared that MSA's saw positive annual home price growth from 2009 through 2014, were harmed by the presence of a large FIRE industry, were not very effected by fiscal stimulus disbursements, benefitted from warm temperatures, and favored nonjudicial foreclosure proceedings. These results may be due to the general trough that US home prices were coming out of at the time, the destruction of the FIRE industry during the mortgage crisis, the time delay that might be associated with fiscal stimulus programs, a general tendency amongst Americans to favor living in warm areas, and the longer length of judicial foreclosure proceedings. While I stand by my results, I realize that my inclusion of some specific variables in

my regression equations, such as the Average Yearly GDP Growth variable, may lead to identification and causality issues due to the close relationships that may exist between them.

Nonetheless, I hope that the results of this project may be of use to a wide variety of researchers, industries, city governments, state governments, and the general population. By analyzing which variables tend to lead to quicker or slower housing market recoveries, interested parties can implement the necessary changes to limit the damaging economic effects of housing market crashes, which are bound to occur again in the future given America's historical love affair with real estate speculation.

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