

The Sour Side of Today's Housing Market:
Testing internal relationships and understanding the composition of today's market.

Abstract

This paper examines the relationship between the percentage of distressed homes and price growth in the United States on a state level from 2005-2007, as well as the relationship between the percentage of REO Resale's and price and sales activity measures for California between 1995-2007. Both regressions find that distressed levels have a significant impact on price and sales activity. The composition of today's housing market is dissected to understand the recent shift in quality due to distressed sales and their overall impact on new and existing home sales activity.

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I would like to thank Professor Adam Szeidl for his insights and advice throughout the preparation of this Thesis. I would also like to thank everyone who listened to me explain my ideas for the thesis and helped me expand on them. While I do not enjoy witnessing the current misery which has accompanied the housing bust, I am grateful to be able to observe and learn from these historical events. **Contact:** peterlewicki@berkeley.edu

1. Introduction

The last few years have seen an unprecedented reversal in the national existing and new home markets. In January of 2005, existing and new home prices stood at all time highs after just completing several years of record sales and price growth¹. As a result, focus on housing prevailed throughout the country, as calls for continued price gains grew louder. Fast forward four years to January of 2009, and the national existing median home price stood at near seven year lows². At the same time, the number of distressed homes around the nation grew exponentially. What is the relationship between the increasing number of homes under distress and these recent price movements? Is the recent increase in the level of distressed homes responsible for the dramatic reversal in price growth and other key market statistics? Do higher levels of distress cause median home prices to decline?

This paper seeks to examine the relationship between distressed homes and several key real estate statistics using econometric analysis. First, we consider the log of state level year-over-year (y-o-y) price change for all fifty states and D.C., regressed on the percentage of distressed homes per state from 2005 through 2007¹. Next, we shift focus to California and take a longer term look at the relationship between the percentage of monthly resale's that are Real Estate Owned (REO), and four real estate market statistics; Price, Sales, Days on the Market, and Inventory. Finally, we address the changing internal dynamics of the housing market by examining how the composition of the market has changed over the past few years as a result of distressed homes driving out higher quality homes.

To control for omitted variables which are correlated with both, distressed levels and price movement, two measures of economic activity, GDP and the Unemployment Rate, as well as Time Fixed Effect variables are included in the regressions. Because it is possible that lower

¹ $\ln(\text{Price}) = \ln(\text{price}_{t+1}) - \ln(\text{price}_t)$

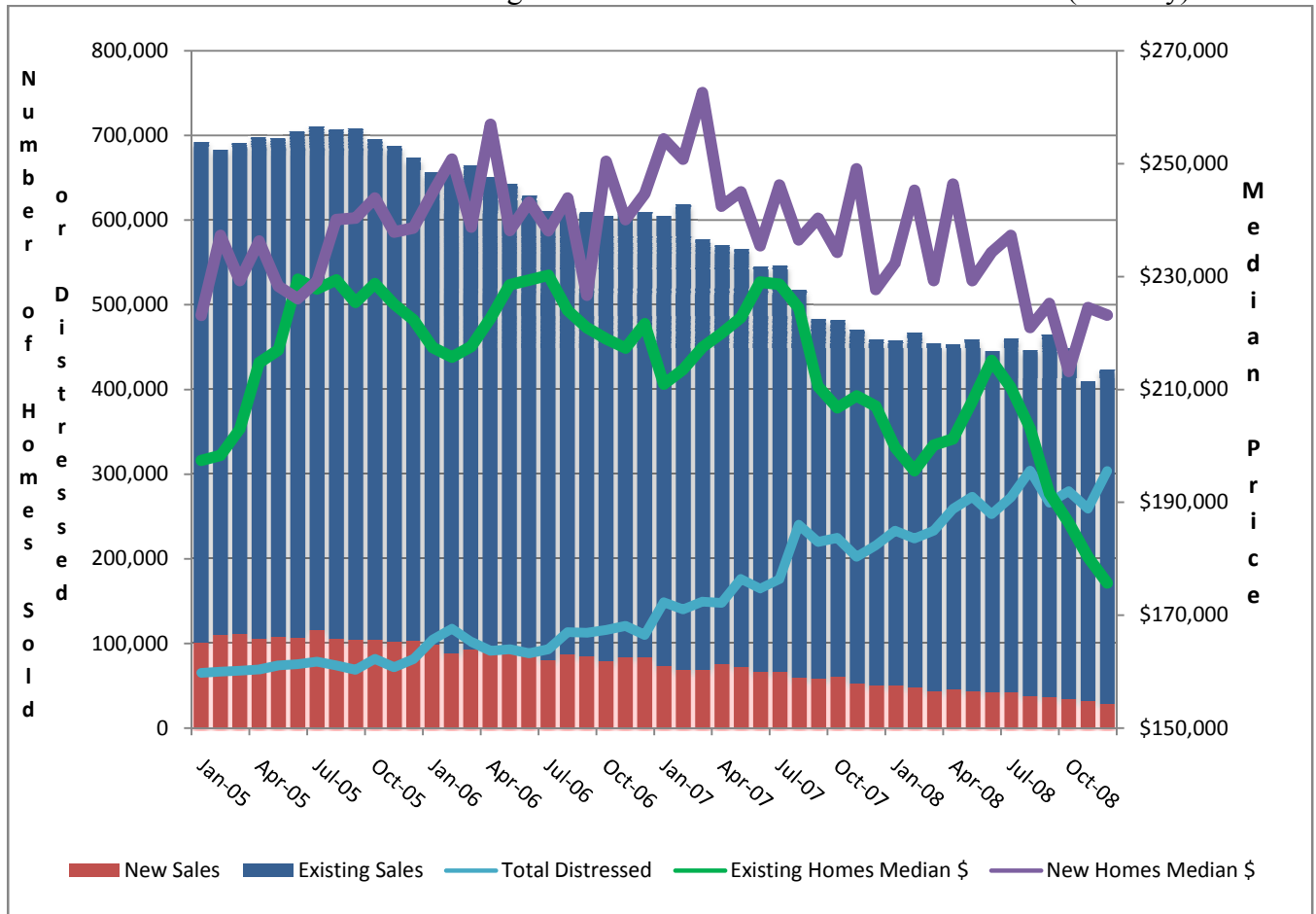
home prices lead to higher levels of distressed homes, and not vice versa, reverse causality must be addressed and controlled for. In both, the state-level and California regressions, time lags are introduced in order to address this concern.

The main takeaway from the regression analysis is that increased levels of distressed homes do appear to have a statistically significant impact on home prices and sales activity. While the two regressions differ in their exact components, a parallel story is evident in both the U.S. and California regression results. Namely, as distressed levels per state increase by one percentage point, home prices are expected to decrease by 2.7% on average, holding GDP constant. In California, a one percentage point increase in the percent of REO resale's corresponds to an annualized decrease in home prices of 1.08%, a decrease in monthly home sales of 1,168, an increase in selling time of 1.62 days, and an increase in inventory of 0.39 months

After evaluating the relationship between distressed homes and home prices, Section 10 addresses potential policy measures government officials can undertake to stabilize short-term housing prices. With the regressions in hand, and a firm understanding of the composition of today's housing market, Section 11 takes a look forward at what may be in store for the housing market in the United States, and California in particular. But first, Section 2 presents an overview of recent trends in housing to help gauge the magnitude of what has recently transpired. Section 3 takes a look at previous studies into the relationship between distressed homes and home prices. Section 4 defines distressed, and outlines the dichotomy between distressed and non distressed homes. Section 5 outlines the methodology used in the regressions. Section 6 provides a summary of the data used within the regressions. Section 7 provides the regression results and a discussion of major findings. Sections 8 and 9 take a look at the composition of today's residential real estate market and historical dollar volume.

2. Recent Housing Trends

Chart 1: United States New and Existing Home Prices and Sales 01/2005 – 12/2008 (monthly)

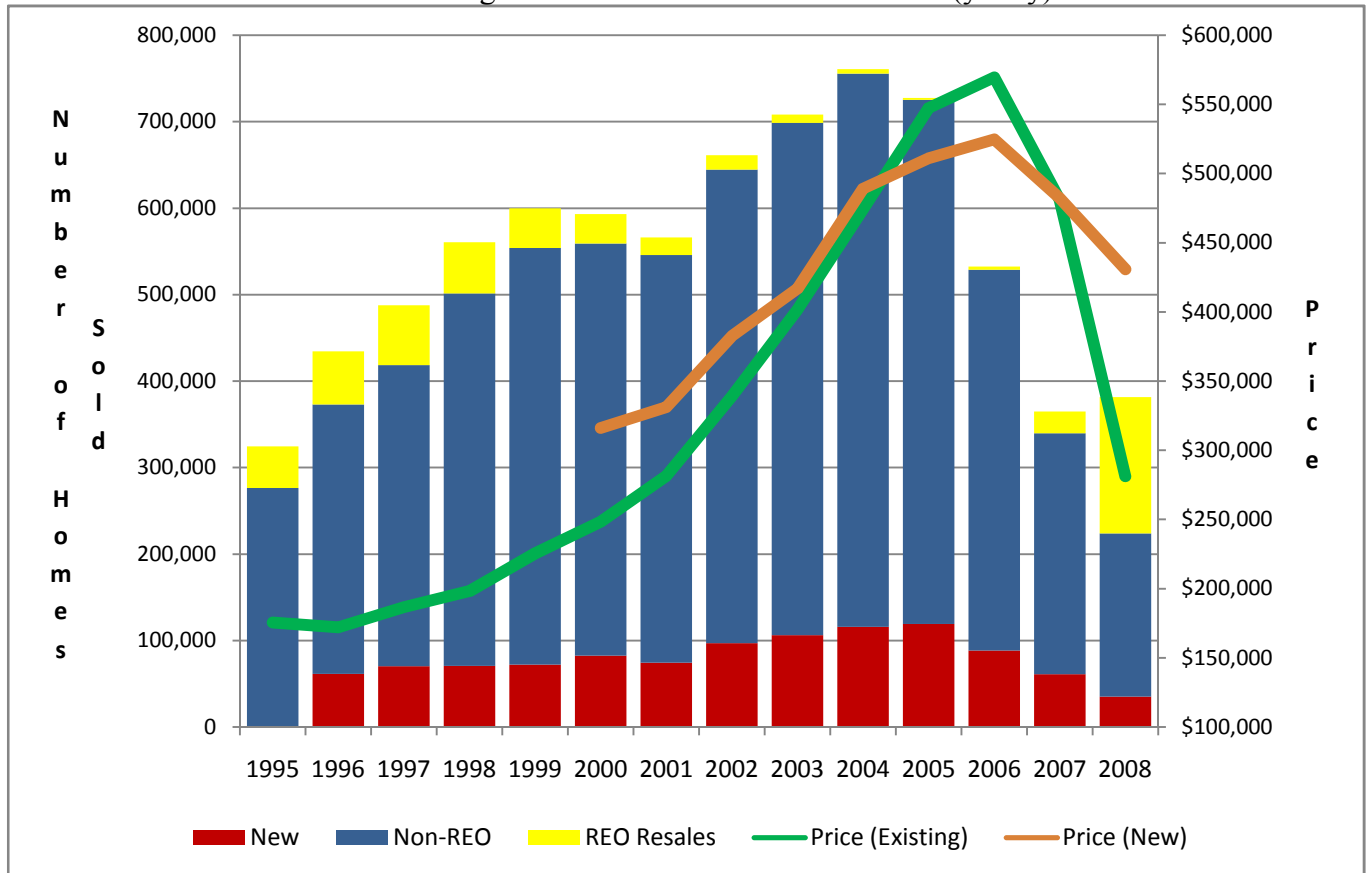


Sources: National Association of Realtors, United States Census Bureau, and RealtyTrac

2.1 United States

From the chart above it is evident that something dramatic has happened over the past four years, as seasonally adjusted existing home sales have declined by 33.2% between 01/2005 and 12/2008, and the median price has fallen by 11.0%³. From their peak, existing home sales are down 34.6% and the median price has fallen 23.4%. Seasonally adjusted new home sales have fared much worse declining 71.4% between 01/2005 and 12/2008, while the median price is virtually flat with a \$100 difference from 01/2005 to 12/2008⁴. From their peak, new home sales are down 75.2% and the median price has fallen 15.0%. The number of Total Distressed homes in the United States, as compiled by RealtyTrac, has increased by 262% between 2005 and 2008.

Chart 2: California New and Existing Home Prices and Sales 1995-2008 (yearly)



Sources: MDA DataQuick Information Systems and Hanley Wood Market Intelligence (HWMI)

2.2 California

California has been especially hard hit by the housing downturn as existing home sales are down 43.1% between 2005 and 2008, with the median price falling 48.6%⁵. From their peak, existing home sales are down 46.6% and the median price has declined by 57.7%. New home sales have fallen 69.8% between the first quarter of 2005 and the fourth quarter of 2008, with the average price falling 15.3%⁶. From their peak, new home sales are down 71.5% and the average price has declined 19.4%. Looking at the long term chart of California home sales and prices above, a recent rebound in total sales is evident, but the composition of those sales is dominated by REO resale's, which I argue are of lower quality. At the same time, existing and new home prices have not displayed a similar rebound.

3. Previous Studies

3.1 Effect of Distressed Homes on Housing Prices

My findings closely parallel those of other studies concerned about the relationship between distressed homes and home prices. In *The External Costs of Foreclosure: The Impact of Single-Family Mortgage Foreclosures on Property Values*, Immergluck and Smith (2006) test the relationship using data for individual homes within the city of Chicago in 1997 and 1998⁷. They conclude that foreclosures had a significant impact on nearby property values, and estimate “that each foreclosure within an eighth of a mile resulted in a decline 0.9% in value.”(58)

Harding, Rosenblatt, and Yao (2008) investigate the direct relationship between distressed homes and home prices by controlling for the overall price trend, and then testing for the impact of nearby foreclosures⁸. They find statistically significant evidence that distressed homes have a negative impact on nearby property values on the magnitude of 1.2% per nearby distressed home. This contagion effect, declines with distance but permeates well after the home has been resold by the lender.

3.2 The Question of Quality and Uncertainty (Lemons)

I believe that REO homes are of inferior quality when compared to owner occupied existing homes or new homes. That new homes are of higher quality on average is logical, but the assertion that occupied existing homes are superior to REO homes requires some justification. Two immediate theories come to mind. First, foreclosure by its definition represents a time of financial hardship for the owner of a home. As Pennigton-Cross (2006, 198) points out, “owners who are at risk of defaulting may spend less on maintaining the property⁹”, a finding echoed by Harding, Miceli and Sirmans (2000)¹⁰. Financial hardship increases the probability that maintenance on the home is being deferred or ignored all together. Second, and on a much

more emotional level, owners facing foreclosure may feel wronged and purposely degrade the quality of the home prior to leaving. While this type of activity may be impossible to quantify, its documented presence only adds to the stigma associated with a distressed home.

It could be argued that damage to a home is visible and thus accounted for in price, but some damage, especially from deferred maintenance, needs thorough inspection to be uncovered. However, in California REO sales are not treated as typical private party sales and have limited disclosure laws. California Civil Code 1102.2 (b) & (c) exclude foreclosure sales from the state mandated disclosure requirements¹¹. This difference in disclosure laws directly leads to incomplete information and the accompanying negative impact this has on buyer psychology.

Buyers may lower their bids in an attempt to protect themselves from overpaying for a home that may hide unknown damage. Owners of quality homes on the other hand, may remove their homes from the market, believing that buyers are discounting quality homes disproportionately as a result of nearby comparable sales which happen to be REO's. This leads to a phenomenon known as the lemons effect, first introduced in the context of used cars by Nobel Prize winning economist George Akerlof in 1970, in which, "bad cars tend to drive out the good, (Quarterly Journal of Economics, 489)¹²". I believe that today's housing market is suffering from a variation of this same phenomenon, as is evident by the current composition of existing home sales and the steep decline in new home sales. This is the *Sour Side of Today's Housing Market*, as distressed homes are driving out quality homes.

4. Defining Distressed and REO

Distressed homes can be quantified in a number of ways. In general, a distressed home will be in one of the three stages of foreclosure; Default, Auction, or REO. The specifics vary by state, but in general a mortgage is in default when the borrower is more than 30 days late in

payment¹³. After the initial Notice of Default the borrower has the opportunity to bring their account up to date. If the borrower is unable to do so within a set period of time, varying between three to six months depending on the state, the home will be placed for auction either by the local court or Sheriff's office¹⁴. In some instances the lender will step in during the auction process and purchase the home thus reverting it to REO. This occurs when the auction bid price remains below the outstanding mortgage on the home. After taking possession, banks then attempt to resell these homes at a price higher than their bid in order to recoup and minimize their losses.

5. Methodology

5.1 Overview

In general the regressions used in this study follow a log-linear specification for price change, and a linear-linear specification for the other market statistics^{II}. Market statistics are regressed against distressed home levels, while controlling for economic conditions.

$$\text{Market Statistic} = \alpha + \beta * \text{distressed level} + \text{controls} + \varepsilon$$

For the state level regression's, the three distressed categories, Default, Auction, and REO, are summed over twelve months and represent the total number of distressed homes in each state per year. The total number of distressed homes per state is then normalized by dividing by the annual number of housing units per state. This eliminates several outliers, which if not normalized would cause the subsequent ordinary least squares regression to overcompensate for these outliers, thus leading to inaccurate coefficient estimates. Using monthly observations would be preferred, but is unfeasible due to the absence of a state level monthly price index to use as the dependent variable. A regression based on quarterly price change is possible; however, state-

^{II} Market Statistics: Price Change(U.S. & CA), Sales, Median Days on the Market, and Inventory (CA only)

level GDP, an important control variable, is only available on a yearly basis. Also, while distressed levels for 2008 are available, price change from 2008-2009 is needed to complete regression. Therefore, the regression does not take into account price and distress activity from 2008.

Although total distressed levels for California are only available for the past four years, the monthly composition of resales is available from 1995. A resale falls into one of two categories, REO or Private party. The number of REO's is divided by the total number of resale's to find the percentage of REO resales. This percentage is used to test the effect of REO resale's on four real estate statistics; Sales, Price Change, Median Days on the Market, and Inventory in California with monthly observations from 01/1995 to 12/2007. As in the U.S. regression, 2008 observations are not included.

5.2 Dependent Variables: Price Change and Sales Activity

The median price, while not a perfect or all encompassing gauge of the housing markets health, represents the value of a home in monetary terms. Simply put, half of all homes sell below the median and the other half sell above. Therefore, using the log of the state level year-over-year growth rates in median home prices is an attempt to quantify the average cost to homeowners resulting from an increase in the percentage of distressed homes. Other possible dependent variables, such as sales and inventory, are not readily available at the state level.

With a wider array of data available for California, three additional dependent variables; Sales, Median Days on Market, and Inventory are also tested to quantify the overall impact that REO resale's have on all available statistics of real estate market activity. The monthly Sales number is seasonally adjusted and represents the number of existing homes sold in the state, as reported by the California Association of Realtors. Median Days on the Market proxies selling time by reporting the median amount of days a home is listed before it enters escrow. Lastly,

Inventory estimates the months of inventory by dividing the inventory of existing homes by the previous month's sales.

5.3 Variables of Interest: Distressed and REO

The earlier charts show a quickly deteriorating housing market, both in California and on a national level. One plausible contributor to the recent poor performance of home sales and prices is the increasing level of distressed homes as a percentage of all homes in a state. Several states, including California, have experienced a surge in distressed levels over the past three years, with three states experiencing distressed levels above six percent, and one, Nevada, experiencing twelve percent distressed levels in 2008 (Appendix, Exhibit 1).

The base specification for the state level data will be the percentage of homes that are distressed per state, per year^{III}. This variable is of primary interest, as this paper looks to test the impact of distressed homes on residential real estate price growth. This variable will also act as the foundation onto which additional factors can be added and controlled for in order to complete a more sophisticated test of the relationship. The base specification is similar in the case of the California regression, but instead of percentage of distressed homes, the monthly percentage of REO resales is used^{IV}. This variable was chosen for two reasons. First, it tests the relationship between bank owned homes selling in the market and key real estate statistics, and second, it was the best proxy of distressed homes available to the author.

5.4 Omitted Variable Bias and Other Factors

There are many factors that cause homes to become distressed, each of which may have contributed to the historical poor performance of housing over the past few years. The United States, along with the rest of the world's economies, is suffering through one of its worst

^{III} Percentage Distressed level: 1% = 0.01

^{IV} Percentage REO Resale's: 1% = 0.01

economic recessions in several decades. The world's financing engine is no longer issuing consumer credit at record pace, as the availability of credit, especially mortgage credit, is not what it was just a few short years ago. This prolonged recession has perhaps lengthened the housing recession, but GDP has only recently turned negative.

Choosing to only include measures of distress as the independent variable produces an incomplete picture, and is vulnerable to omitted variable bias. Economic theory suggests that the state level Unemployment Rate and GDP would on average have some relation to distressed levels, while at the same time affecting housing price growth. Since GDP measures economic growth, one could assume that as the economic growth rate in a state increases, demand for housing would also increase, leading to a rise in housing price growth. Using the same logic, as unemployment decreases, new jobs are created, thus leading to more demand for housing and a subsequent increase in housing price growth.

Controlling for the Unemployment Rate and state level GDP growth addresses omitted variable bias and helps test the relationship which underlies the motivation for this paper. There are admittedly numerous other factors that can be responsible for decreased home sales and prices, but none that are readily available at the state level to the author. To address these other unknown factors, statistical techniques are employed to determine their significance.

5.5 Time Fixed Effects

Because many variables other than distressed levels, GDP, and unemployment may affect housing, Time Fixed Effect variables; 2005, 2006 and 2007 are added to the state level base and alternative specifications. These variables are introduced to control for variables which differ over time but not across states, and may have an effect on house prices. Controlling for these variables produces a more accurate estimate of the coefficient on % Distressed, as the coefficient is not driven by omitted year-specific factors. These factors can include mortgage

rates, stock market returns, lending standards, etc. Because the California observations are based only on one state, Time Fixed Effects can not be used to control for these same unobserved variables.

5.6 Reverse Causality and Time Lags

There is no definitive method to prove that distressed homes are causing home prices and sales to decline, while at the same time increasing inventory and the amount of days required to sell a home. It may be that falling home prices are responsible for higher levels of distressed homes. To partially address this issue of reverse causation, the log of price change ($\text{Price}_{t+1}/\text{Price}_t$) is used to measure the percentage change in price from the base period to the next period, against the base period's level of distressed homes. This method measures price change with a one period lag.

To further strengthen the causation argument, supplementary regressions are run with an additional one year lag on the state level data, and additional three and six month lags on the California data. The results are then compared to the original base and alternative specifications. The results of adding a time lag will be interpreted by completing a t-test of the difference in target coefficients to test for significance.

6. Data Sources

National Association of Realtors (NAR)

The NAR has monthly data for Sales and Median Home Prices beginning in 1999, and yearly data that date's back to 1989. The data is available for the U.S. as a whole and for four regions (Northeast, Midwest, South, and West). Prices and sales data, however, are not available at the state level. The NAR samples 160 real estate associations/boards and multiple listing services (MLS) nationwide each month, and believes to capture 30-40% of all existing-home sale

transactions with its monthly survey¹⁵. Median home prices are obtained through the same monthly survey, however, are not seasonally adjusted.

RealtyTrac

RealtyTrac provided state level monthly data on Defaults, Auctions, and REO's from 4/2005 through 12/2008. Defaults are defined as initial Notice of Default (NOD) and Lis Pendens (LIS). Auctions are defined as Notice of Trustee Sale and Notice of Foreclosure Sale (NTS and NFS). REO's are defined as properties that have been foreclosed on and repurchased by a bank¹⁶. These three categories representing distressed homes are summed and signify the total number of distressed homes per state, per year. RealtyTrac only counts the most recent filing, thus eliminating double counting.

United States Census Bureau

To normalize the RealtyTrac distressed homes data, the total number of distressed homes in each state is divided by the total number of housing units in that state for that year¹⁷. The housing unit data is provided by the Population Estimates Program and is available for 2000-2007. New homes data was also obtained from the Census Bureau for the compilation of Chart 1¹⁸. The data is for the U.S. as a whole and uses a seasonal adjustment to reduce seasonality inherent in home sales. The new home median price is provided on a non-seasonally adjusted basis. The Census Bureau's survey is based on a sample selected from building permits.

Office of Federal Housing Enterprise Oversight

The OFHEO maintains a quarterly State Price Index from Q1-1975 through Q4-2008¹⁹. The Index is compiled using a weighted, repeat sales, method of mortgages purchased or securitized by Fannie Mae or Freddie Mac and is not seasonally adjusted. Fourth quarter price data for each state was used to represent a closing price for that year. Year over year price

changes were measured using the natural logarithm and are used as the dependent variable in the state level regressions.

Bureau of Economic Analysis

In addition to the level of distressed homes per state, the (y-o-y) percentage change in Gross Domestic Product (GDP) per state is added as a control variable in both the state level and California regressions. The *NAICS All Industry Total* data set is used to represent the dollar value of all products produced within a state for a given year and is available through 2007²⁰. Data for 2008 will be available in June 2009, at which time the California level regressions will be updated to reflect year 2008 observations.

Bureau of Labor Statistics

The other control variable used in the regressions is the statewide Unemployment Rate. The Unemployment Rate is measured as a percentage of the labor force and is reported as the full year average²¹. The data is reported on a seasonally adjusted basis to eliminate seasonality which may have a pronounced effect in some states.

California Association of Realtors (CAR)

The CAR provided historical data on several key real estate market statistics including; Price, Total Sales, Median Days on the Market, and Inventory. The data is available on a monthly basis from 1/1989 through 12/2008. All of the data pertains to existing homes in the state of California. In the California regressions, price change is measured by taking the log of month-over-month (m-o-m) price change. Total monthly sales are used in order to eliminate noise which may be associated with using a (m-o-m) percentage change in sales. Median Days on the Market measures the median amount of days a home was listed before the property entered escrow. The Inventory index is simply the month's supply of existing homes and is measured by dividing the current month's inventory by the previous month's total sales

MDA DataQuick Information Systems

DataQuick provided the monthly number of REO resale's in California from 1/1995 through 12/2008. The REO percentage represents the fraction of existing homes that were sold per month in which the owner was a financial institution and had taken back property after default. Banks retain these properties at the last stage of foreclosure process and then place them on the market in an attempt to recoup the losses resulting from the defaulted mortgage. The REO percentage is used as the independent variable to test the relationship between REO resale's and the four real estate market statistics obtained from CAR. The REO percentage will also be used to understand how the composition of California's home market has dramatically shifted over the past few years.

Hanley Wood Inc.

Hanley Wood Inc. provided quarterly data on the number of sales and the average price of new homes sold in California from 1996 and 2000, respectively. This data was used in the compilation of Chart 2, and will help us more clearly understand the composition of today's housing market, specifically, the trend in new home sales in California.

7. Regression Results and Discussion

7.1 United States

Table 1: United States-Price Change

Regression of ln(price) on Percentage Distressed, Unemployment Rate, and GDP (all states 2005-2007)							
Dependent Variable: ln(price)							
Regressor	(1)	(2)	(3)	(4)	(5)	(6)*	(7)*
% Distressed	-3.11** (0.755) [-4.11]	-3.17** (0.78) [-4.08]	-2.7** (0.72) [-3.74]	-2.80** (0.74) [-3.76]	-2.45** (0.74) [-3.33]	-1.92* (0.87) [-2.22]	-1.92* (0.88) [-2.18]
Unemployment Rate		0.35 (0.33) [1.04]		0.58 (0.31) [1.87]	0.21 (0.31) [0.66]		
State GDP % Δ Y-o-Y			0.88** (0.144) [6.12]	0.91** (0.15) [6.14]	0.82** (0.15) [5.47]	1.04** (0.28) [3.81]	1.05** (0.28) [3.83]
2005					0.011 (0.019) [0.55]		
2006					-0.02 (0.018) [-1.17]	-0.032* (0.015) [-2.15]	
2007					-0.016 (0.017) [-1.00]	-0.033* (0.014) [-2.27]	
Intercept	0.053** (0.006) [9.35]	0.037* (0.015) [2.43]	-0.001 (0.009) [-0.11]	-0.028 (0.016) [-1.73]	0 -	0 -	-0.033* (0.014) [-2.32]
SER	0.05	0.05	0.05	0.05	0.04	0.05	0.05
R ²	0.22	0.22	0.35	0.36	0.54	0.22	0.18
Adjusted R ²	0.21	0.21	0.34	0.35	0.52	0.19	0.16
n	153	153	153	153	153	102	102
F-stat	16.92	8.33	25.29	16.61	36.46	6.86	8.21
	* Distressed 1 yr prior		** 1% significance level		* 5% significance level		

Specification (1): Single Regressor

In this base specification the natural logarithm of price change is regressed on the annual percentage of distressed homes per state^v. The % Distressed explanatory variable explains 22% of the variance in ln(price). The coefficients on both, % Distressed and the intercept are statistically significant at the 1% level. These results seem to suggest a strong relationship between the level of distressed homes and home prices, but because of potential for omitted

^v Percentage Distressed: 1% = 0.01

variable bias we need to control for other factors before we can estimate the true effect of distressed homes with any precision.

Specifications (2) – (5): Multiple Regressors

These four specifications address the omitted variable bias by controlling for conditions that economic theory suggests would have an impact on home prices. When the Unemployment Rate is included, the coefficients on % Distressed and the intercept are virtually unchanged, while the coefficient on Unemployment Rate is statistically insignificant at all conventional levels. In contrast, when GDP is controlled for, the coefficient on % Distressed decreases; suggesting GDP is an important omitted variable which leads to an upward bias in the coefficient on % Distressed in the base specification. When the Unemployment Rate and GDP are controlled for simultaneously, % Distressed remains statistically significant at the 1% level. Between State GDP and Unemployment Rate, the former has a much stronger relationship with price change as it remains significant at the 1% level for all four specifications, while the Unemployment Rate is not significant in any of the specifications.

Controlling for economic conditions addresses omitted variable bias as is evident from the decreasing predicted effect of distressed levels on price change when control variables are added, but many variables remain unaccounted for. Adding Time Fixed Effects; 2005, 2006, and 2007 controls for variables which are constant for all states but vary between years. All three Time Fixed Effects prove statistically insignificant at the 5% level, suggesting that the previous regressions do not suffer much from year specific omitted variable bias.

Specification (6) – (7): Multiple Regressors and Time Lag

After adding additional variables to control for economic conditions and year specific factors, the causation argument is strengthened, however, the possibility of reverse causation

remains. To address this concern, $\ln(\text{price})$ is regressed on % Distressed from the prior year. When an additional one year lag of distressed levels is used all of the t-statistics decrease, but % Distressed and State GDP remain statistically significant at the 5% and 1% levels respectively. Using a t-test to test the difference in coefficients on % Distressed results in a t-statistic of -0.50^{VI}. Thus the change is not significant and may be caused by sample randomness. The additional lag does not provide a stronger case for causation between distressed levels and home prices. Also the time lag reverses the sign on the coefficient making it negative. This suggests a delayed reaction in home prices to increasing distressed levels, but the difference is not significant at the 5% level.

Forecasting

After analyzing the regression results and sorting through their interpretations, I feel that the following regression equation best explains the relationship between distressed homes per state and (y-o-y) price growth.

$$\ln(\text{price}) = -0.001 - 2.7\% \text{Distressed} + 0.88 \text{StateGDP} + E$$

As the percentage of distressed homes per state increases by 1 percentage point, existing home price growth is expected to decrease by 2.7% on average, holding State GDP constant. The coefficients on both % Distressed and State GDP are statistically significant at the 1% level, while the intercept is not statistically significant but is very close to zero.

^{VI} $-2.47 + 1.88/\sqrt{(.73^2 + .94^2)} = -0.496$

7.2 California

Table 2: California-Price Change

Regression of $\ln(\text{price})$ (m-o-m) on CA % REO Resale's, Unemployment Rate, and GDP (1995-2007)							
Dependent Variable: $\ln(\text{price})$							
Regressor	(1)	(2) [#]	(3)	(4)	(5)	(6) ⁺	(7) ^{**}
% REO Resale's	-0.09* (0.04) [-2.04]	-0.12** (0.02) [-5.85]	-0.12* (0.05) [-2.31]	-0.1* (0.05) [-2.14]	-0.15* (0.06) [-2.51]	-0.096 (0.06) [-1.74]	-0.094 (0.05) [-1.89]
Unemployment Rate			0.47 (0.26) [1.79]		0.63* (0.32) [1.96]	0.52 (0.34) [1.51]	0.52 (0.34) [1.51]
State GDP				0.11 (0.11) [1.0]	0.19 (0.13) [1.44]	0.17 (0.14) [1.18]	0.18 (0.14) [1.25]
Intercept	0.01** (0.004) [3.21]	0.01** (0.003) [4.85]	-0.01 (0.01) [-0.99]	0.01 (0.01) [1.58]	-0.03 (0.02) [-1.41]	-0.03 (0.02) [-1.13]	-0.03 (0.02) [-1.15]
SER	0.03	0.03	0.03	0.03	0.03	0.03	0.03
R ²	0.04	0.2	0.06	0.05	0.08	0.03	0.08
adjusted R ²	0.03	0.19	0.05	0.03	0.06	0.01	0.06
n	156	168	156	156	156	153	150
F-stat	4.16	34.25	2.72	2.31	2.15	1.04	2.17

Includes 2008 data + % REO 3 months prior + % REO 6 months prior * 5% significance level ** 1% significance level

Specification (1) – (2): Single Regressor

In this base specification the natural logarithm of price change is regressed on the percentage of REO resales^{VII}. In specification (1), the coefficients on % REO Resale's and the intercept are statistically significant at the 5% and 1% levels respectively. The % REO Resale's explanatory variable explains only 4% of the variance in $\ln(\text{price})$. In specification (2), which includes data for 2008, the intercept is unchanged, while the coefficient on % REO Resale's decreases to -0.12. Both coefficients are statistically significant at the 1% level. Specification (2) explains 20% of the variation in $\ln(\text{price})$. These results suggest some relationship between the level of REO resale's and home prices, but as in the state level regression, the potential for omitted variable bias is great, therefore, we need to control for other factors before we can estimate the true effect of distressed homes with any precision.

^{VII} Percentage REO Resale's, Unemployment Rate, and State GDP: 1% = 0.01

Specifications (2) – (4): Multiple Regressors

As in the state level regressions, the Unemployment Rate and State GDP are included to control for economic conditions which may affect home prices. When the two variables are introduced individually, neither is statistically significant at the 5% level. However, when they are introduced simultaneously the Unemployment Rate becomes significant at the 5% level, while State GDP remains insignificant. When we control for the Unemployment Rate, the coefficient on % REO Resale's becomes more negative, confirming economic theory that the Unemployment Rate is positively correlated with % REO Resale's and negatively correlated with housing price growth.

Specification (5) – (6): Multiple Regressors and Time Lag

To address reverse causality, specification's (5) and (6) introduce a lag of three and six months respectively. When the lags are introduced, none of the coefficients are statistically significant at the 5% level, suggesting that the time lag weakens rather than strengthens the causation hypothesis. In general, specification's (5) and (6) mirror specification (1) in that a one percentage point increase in the percentage of REO resale's leads to negative 0.09% price growth per month.

Effect of REO resale's on Other California Housing Statistics

The following three tables report the results of regressing a variety of sales related statistics in California on % REO Resale's for the same thirteen year time period as in the $\ln(\text{price})$ regression above. The regressions include the same controls, State Unemployment Rate and State GDP, as well as three and six month lags of REO resales. The scale used for the regressors has been modified for the following three regressions for the sake of clarity. A one

percentage point change is now equal to 1 rather than 0.01 as was the case in the price regression^{VIII}.

Table 3: California-Monthly Sales

Regression of Monthly Sales (Seasonally Adjusted) on CA % REO Resale's, Unemployment Rate, and GDP (1995-2007)						
Dependent Variable: Monthly Sales						
Regressor	(1)	(2)	(3)	(4)	(5) ⁺	(6) ⁺⁺
% REO Resale's	-927** (68.5) [-13.52]	-964** (70.4) [-13.69]	-1,029** (61.4) [-16.76]	-1,168** (64.7) [-18.03]	-1,096** (79.8) [-13.73]	-941** (78.4) [-12.00]
Unemployment Rate		537 (510) [1.05]		1,745** (509) [3.42]	2,016** (628) [3.21]	2,006** (652) [3.07]
State GDP			1,250** (154) [8.09]	1,469** (180) [8.15]	1,676** (259) [6.45]	1,654** (286) [5.78]
Intercept	48,723** (701) [69.48]	45,747** (3,129) [14.61]	44,311** (951) [46.56]	33,866** (3,485) [9.72]	30,946** (4,473) [6.92]	30,302** (4,745) [6.39]
SER	5,714	5,712	4,942	4,724	5,480	5,977
R ²	0.51	0.51	0.64	0.67	0.54	0.41
adjusted R ²	0.51	0.51	0.63	0.67	0.53	0.4
n	156	156	156	156	153	150
F-stat	182.4	99.03	149.35	113.25	71.22	51.1
⁺ % REO 3 months prior ⁺ % REO 6 months prior * 5% significance level ** 1% significance level						

Table 4: California-Median Days on the Market

Regression of Median Days on Market on CA % REO Resale's, Unemployment Rate, and GDP (1995-2007)						
Dependent Variable: Median Days on Market						
Regressor	(1)	(2)	(3)	(4)	(5) ⁺	(6) ⁺⁺
% REO Resale's	1.54** (0.13) [11.05]	1.46** (0.12) [11.05]	1.62** (0.13) [11.89]	1.58** (0.11) [13.59]	1.32** (0.16) [7.99]	1.07** (0.16) [6.42]
Unemployment Rate		1.22 (0.06) [1.16]		0.49 (1.14) [0.42]	0.19 (1.37) [0.14]	0.35 (1.45) [-0.24]
State GDP			-0.95** (0.33) [-2.81]	-0.88* (0.37) [-2.34]	-1.01* (0.48) [-2.08]	-0.91 (0.52) [-1.73]
Intercept	30.77** (1.49) [20.67]	23.99** (6.59) [3.64]	34.12** (2.2) [15.48]	31.18** (7.99) [3.90]	35.07** (9.44) [3.71]	35.09** (9.93) [3.53]
SER	11.27	11.25	11.09	11.11	11.98	12.52
R ²	0.43	0.44	0.45	0.45	0.3	0.21
adjusted R ²	0.43	0.43	0.44	0.44	0.29	0.18
n	156	156	156	156	153	150
F-stat	122.17	74.85	72.43	64.12	25.62	30.57
⁺ % REO 3 months prior ⁺ % REO 6 months prior * 5% significance level ** 1% significance level						

^{VIII} Percentage REO Resale's, Unemployment Rate, and State GDP: 1% = 1

Table 5: California-Inventory (months)

Regression of Months of Inventory on CA % REO Resale's, Unemployment Rate, and GDP (1995-2007)						
Dependent Variable: Months of Inventory						
Regressor	(1)	(2)	(3)	(4)	(5) ⁺	(6) ^{**}
% REO Resale's	0.36** (0.03) [11.96]	0.36** (0.03) [10.77]	0.40** (0.02) [14.12]	0.42** (0.03) [13.32]	0.35** (0.04) [9.28]	0.27** (0.03) [8.52]
Unemployment Rate		0.03 (2.35) [0.15]		-3.65 (2.50) [-1.46]	-3.95 (2.98) [-1.32]	-3.17 (3.02) [-1.05]
State GDP			-0.44** (0.07) [-5.68]	-0.48** (0.09) [-5.03]	-0.51** (0.13) [-3.93]	-0.47** (0.13) [-3.51]
Intercept	2.73** (0.25) [10.99]	2.53 (1.41) [1.79]	4.28** (0.44) [9.74]	6.47** (1.76) [3.68]	7.25** (2.16) [3.34]	7.06** (2.22) [3.18]
SER	2.35	2.36	2.12	2.12	2.45	2.65
R ²	0.48	0.48	0.58	0.59	0.38	0.24
adjusted R ²	0.48	0.48	0.57	0.58	0.37	0.22
n	156	156	156	156	153	150
F-stat	143.06	71.26	100.67	71.36	41.78	30.57

⁺% REO 3 months prior ⁺% REO 6 months prior ^{*} 5% significance level ^{**} 1% significance level

In nearly all three cases the coefficients on % REO Resale's and State GDP remain statistically significant at the 1% level, suggesting that when GDP is controlled for, the percentage of REO resale's has a more robust effect on sales than on prices. The coefficient on Unemployment Rate on the other hand is only statistically significant in the Sales regression. When a six month time lag is introduced, the decrease in the coefficient on the % REO Resale's is significant at the 5% level for the Median Days on the Market and Inventory regressions.

Forecasting

The results of the four individual California regressions follow intuition. When controlling for both, the California Unemployment Rate and GDP, an increase in the percentage of REO resale's leads to a decrease in home prices and sales, while at the same time increasing the median days on the market and inventory. After analyzing the regression results and sorting through their interpretations, I feel that the following regression equations best describe the relationship between the percentage of REO resales and the four California real estate statistics.

Price Change

$$\ln(\text{Price}) = 0.01 - 0.09\% \text{REO Resale's} + E \quad (\text{excluding 2008 data})$$

As the monthly percentage of REO resale's increase by 1 percentage point, existing home price growth in California is expected to decrease by 0.09% per month (1.08% annualized) on average. The intercept coefficient is statistically significant at the 1% level, while the % REO Resale's coefficient is significant at the 5% level.

$$\ln(\text{Price}) = 0.01 - 0.12\% \text{REO Resale's} + E \quad (\text{including 2008 data})$$

As the monthly percentage of REO resale's increase by 1 percentage point, existing home price growth in California is expected to decrease by 0.12% per month (1.44% annualized) on average. The coefficients on both, % REO Resale's and the intercept are statistically significant at the 1% level.

Sales

$$\text{MonthlySales} = 33,866 - 1,168\% \text{REO Resale's} + 1,745 \text{UnemploymentRate} + 1,469 \text{StateGDP} + E$$

As the monthly percentage of REO resale's increase by 1 percentage point, monthly existing home sales in California are expected to decrease by 1,168 units on average, holding the Unemployment Rate and State GDP constant. All of the coefficients are statistically significant at the 1% level.

Median Days on the Market

$$\text{DaysOnTheMarket} = 34.12 + 1.62\% \text{REO Resale's} - 0.95 \text{StateGDP} + E$$

As the monthly percentage of REO resale's increase by 1 percentage point, the median amount of days on the market for an existing home in California is expected to increase by 1.62 days, on average, holding State GDP constant. All of the coefficients are statistically significant at the 1% level.

Inventory

$$\mathbf{Inventory = 4.28 + 0.39\%REOResale's - 0.44StateGDP + E}$$

As the monthly percentage of REO resale's increase by 1 percentage point, the months of inventory of existing homes in California is expected to increase by 0.39 months on average, holding State GDP constant. All of the coefficients are statistically significant at the 1% level.

Forecast's Versus Observed Values for 2008

Since 2008 data is not used in the four regressions due to the unavailability of 2008 State GDP control data, the above regression equations can be tested for forecasting accuracy by estimating California Real Estate market statistics for 2008 by using % REO Resale data from 2008. Assuming REO Resale's of 43.9%, which is the average for 2008, home prices in California are expected to fall 35.4%^{IX}. In 2008, the actual price decline was 58.5%. With % REO Resale's at 43.9%, the Unemployment Rate at 7.2% (2008 average), and State GDP growth of 0%, total monthly sales are expected to be -4,845 versus the actual monthly average of 36,645 for 2008. In this forecast the regression completely fails to anticipate the pick up in sales resulting from of the recent surge in REO resales. In the past REO Resale's were associated with decreasing monthly sales. The estimate for Median Days on the Market is 105.23 days versus the actual 2008 monthly average of 52.08 days. Inventory is estimated to be 21.4 months versus the 2008 actual monthly average of 8.89 months. The wide divergence in actual versus predicted values shows just how unprecedented residential real estate activity was in California in 2008.

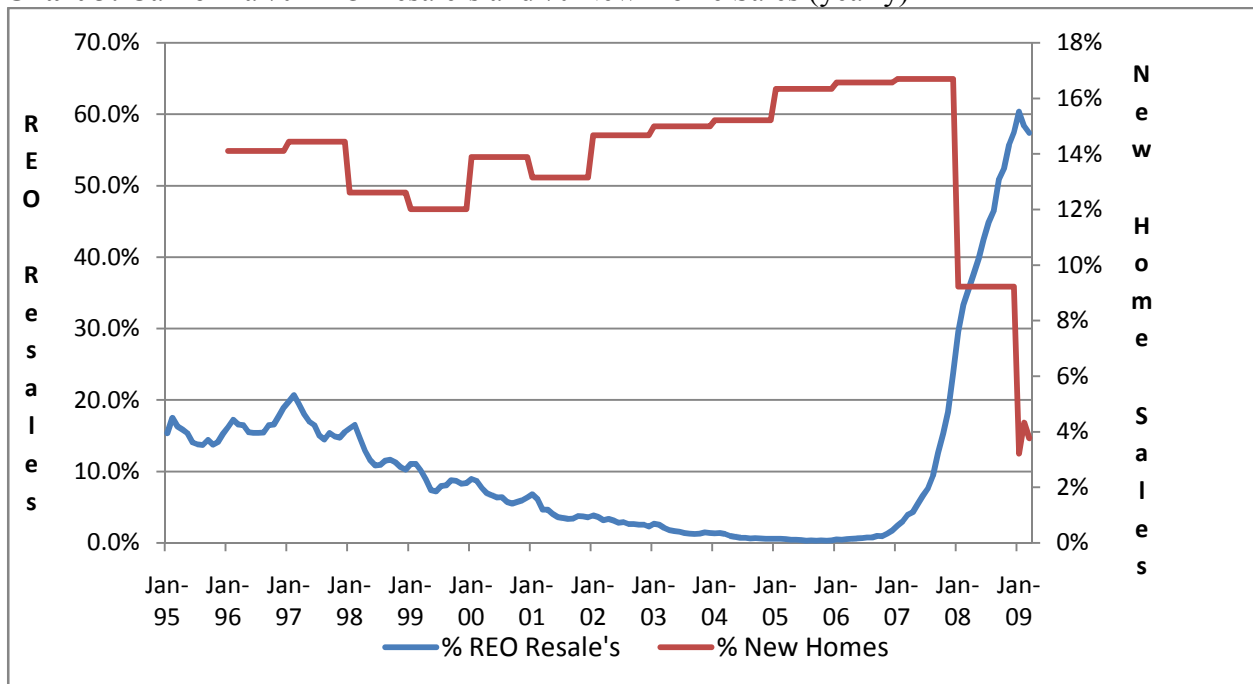
9. Composition of Current Sales

Returning to the second underlying motivation for this paper, I will now focus on how the composition of today's housing market has changed over the last few years. In January of 2005 new home sales accounted for 14.5% of all home sales in the United States²². In December of

^{IX} Using Price regression equation that excludes 2008 data

2008 that number was down to 6.8%. On a percentage basis, new home sales decreased 71% over that time period. While new homes now make up a smaller proportion of total home sales and the absolute number of new homes sold has decreased, distressed sales seem to be steadily increasing. Nationwide data for REO resales is unavailable, but RealtyTrac reports that the number of REO homes has increased sharply, as has the number of homes sold through auctions. This suggests that a growing number of homes clearing the market or soon to be listed on the market are distressed.

Chart 3: California % REO Resale's and % New Home Sales (yearly)



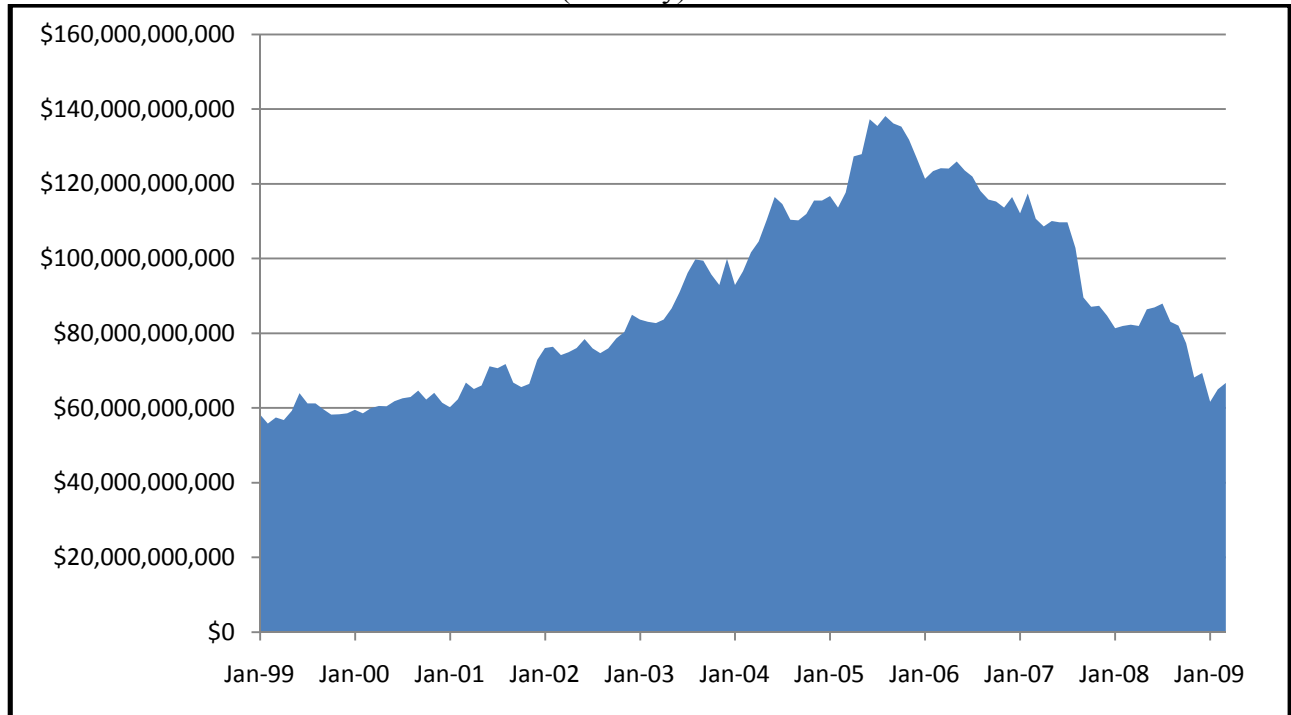
Sources: MDA DataQuick Information Systems and Hanley Wood Market Intelligence (HWMI)

Fortunately, data is available for the percentage of REO resales, as well as the number of new home sales in the state of California. In 2005, new home sales accounted for 16.5% of all home sales in California²³. By 2008 that percentage had dwindled down to 9.2%, and in the first 3 months of 2009 stands at about 4%. During this time period new home sales fell by 70.4% and the percentage of REO resale's increased from 0.5% to 57.5%. This stark divergence in the composition of the market presents important questions about the future fate of California

residential real estate. I will shortly ponder what to make of this shift in composition, but first let us examine one more indicator of housing market activity for the United States and California.

10. Dollar Volume

Chart 4: United States 01/1999 – 03/2009 (monthly)



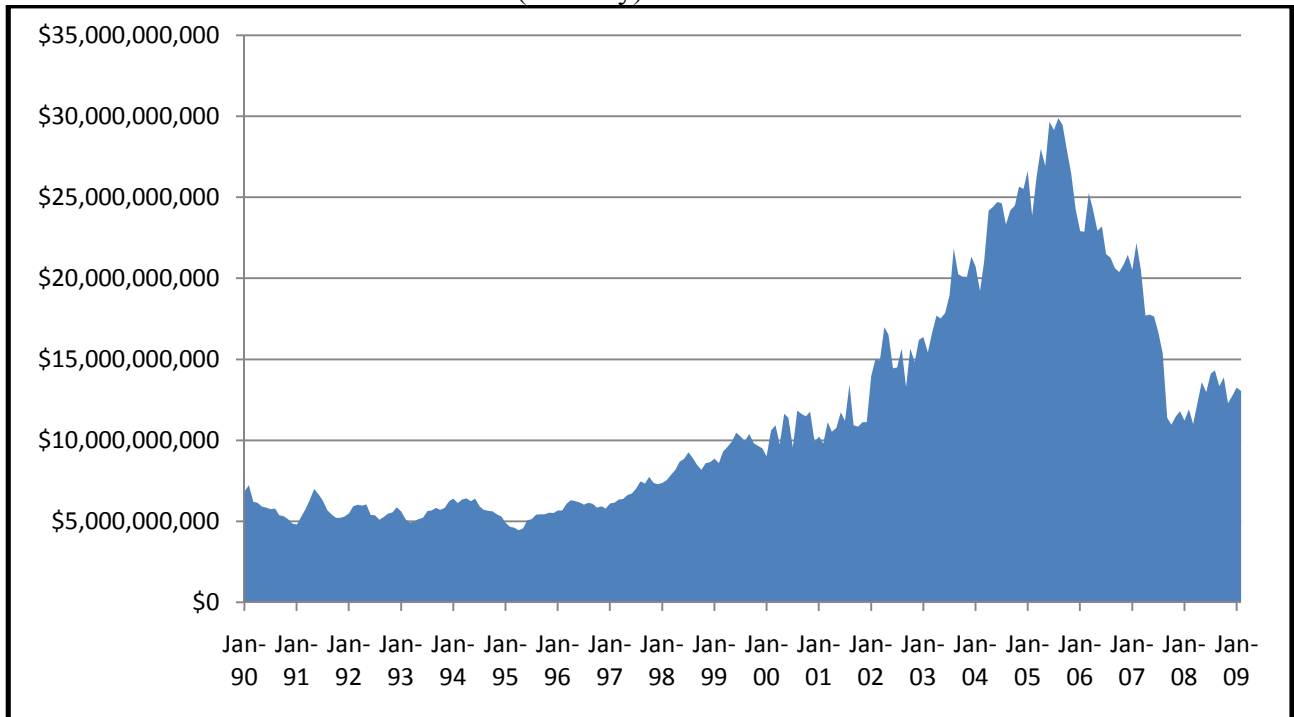
Source: Authors calculations using NAR data

The above dollar volume chart was compiled by multiplying the monthly median price by seasonally adjusted monthly sales. I understand that the average price and the median price can be significantly different due to skewness in the data. Nevertheless, this chart is presented with caution in an attempt to measure dollar volume activity over time in the United States existing homes market. From its peak in the summer of 2005, dollar volume is down 52.9% and is near eight year lows.

During the boom times of 2004-2006, mortgage financing for high priced homes, or jumbo loans, was much easier to obtain. As a result, the average price of all existing home sales may have been higher than the median price, leading to an underestimate of the total dollar value in the above chart. Contrast that with today's lending environment in which jumbo loans are

much scarcer and the number of million dollar home sales has fallen substantially, while at the same time foreclosures have risen exponentially, and it is plausible that the average price is now below the median price, leading to an overestimation of dollar volume for the most recent months²⁴. Taken together, the plunge in dollar volume may be even more pronounced than the above chart suggests.

Chart 5: California 01/1990 – 02/2009 (monthly)



Source: Authors calculations using CAR data

The collapse in California dollar volume is even more dramatic with dollar volume declining by 56.3% from its peak in the summer of 2005. Using the median price for California may be even more dangerous, as California real estate has historically been one of the priciest in the nation, while at the same time California has been one of the hardest hit by foreclosures. This combination, leads to an even greater potential for error, but as with the state data, I argue that the error may just underestimate the true change in dollar volume

11. Policy Proposals

The preceding regressions show that a relationship between distressed homes and home prices and sales activity exists. The historical charts show that recent events in the residential real estate market are unprecedented. With record home price declines throughout the United States, some may call on government officials to intervene in order to stem the slide. Employing the above regressions shows that a policy which directly targets distressed homes can be expected to raise the housing price growth and sales rates, while decreasing selling time and inventory.

Two questions immediately come to mind with any proposal in which politicians tinker with the market mechanism. First, what would it cost to decrease the percentage of distressed homes around the country? Second, and arguable more fundamental, is it the governments responsibility to subsidize asset prices? Any actions by government officials would probably fall under the pretext of maintaining economic stability, but may nevertheless send dangerous signals to future home buyers.

Reducing the number of distressed homes addresses the negative repercussions of a historic housing bubble and subsequent bust, but does little to address the underlying problems which led to the bubble in the first place. I believe that the best long-term strategy that government officials can take to ensure the long term health of the real estate market is to enforce conservative lending standards. By maintaining more conservative lending standards, relative to those in place during 2004-2007, the housing market may be better able to achieve stable growth, without the accompanying booms and busts.

With that being said, if they choose to, how exactly can elected officials bring down the level of distressed and REO homes? For one, they can step in and pay down home owners' mortgages to the current market value of the home. As Fabozzi (2007) highlights "a mortgage's Loan-to-Value ratio has been found in numerous studies to be the single most important

determinant of its likelihood of default” (pg 237)²⁵. By bringing homeowners closer to break even, government officials may be able to prevent or at least significantly reduce the incentive of homeowners to default. This policy may be favored over court decisions which force holders of residential mortgage backed securities to write down the principal on the mortgages because rewriting contracts would have the negative consequence of weakening the underlying confidence in the residential mortgage backed securities market. While lowering the future number of potential defaults, this policy fails to address the current inventory of REO homes. This policy favors homeowners currently in distress while ignoring those who have already defaulted, thus is easy prey for arguments about fairness.

To reduce the size of the current REO inventory, bulldozing or destroying the homes in some other fashion may be the only way to clear them from the market. If the government chose to buy the homes they would eventually still need to sell them, thus returning the homes to the market to compete with other listed homes. But, if the homes are destroyed the properties are removed for good. The land could then be sold to independent builders or even individuals who could then rebuild. While this may still present a form of competition for listed homes, it is not nearly as direct as from an existing home. Selling the homes back to their former or current owners at a discount is simply a variation on the principal reduction idea presented above.

Giving the homes away is a possible substitute for demolition, but the question of fairness and distribution leaves any such plan highly questionable. If the homes are given away to potential home buyers, then future demand will be deflated. If the homes are given to their former owners, a dangerous precedent is established (i.e. rewards for financial mismanagement). Renting the homes may also be an option, but would require an extensive administrative infrastructure, and would drastically impact the market for rental homes. In the end I believe a

hands-off approach is in the best interests of taxpayers, although politician interests and taxpayer interests do not always align.

12. Looking Forward

The preceding data, regressions, and analysis have focused on what has already transpired in the housing market, but I believe the more important question is what is going to happen next in the housing market and what a recovery might look like. On a national level, distressed homes continue to appear on the market, while existing home sales are near twelve year lows. In California, monthly total sales have sharply risen on a (y-o-y) basis, led by REO resales. Because this uptick in sales is the result of REO and Auction sales, it may prove to be only temporary. If the monthly data for California is characteristic of all states, then any increase in seasonally adjusted national sales in the coming months will likely be the result of REO and Auction homes. Announcing the end of the housing downturn as a result of an uptick in sales may be premature.

What happens after the initial surge of REO resale's and Auctions will determine the future outlook for the housing market. If the percentage of REO resale's returns to its historical average, 10.3% in the case of California, and the median price does not increase by much, this will signal that the value of owner occupied existing homes is comparable to that of REO homes. In the California regression, 10.3% REO resale's corresponds to a monthly price change of -0.9% (-10.8% annualized). This average may be exaggerated due to the recent historic levels of REO resale's which skew the long term average upwards. Nevertheless, a recovery may simply mean a flat median price, for several years.

Data on the number of homes withdrawn from the market is unavailable, but if the lemon's theory has any merit, then existing home owners are waiting on the sidelines to relist their homes as soon as they sense competition from distressed homes has subsided. This pent-up

supply of non distressed homes may delay any price recovery in housing. Another source of shadow inventory lies in REO properties which are yet to hit the market. From all the data collected, there is no reason to believe that distressed levels have peaked and begun to subside. To the contrary, in California the number of defaults in the first quarter of 2009 was up 80% from the fourth quarter of 2008, and up 19% from the first quarter of 2008²⁶.

If the above regressions are persuasive, then one can expect home prices to fall on average in California and the rest of the United States for the remainder of 2009 and throughout 2010, and perhaps even longer. The regression predicts that with U.S. GDP growth at 0%, and with current statewide average distressed levels at 1.75%, price growth will be -4.7% per year on average. Forecasts for California are more difficult because the level of REO resale's is so much greater than in recessions past, that it makes forecasting near term price direction a true speculation, as the forecasts above vividly demonstrated. Nevertheless, estimates for price drops of about 10% for 2009 and again in 2010 are not that unreasonable.

14. Appendix

Exhibit 1: Percentage of Distressed Homes Per State 2005-2008

	2005	2006	2007	2008
Alabama	0.20%	0.21%	0.37%	0.41%
Alaska	0.55%	0.38%	0.58%	0.82%
Arizona	1.11%	1.07%	2.62%	6.07%
Arkansas	1.01%	0.89%	1.11%	1.33%
California	0.47%	1.08%	3.62%	6.45%
Colorado	1.48%	2.61%	3.34%	3.25%
Connecticut	0.77%	0.82%	1.63%	1.79%
Delaware	0.07%	0.11%	0.37%	0.80%
District of Columbia	0.07%	0.04%	0.28%	1.65%
Florida	1.41%	1.46%	3.20%	6.07%
Georgia	1.16%	1.96%	2.51%	3.09%
Hawaii	0.19%	0.13%	0.25%	0.68%
Idaho	0.40%	0.41%	0.96%	1.89%
Illinois	0.90%	1.39%	1.73%	2.24%
Indiana	1.14%	1.73%	1.91%	2.24%
Iowa	0.17%	0.26%	0.56%	0.49%
Kansas	0.16%	0.34%	0.41%	0.67%
Kentucky	0.26%	0.38%	0.46%	0.47%
Louisiana	0.18%	0.16%	0.39%	0.40%
Maine	0.02%	0.03%	0.19%	0.46%
Maryland	0.25%	0.20%	1.08%	1.83%
Massachusetts	0.19%	0.59%	1.52%	2.00%
Michigan	0.87%	1.79%	3.01%	3.25%
Minnesota	0.10%	0.26%	0.59%	1.05%
Mississippi	0.17%	0.08%	0.16%	0.19%
Missouri	0.45%	0.67%	1.21%	1.62%
Montana	0.23%	0.25%	0.32%	0.28%
Nebraska	0.30%	0.39%	0.51%	0.43%
Nevada	0.75%	1.98%	6.02%	12.16%
New Hampshire	0.03%	0.02%	0.71%	1.37%
New Jersey	1.11%	1.15%	1.53%	2.02%
New Mexico	0.96%	0.62%	0.45%	0.54%
New York	0.54%	0.66%	0.72%	0.71%
North Carolina	0.40%	0.56%	0.91%	1.06%
North Dakota	0.04%	0.06%	0.10%	0.12%
Ohio	1.10%	1.62%	3.02%	2.92%
Oklahoma	0.87%	0.97%	0.84%	1.01%
Oregon	0.41%	0.60%	0.67%	1.61%
Pennsylvania	0.58%	0.70%	0.62%	0.79%
Rhode Island	0.01%	0.28%	0.72%	1.64%
South Carolina	0.37%	0.35%	0.25%	0.84%
South Dakota	0.05%	0.08%	0.09%	0.12%
Tennessee	1.09%	1.37%	1.68%	1.95%
Texas	1.52%	1.70%	1.59%	1.43%
Utah	1.23%	1.45%	1.04%	2.13%
Vermont	0.02%	0.01%	0.02%	0.04%
Virginia	0.10%	0.13%	0.74%	2.13%
Washington	0.54%	0.69%	0.86%	1.22%
West Virginia	0.13%	0.10%	0.13%	0.08%
Wisconsin	0.20%	0.30%	0.68%	1.00%
Wyoming	0.09%	0.17%	0.21%	0.38%

* 2008 numbers use 2007 Housing units in calculation

Source: Authors calculations using RealtyTrac and U.S. Census Bureau data

Endnotes

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 - ³ Ibid
 - ⁴ United States Census Bureau
 - ⁵ MDA DataQuick Information Systems
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 - ¹⁹ Office of Federal Housing Enterprise Oversight, Research and Analysis. <http://www.ofheo.gov/Research.aspx?Nav=111>
 - ²⁰ Bureau of Economic Analysis, Regional Economic Accounts. <http://www.bea.gov/regional/gsp/>
 - ²¹ Bureau of Labor Statistics, Local Area Unemployment Statistics. <http://www.bls.gov/lau/>
 - ²² United States Census Bureau
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