SPILLOVER EFFECTS OF FORECLOSURES IN SACRAMENTO COUNTY, CALIFORNIA

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SPILLOVER EFFECTS OF FORECLOSURES IN SACRAMENTO COUNTY, CALIFORNIA

A Thesis

by

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Abstract

of

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Lawmakers take steps to address the subprime mortgage crisis, only to face criticism. In many cases, people focus on tax dollars going to prevent foreclosures and are not aware of the level of benefits they would retain by preventing foreclosures. The goal of this thesis is to quantify the effects of foreclosures on surrounding property values in Sacramento County, California between January 2008 and July 2009. The data used in this thesis comes from the Multiple List Service (MLS) database and the 2000 U.S. Census. The thesis uses an Ordinary Least Squares regression. This thesis found that homes in foreclosure experience a selling price decrease of 19.989% and decrease the selling price of surrounding properties by 0.496% per unit change in the foreclosure rate. The values derived from the regression indicate that the equity preserved for the public and the government outweighs the cost of enacting foreclosure mitigation programs.

_____, Committee Chair
Robert W. Wassmer, Ph.D.

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Date

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TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF FIGURES

Page

Chapter 1

INTRODUCTION

In February of 2009, President Barack Obama proposed the Homeowner Affordability and Stability Plan that included three elements: to assist homeowners on the brink of foreclosure, to allow struggling homeowners to refinance without penalty, and to stabilize the government sponsored enterprises Freddie Mac and Fannie Mae. Although this plan has received much criticism, the Obama Administration argues that this plan will help all Americans because preventing foreclosures will stabilize home prices. This argument begs the question: how much of an affect do foreclosures have on surrounding property prices?

The recent dramatic rise of home foreclosures began in 2007. The reasons for the foreclosures include deregulation, predatory lending practices, unprofessional mortgage underwriting, deregulation which allowed shady investing in collateralized debt obligations and credit default swaps, and homeowners losing their incomes and ability to pay their mortgages. A foreclosure in a neighborhood used to be a rarity. Now there are many foreclosed homes in a single neighborhood, and the result is evident in the declining appearance of the neighborhood, the increase in crime, and the decreasing prices of nearby homes. This thesis explores how the number and concentration of foreclosed homes affects the sales prices of homes within a given zip code, based on housing market data in Sacramento County, California between January of 2008 and July 2009.

This section will contain a historical account of the events and public policy decisions that led up to the subprime mortgage crisis. Next, there is a discussion of the fiscal and non-fiscal negative externalities associated with foreclosures. Additionally, this section will include recent legislation that is pending or has passed at both the state and federal levels.

A Brief History of the Mortgage Crisis

The forces that led to the mortgage meltdown are many and complex. Below is a brief explanation of some of the primary forces that led to the mortgage meltdown. A combination of deregulation, questionable lending practices, and investing practices destroyed the American dream of homeownership for many and brought the U.S. and world economies to the brink of disaster.

Predatory Lending Practices

Lenders offered "subprime" loans to purchasers of new homes and existing homeowners who had built up equity, encouraging them to take out larger lines of credit than they should have. These creative loans included loans with adjustable rates, teaser introductory rates, zero interest loans, and loans with "Pick-a-Pay" mortgage payment plans with negative amortization as an option. Many borrowers did not understand how the loans worked and the jeopardy they would face when the adjustments in the interest rates occurred or the loan balance grew instead of reduced as borrowers made payments.

Unprofessional Mortgage Underwriting

Mortgage lenders and brokers receive big commissions for each loan they close. The incentive and pressure to sell loans was unprecedented. To close as many loans as possible, they inflated the incomes of borrowers and the values of homes to qualify borrowers for big loans that they could not afford. Many of the loans they sold were labeled “Liar Loans” or NINJA (No Income, No Job or Assets) loans. There was very little likelihood that a borrower would ever be able to pay off a mortgage or even be able to make minimum monthly payments, but the lender would get his or her payment up front (Wray, 2008).

Loss of Available Credit to Refinance or Buy

When the real estate bubble burst, access to credit for those needing to refinance or wanting to buy a foreclosed property disappeared. Deregulation created the bubble, and when it popped, property values and credit opportunities disappeared.

Short History of Public Policies Behind the Subprime Mortgage Crisis

This is an interesting time in the real estate market. The real estate market has experienced what has become commonly termed the subprime mortgage crisis. The roots of the crisis date back to the 1950s with the passage of the Treasury-Fed Accord by Congress. Directly following World War II, in 1942, the Federal Reserve Bank pledged to maintain low interest rates on all Treasury Bills. The main goal of the plan was to prevent the events of the recent past, namely another Great Depression, and help boost the economy. The commitment lasted until 1951, when the Federal Reserve Bank

dissolved the agreement because of uncertainty about the possibility of entering long periods of deficit because of the Korean War (Hetzel & Leach, 2001). For years to come, the Federal Reserve Bank continued to relax constraints at a barely noticeable slow place. Small changes occurred and the federal government slowly lifted regulations.

Congress passed the Taxpayers Relief Act of 1997. This measure created tax incentives for couples to invest in second homes and investment properties, by increasing the capital-gains exclusion from $125,000 to $500,000 per couple.

The next major event was the Financial Modernization Act of 1999, which repealed the Glass-Steagall Act and allowed commercial banks to participate in investment activity. Congress established the Glass-Steagall Act in 1933 to prevent what happened in the Great Depression involving banks' investments of its depositors' money in the stock market. Congressional committee hearings classified these acts as fraud and conflicts of interest. (Jackson, 1987) The repeal of this Act opened the door to the same types of activities that occurred in the 1920s and the questionable business practices that lead to the subprime mortgage crisis in 2007.

Subprime Lending

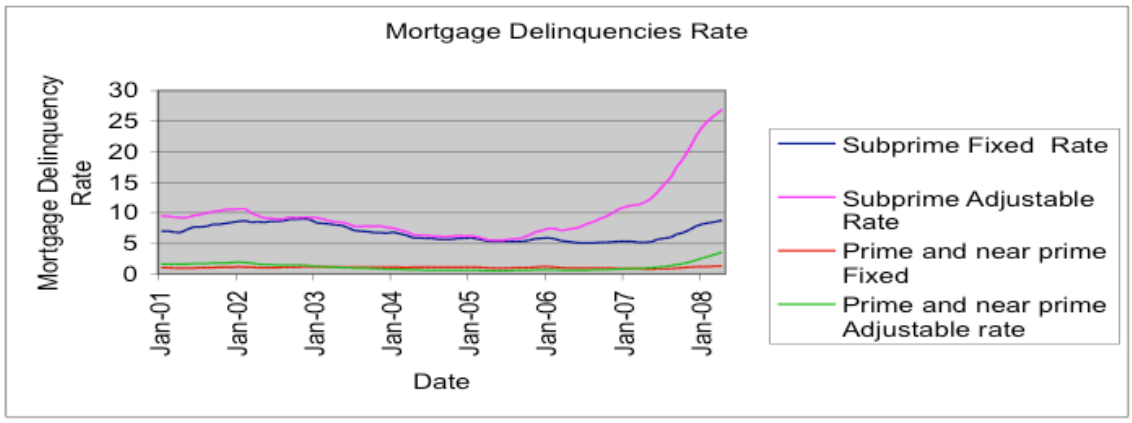
A combination of public policy decisions allowed lenders to market subprime loans to people with poor credit histories or those who were not able to put down 20% down payments. In 1980, Congress passed the Depository Institutions Deregulation and Monetary Control Act, which suspended state interest rate caps. The second measure, the Alternative Mortgage Transaction Parity Act of 1982, allowed variable interest rates and

balloon payments. The third measure, the Tax Reform Act of 1986, eliminated tax incentives for interest on consumer loans except for mortgages, which increased the appeal of mortgage consumer debt (Chomsisengphet & Pennington-Cross, 2006).

The aforementioned public policy decisions set the stage for a new model of mortgage. Subprime mortgages have attractive rates below the prime rate for the first few years but will then reset to higher and higher rates. Additionally, lenders allowing looser down payment restrictions allowed more people to obtain mortgages with these initially lower interest subprime rates. In addition to benefits for those on Wall Street, public policy allowing these types of loans had positive motivations to increase the number of homeowners in the country. President George W. Bush actively pushed a policy to expand the opportunity for home ownership to minorities, causing mortgage brokers to become more lenient with their lending strategies. Both Democrats and Republicans supported this policy. Democrats favored the plan because it provided more access for all and helped level the playing field. Republicans favored the plan because it was good for the market would likely win votes. All of these factors combine to allow the opportunity of homeownership to those whom typically would not have been able to buy homes.

However, subprime loan holders often have a higher risk of missing payments and defaulting. Additionally, people who could traditionally afford homes over extended themselves and got loans for larger amounts than they could afford. Studies have shown that subprime mortgages are six times more likely to go into defaulted than tradition mortgages (Chomsisengphet & Pennington-Cross, 2006).

Figure 1-1 shows mortgage delinquency rates between 2001 and 2008. It is important to note that the subprime mortgages are more likely to default than prime and near-prime loans whether or not they have fixed or adjustable rates. Overall, owners who hold adjustable rate mortgages are more likely to default on their loans than those who hold fixed loans. This table also shows the point in time when the number of foreclosures began to increase. In mid-year 2005, the mortgage delinquency rates begin to diverge. Generally the prime and near prime mortgages remain stable and start with lower interest rates than subprime rates. Subprime fixed rates remain relatively stable and only increased slightly in late 2007. The most dramatic changes occur within the delinquency rates for subprime adjustable mortgages: they increased slightly beginning in mid 2005 and then started to increase dramatically in 2007.



Source: Board of Governors of the Federal Reserve System, 2008.

Figure 1-1. Mortgage Delinquencies Rate.

Securitization makes subprime mortgages less risky for investors. Common practice for mortgage brokers is to bundle subprime mortgages and sell them to specialty

finance companies. The specialty finance companies operate under the principle that acquiring more loans is similar to diversification and therefore the company should acquire as many mortgages as possible (Weaver, 2008).

The past decade was a fantasy opportunity for people who would not have qualified for traditional mortgages allowing them to become first time homebuyers with the help of subprime mortgages. Some of the individuals who secured the mortgages successfully made payments and realized the American Dream. Others have not been so lucky. Some of these individuals may have fallen into the trap of predatory lending.

A subset of the subprime lending market is commonly termed predatory lending. Predatory lending includes basing the loan value on the value of collateral instead of the borrower's ability to repay the loan, prepayment penalties, balloon payments that are above the borrower's ability to play, and disguised excessive interest rates. Predatory lending occurs when lenders drive borrowers into agreements they do not understand and make the property appear affordable when it is not, with the intention of making more loans without regard for the risk to the borrower (Quercia, Stegman, & Davis, 2007).

General State of the Economy

The economic crisis dates back to the economic boom and real estate boom that started in the 1990s. The first glimpse of trouble was the stock market bubble bursting in 2000. There was a small recovery in the stock market in 2003, but the 2000 dip was the first sign of what was yet to come. The rapid increase in the stock market and money in people's pockets fueled home buying and the real estate market. Refinancing was also

prominent during the same time-period, replacing normal loans with subprime loans. Subprime loans had broad effects on the stock market because of the practice of bundling home loans and mortgages into packages ranked by class, for sale to large investors interested in turning a profit on the interest rates involved (Shiller, 2008).

Economic Effects

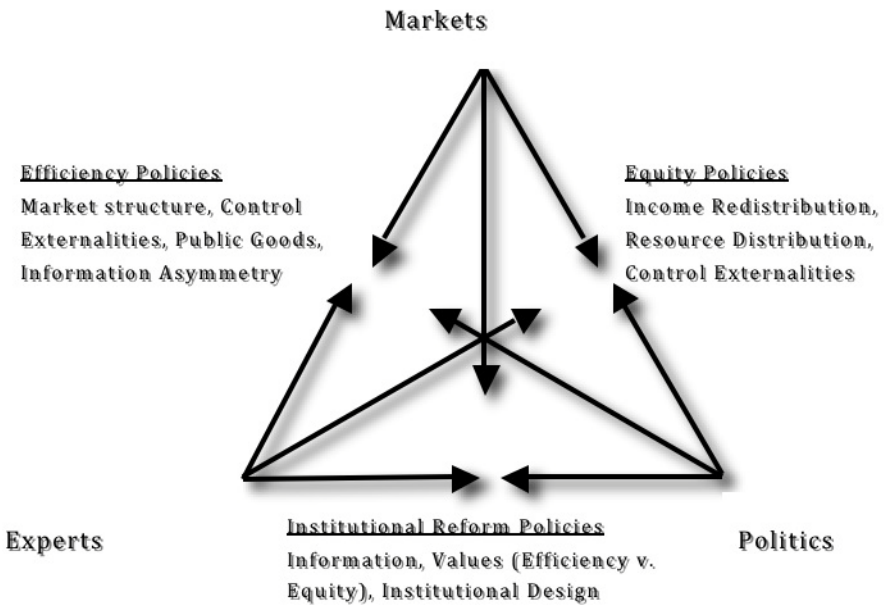
Foreclosures can be a negative externality for the neighboring homeowners. An externality affects someone who is not directly involved in the transaction. Because it occurs outside of the transaction, its effects are not included in the economic calculations. There are two types of externalities, negative and positive.

Foreclosures have a number of effects on neighborhoods that range from crime rates to blight. Immergluck and Smith (2005) document increased crime rates in neighborhoods that have higher concentrations of foreclosures. Crime rates are often one of the factors examined when assessing the standard of living in a neighborhood. Additionally, it is generally accepted and cited that an increase in foreclosures will also lead to an increase in blight. These factors combine to encourage people who would normally be happy to stay and live in the neighborhood to move away, which leaves more houses that are vacant and the possibility of increased crime levels and blight (Bier, 2001).

Homes sit vacant and banking institutions fail to provide the needed upkeep. The landscaping quickly grows out of control and the properties are likely to become targets for squatters. The goal of government is to do what is best for society so positive

externalities should be encouraged and government should step-in with ways to discourage negative externalities. People do not make decisions about foreclosure with the greater good in mind. Homeowners often face foreclosure in times of great distress and make the decision with priority to their family's needs. If it is less costly to default on the loan and go into foreclosure, than that is what they will do. Banks also consider the costs and benefits of whether to foreclose on a house, and if the benefits outweigh the costs, banks will proceed. The government can intervene with public policy measures to assist the financial market and make foreclosures less appealing for banks. If the benefits of placing a property in default and entering the foreclosure process do not outweigh the costs, the motivation to foreclose will not be there and the rates of foreclosures will decrease.

A comprehensive visual representation of the general category of players involved in economic related issues is what is familiarly termed as Munger's (2000) Triangle. The Munger Triangle often used to examine public policy issues from an economic standpoint.



Source: Munger, 2000

Figure 1-2. Munger Triangle.

Within this diagram, Munger displays the three vertexes of a triangle that represent markets, experts and politics. The corners represent opposing forces in conflict. Each leg of the triangle connecting its respective vertexes represents conflict between markets, experts and politics. The leg connecting experts and politics deals with Institutional Reform policies such as information values (efficiency vs. equity) and institutional design. The leg connecting markets and politics deals with Equity Policies like income redistribution, resources distribution and controlling externalities. The leg

connecting markets and experts deals with Efficiency Policies like market structure, controlling externalities, public goods and information asymmetry (Munger, 2000).

Negative externalities are a form of market failure and fall on the efficiency side of the Munger Triangle. Negative externalities violate optimality rules and lead to allocation inefficiency (Gibson, 1996). For a policy to be optimal, the marginal costs of undertaking the policy must equal the benefit of the policy. The true social cost or benefit is unknown, so the good could be over or under produced.

The concept of government intervention also ties into the equity side of the Munger Triangle. When negative externalities are adversely affecting people outside the interaction, an externality often causes an equity issue. The government often intervenes because the marginal costs to society outweigh the marginal benefits to society. Government should intervene in the foreclosure crisis because the marginal costs to society outweigh the marginal benefits to society. Saving homeowners from foreclosure is likely to help all homeowners by maintaining property values. When foreclosures affect low-income homeowners more adversely than middle and upper-income homeowners, it is an equity issue. Government should also intervene in this case because it affects the equity side of the Munger Triangle. According to Schloemer, Li, and Keest (2006) many lower income homeowners find themselves in situations where they face foreclosure because they refinance in order to use their equity to live and are more likely to experience foreclosure. Another study found that low-to-moderate income neighborhoods experienced higher levels of negative equity. The principles behind the

Munger Triangle suggest controlling foreclosures because low-income owners are disproportionately affected leading to income redistribution. The Munger Triangle illustrates how regulation efforts address different types of conflicts.

Effects of Local Governments

The widespread and deep cutting effects of the increased sales of foreclosures are now affecting the revenue generation of local governments. Normally, houses increase in value with time and homeowners view them as good investments (Chomsisengphet & Pennington-Cross, 2006). Since the bubble burst on the housing market, homes are now selling for less than their previous values. Foreclosures became are a public policy concern because less property tax is generated translating into less revenue being generated. The housing boom that preceded the crash further exacerbated the problems concerning property tax revenue and the overall economy. Many local governments used the abnormally higher revenue levels as a funding source for new programs and now face these decisions about which programs to cut and which to save (Global Insight, 2007).

The recession has affected a number of aspects of the economy. The additional pressure that accompanies the loss of property tax revenue could potentially push local governments over the edge leading to a host of other problems. Proposition 13 severely limits local government's ability to generate revenue and the State's recent cuts to their budgets put them under an additional strain.

Current Legislative Proposals

Public policy opened the door for the subprime mortgage crash and foreclosure crisis. Bad public policy played a major role in the creating problem and legislators must find a solution with better public policy. There have been attempts at public policy recovery plans from the California State Legislature.

California Legislation

In 2008, the California Legislature approved two measures focused on foreclosures. SB 1137 required that mortgage holders must notify borrowers at least 30 days before a foreclosures is initiated, provide information for Housing and Urban Development (HUD) housing counselors, provide a toll-free number for client services, give tenants 60 days notice of foreclosures, and maintain the exterior of properties (punishable by a fine of up to $1,000 per day). This bill only affects properties purchased between 2003 and 2007, and the law sunsets in 2013 (Perata & Bass, 2008).

AB 7XX, a budget trailer bill from the February 2009 budget negotiations, established the California Foreclosure Prevention Act. The California Foreclosure Prevention Act would affect houses purchased between 2003 and 2008. This bill would delay lenders from filing a notice of sale for at least 90 days, unless they already had a loan notification program approved by regulators. Governor Schwarzenegger said,

> I proposed the California Foreclosure Prevention Act to further help families at risk of losing their homes to foreclosure. Foreclosures not only devastate families, they hurt neighborhoods and depress the California economy and budget. The

> implementation of this Act paired with previous actions taken here in California and federally will go a long way in helping mitigate the housing crisis. (Governor's Press Office, 2009, ¶ 2)

AB 1588 (2009) introducted by Assemblymembers Bass, Lieu, and Nava would create the Monitored Mortgage Workout Program. This program would provide owners who have received notices of default the opportunity to enroll in a couciling program with a certified HUD councilor. During the enrollment, up to 60 days, the foreclosure procedure is haulted to allow homeowners to explore additional alternatives. There are also limits on the amount that the councilor can charge including banning upfront costs. The primary goal is to prevent foreclosures by supplying the time and resources to allow homeowners to explore alternatives.

There were many pieces of legislation proposed in California to address tangential issues to the subprime mortgage crisis including debt management and tenant's rights issues. Legislators designed the following measures to address foreclosures and the financial crisis.

Federal Legislation

The Emergency Economic Stabilization Act of 2008 (commonly termed "the bailout") was a large package of reforms. The first public policy attempts did not focus directly on foreclosures, but encouraged financial institutions to rebuild capitol and increase the flow of financing by relieving the financial institutions from bad mortgages

that were not likely to default. The financial institutions would later repay these “loans” with interest (U.S. Department of the Treasury, 2008).

The Troubled Asset Relief Program (TARP) is a component of the overall Emergency Economic Stabilization Act of 2008. The specific goal of the Act, according to the U.S. Department of Treasury, is “stabilizing the United States financial system and preventing a systematic collapse” (U.S. Department of the Treasury, 2009b, ¶ 2). The program allows the federal government to purchase bad loans and relieve banks from the responsibility of loans they may never recover. Free of constraints, banks could then begin to give out new loans and stimulate the economy.

Additionally the Homeowner Affordability and Stability Plan was introduced to assist homeowners who over extended themselves with subprime loans and/or were victims of predatory lending. The public, who considered the measures a handout to those who had made poor financial decisions, did not receive the new Federal laws with open arms. They should consider the effect foreclosures will have on their neighborhoods and property values (U.S. Department of the Treasury, 2009b).

The Housing and Economic Recovery Act (HERA) of 2008, focused on preventing additional foreclosures and stabilizing the housing market. Many provisions of the Act focus on regulating mortgage-licensing activities of high foreclosure-risk transactions. (U.S. Department of Housing and Urban Development [HUD], 2009b)

The American Recovery and Reinvestment Act (ARRA) 2009, is the big-ticket stimulus package. ARRA authorizes $787 billion in resources be divided among tax cuts

for individuals and companies, healthcare, education, enhancing the social services safety net, infrastructure improvements, advancement of energy technology, and other scientific research endeavors (American Recovery and Reinvestment Act, 2009).

The Neighborhood Stabilization Program focuses on buying and redeveloping foreclosed homes in an effort to stabilize the surrounding homes. The ARRA allocated these funds and limiting them to local governments or redevelopment agencies. Individual homeowners cannot collect these funds directly. According to HUD,

> NSP funds may be used for activities including, but not limited to: establishing financing mechanisms for purchase and redevelopment of foreclosed homes and residential properties; purchase and rehabilitate homes and residential properties abandoned or foreclosed; establish land banks for foreclosed homes; demolish blight structures; and redevelop demolished or vacant properties. (HUD, 2009a)

Legislators created this program as a direct result of the externalities that come from dramatic increases in foreclosures.

The Hope for Homeowners program focuses on homeowners who are at risk of foreclosure, established on October 1, 2008 by President George W. Bush and modified November 19, 2008. The program assists homeowners who cannot afford to refinance into government-backed mortgages. Homeowners must meet a number of criteria including purchasing the home before 2008, the mortgage payments must comprise more than 31% of their monthly income, and the property must be their primary residence. The

program assists homeowners by increasing the loan-to- value rate of 96.5% in limited cases, and allows for extension of mortgage terms from 30 to 40 years (HUD, 2008).

President Barrack Obama announced the Homeowner Affordability and Stability Plan on February 18, 2009, which focuses on mitigating current foreclosures. This plan was controversial from the beginning and drew widespread cynicism. The plan includes three provisions: it allows millions of homeowners to refinance without penalties from falling home prices, provides $75 billion to help homeowners struggling to make their payments, and supports low mortgage rates by stabilizing Fannie Mae and Freddie Mac. One of the main arguments against the plan is that it bails out people who have made mistakes at the expense of other more fiscally savvy taxpayers. The Obama Administration argues that this plan will actually benefit all homeowners by stabilizing home prices for the entire neighborhood. In addition to protecting the standard of life for the neighborhood, the Obama Administration cites that preventing foreclosures would help stabilize housing prices and reduce the decline of general home prices by up to $6,000 (U.S. Department of the Treasury, 2009a). This explanation has not been widely accepted and critics focus on rewarding those people who made bad financial decisions.

Overview

The focus of this thesis is to quantify the effects of foreclosures on surrounding home prices in Sacramento County. There are wide spread effects on the welfare of people and the state of the economy that could be mitigated with the use of public policy

actions. The rest of this thesis will be dedicated to exploring the impact of foreclosures on neighboring properties in Sacramento County, California.

The focus of this thesis is to quantify the effects of foreclosures on surrounding home prices in Sacramento County. There are widespread effects on the welfare of people and the state of the economy that could be mitigated with the use of public policy. Chapter 2 gives an overview of the previous research conducted about spillover effects on neighborhoods by foreclosures and other negative factors. Chapter 3 discusses the methods used in this thesis including a brief description of the variables and their expected effects. Additionally, Chapter 3 reviews statistical facts and the correlates that describe the interaction of each variable. Chapter 4 is focused on the regression results, how to correct for different anomalies, and differences between the expected and observed results. Finally, Chapter 5 summarizes the impact of foreclosure status on the price of a property and the surrounding homes, what it means to legislators and improvements to this thesis for future researchers.

Chapter 2

LITERATURE REVIEW

There is a growing body of literature focusing on spillover effects of foreclosures on neighboring home prices. The first part of this chapter focuses on a general description of hedonic regression analysis. The second part of this chapter focuses on the categories of variables used in hedonic regression studies. The third and final part of this chapter is a general overview of hedonic regression studies that had measures of the effects of foreclosures on surround property values.

Hedonic Regression Studies in General

There are multiple methods used to quantify the relationships between various independent variables and their effects on house prices. Some of these methods of house pricing include hedonic pricing, the weighted repeat-sales model, and a hybrid of the two. The most common method is hedonic pricing. The basis of all hedonic pricing models is regression analysis. Regression analysis is a quantitative research method used to explain the movement of a dependent variable that causes interaction between multiple independent variables. Regression analysis cannot conclude causal relationships, but it can shed light on the interaction between variables. Generally, researchers treat goods as packages.

At its most basic level, hedonic pricing is a method used to determine the price a buyer is willing to pay for a specific characteristic of good or service. Generally, literature presents variables as packages of characteristics (independent variables) to

determine price (dependent variable) (Rosen, 1974). Researchers most often use Hedonic pricing to estimate housing prices, more often than any other method.

One of the first presentations of hedonic regression was by Rosen (1974) in *Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition*. In the model, Rosen outlined the technical method of conducting a hedonic regression including the regression equations and sample variants. Researchers first developed the instructional manual for hedonic pricing more than 35 years ago, but very little has changed from the basic method, except for the efficient computer technology that performs the complex calculations.

Variables Examined

Hedonic pricing models assess a wide variety of variables that affect housing prices. These studies range in their scope and focus, but implement a common bank of variables. There are broad categories of variables that contain multiple independent variables with a common theme. Property characteristics include features about the house itself that range from the number of bedrooms to the square footage of the house. Researchers use market characteristics to describe the lever of activity in the real estate market including factors like the number of days the property sits on the market and the difference between the initial listing price and the final sales price. For instance, location variables include descriptions about the neighborhood. In the following subsections, there will be a detailed description of the independent variables grouped by their effects observed in previous studies.

Property Characteristic Variables

Housing descriptions, such as the number of bedrooms and the square footage, are good indicators and are easily accessible through databases from county registrars and real estate databases like Metro List. These variables have similar effects on sale prices no matter where the house is located. Lutzenhiser and Netusil (2001) found that sales prices increased with the number of bathrooms by a coefficient of 0.2178, the number of fireplaces by a coefficient 0.4690, the total square footage by a coefficient 0.00137, and the size of the property in acres by a coefficient 0.4870. The same study found that sale prices decreased with the age of the house by a coefficient -.00726.

Market Characteristic Variables

A study by Knight (2002) focused on the effects of a house's initial listing price on the final sales price and number of days on the market. These variables help to describe the climate of the market and the external pressures that affect the final sales price. Knight fount that the independent variables included in the general market category such as the percentage the initial sales price exceeds the selling price by a coefficient of 0.08, the level of motivation of the seller by a coefficient 0.08 and the natural log of the number of days on the market by a coefficient 0.08.

Time and Location Variables

Time can play a key factor that can control for swings in the market. Lin, Rosenblatt, and Yao (2009) included dummy variables for time and location where the time variable is in quarterly divisions. Lin et al. found that foreclosures the effects of

foreclosure may decrease as time passes from the sale but can last up to five years. Researchers use dummy variables to isolate effects and relate them to smaller areas. Location variables can provide information on their own, or remove the noise caused by other variables.

Hedonic Regression Results for Foreclosures

There have been a number of studies focusing on different causes and effects of foreclosures. The causes included looking at demographics and forms of lending and example effects to the neighborhood are the increase in crime and blight. Specifically, this section will focus on the effects of foreclosures on surrounding prices analyzed with hedonic pricing models.

Studies vary when it comes to the effect of abandoned houses on surrounding home values. Some studies rely on the assumption that foreclosed properties will remain abandoned and vacant. For instance, one study in particular by Mikelbank (2008) separates vacant/abandoned houses from foreclosed houses. This study found that abandoned properties were more detrimental to property values than foreclosures. Cities tend to have higher concentrations of vacant properties and the dispersion of foreclosures is even throughout various neighborhoods within the cities.

Many studies focus on how foreclosures affect the prices of properties in a neighborhood. They differ in the independent variables used within the regression analysis. Public policy practitioners view foreclosures as a problem due to higher crime rates associated with foreclosed properties and associated increased vacancies.

Immergluck and Smith (2006) found that foreclosures lead to higher violent crime rates (through not statistically significant) and higher violent crime rates lead to lower property values. Other studies focus on the negative effects of foreclosure in a neighborhood in a broader manner and generally refer to the price but do not focus on specific variables like crime and vacancy rates. The studies vary based on factors studied such as geographical region, median income levels, and jurisdiction.

One of the main variables that factors into play with regard to foreclosure spillover effects is the distance of surrounding homes from a foreclosed property. Studies vary in the distances at which they find significance. Most of the effects of a foreclosure also linger beyond the sale of a foreclosed property to a new owner. One study by Lee in 2008 found that the effects of a foreclosure were negligible when they were outside of a quarter mile of the foreclosed property and occurred more than six years ago. A study by Immergluck and Smith (2005) finds an eighth of a mile as the magic number that will cause the average house value to decrease by 1.136%. Within a quarter of a mile, the average house value decreases by 0.9%. In the distance range between a one-eighth and one-quarter of a mile, the result is a 0.325% decline in price.

The Lin et al. (2009) study also focused on the distance between foreclosures and surrounding properties. This study found that foreclosures negatively affect surrounding home prices for up to five years within a 10-block radius. The homes that fall into this criteria sell for 8.7% less, and eventually the effects dwindle to 1.2% and 1.7% less than homes that are outside the radius or time period. This study is interesting because it uses

comparables and incorporates both location dummy variables and quarterly dummy variables.

Schuetz, Been, and Ellen (2008) examined housing prices in New York City. The study includes both dummy variables for zip code and time-period. This study tries to improve on others because it examines the same area over multiple years. Previous studies have looked at different locations for short periods, so the results could not show lasting effects. This study also takes into consideration that foreclosures take time to end up on the market. The study was in New York and state foreclosure proceedings take time, up to 18 months for a home to be in foreclosure. This information was used to focus the study and separate variables examining the effect of prices more than 18 months before the sale, less than 18 months before the sale and after the sale. The effect of the time-period increases as the property goes into foreclosure, placed on the market and eventually sold. Schuetz et al. (2008) found that properties within 250 feet of a foreclosure decrease in price by a magnitude of 0.02 and 0.012 for properties within 500 feet. The study also found that neighborhoods with lower property values are more likely to experience higher levels of foreclosures.

The Campbell, Giglio, and Pathak (2008) study found factors that affect housing prices are deaths, bankruptcies and foreclosures long after they happen. Foreclosures initially had a positive effect on the sales price if within one year by a coefficient 0.011 but then a negative effect for five by a coefficient -0.018 and then a positive effect thereafter by a coefficient 0.033.

Table 2.1 highlights the results of the studies described above that relate to the effects of foreclosures on surrounding home prices.

Table 2-1

Previous Study Results

Publication Dates, Authors	Location, Year, Sample N	Time	Distance	Foreclosure Impact on Sales
Mikelbank, 2008	Columbus, Ohio, 2006, N=19,281	Cross-sectional, within 2006	250 ft. 500 ft. 750 ft. 1000 ft.	-0.031* -0.018* -0.015* -0.016*
Immergluck and Smith, 2006	Chicago, 1997-1999, N= 9,642	Cross-sectional, between 1997 and 1999	Within 1/8 mile 1/8-1/4 mile Within ¼ mile	-1.136** -0.325** -0.9**
Lin et al., 2009	Random Sample from United States, 1990 - 2006, N= 14,427	0-2 years 2-5 years 5 + years	0.9 km 0.6 km 0.4 km	-9.8*** -6.6*** -4.3***
Schuetz et al., 2008	New York City, 2002-2005, N=89,814	18+ months before sale 0-18 months post sale	0-250 ft. 250-500 ft. 500-1000 ft.	-0.02* -0.012* -0.00401*
Campbell et al., 2008	Massachusetts, 1987-2008, N=1,783,360	0-1 year 1-3 years 3-5 years 5 years +	0.25 miles	0.011* -0.028* -0.018* 0.033*

* Percent decrease in housing prices due to a 1% increase in foreclosures
** Percent Discount per Foreclosure
***Spillover Effects from Foreclosures

The focus of this thesis is to utilize regression analysis to study the effects of foreclosure on own and neighboring home prices. This thesis builds upon the studies cited in this chapter. It will focus on Sacramento County and incorporate many of the variables used in previous studies with the addition of neighborhood demographics.

Chapter 3

METHODOLOGY

Previous studies have shown that foreclosures have negative effects on neighborhood home prices. Foreclosures are predicted to have a negative effect on housing prices. Politicians have touted the negative effect of foreclosures on nearby home values as a reason to support measures that alleviate the pressures of foreclosures. The main goal of this study is to see if housing data in Sacramento County supports prediction of the spillover effect of foreclosures and to estimate the magnitude of the effect.

This chapter contains an overview of the methodology used to test the hypothesis about the spillover effects of foreclosures. It covers the objectives of the study, the general method of analysis, a description of the data used, and the main variables used in the analysis. This section also contains the expected relationships and correlations between each independent variable and the dependent variable.

Method of Analysis

This section focuses on the model designed for regression based on cross-section data. Cross-Sectional studies normally focus on the prices of a broad range of homes in one time-period. This study only uses a single time-period, which is reasonable because there is a wider gap between times the sale of a given house to the previous time it sold.

Hedonic pricing allows comparison between properties with each other and estimation of prices without knowledge of prior selling prices. Hedonic pricing treats a property as a complete unit while acknowledging that there is a group of features that

come together to establish the final price of that property (Fuguitt & Wilcox, 1999). Specifically, it evaluates homes based on a variety of variables that the researcher expects to each influence the difference in prices observed across homes.

Area Selection

The thesis will focus on Sacramento County. Sacramento is the capitol of California, the eighth largest economy in the world in 2006 according to the Legislative Analyst's Office (2006). Sacramento County includes the City of Sacramento and the suburban municipalities of Citrus Heights, Elk Grove, Folsom, Galt, Isleton, Carmichael, Fair Oaks, North Highlands, Orangevale, Gold River, Rio Linda, Antelope and Rancho Cordova. In addition to making broad observations about the county as a whole, Sacramento County contains a large city and smaller suburban areas, which allow for a different level of analysis.

Sacramento's real estate market has bounced back in the last year and has moved out of the top-ten list, seated as thirteenth in the nation in 2009. In 2008, Sacramento was ninth in the nation in terms of foreclosures, equating to every one in 19 homes being in foreclosure (RealtyTrac, 2009). Sacramento ranked even higher on the list of highest metro foreclosure rates in 2007 at fifth place. In 2007, Sacramento also won the title of metropolitan area with the fastest growing foreclosure rate at 272% from 2006 (RealtyTrac, 2008).

Model

The variables expected to influence differences in home selling prices fit into three broad categories. The three categories are market characteristics, property characteristics, and household demographics. The depended variable is the sales price of all properties

The following function is the regression model:

Effect of Foreclosure Concentrations = *f* [Market, Property, Household, Location, Time Period]

where:

Market = *f* (Foreclosure Status, Neighborhood Foreclosure Rate, Days On the Market, Neighborhood Vacancy Rate)

Property= *f* (Home Square Footage, Lot Square Footage, Age in 2010, Number of Bedrooms, Number of Full Bathrooms, Number of Half Bathrooms, Number of Stories, Central Heat and Air, HOA dues, Number of Fireplaces, Number of Garage Spaces, Pool, Tile Roof, Composite Roof, Shake Roof)

Demographic= *f* (Neighborhood College Educated, Neighborhood Poverty Rate, Neighborhood Median Household Income, Neighborhood Median Age, Neighborhood Population Asian, Neighborhood Population Black)

Location = *f* (Zip Codes Dummy Variables, City Dummy Variables)

Time Period = *f* (Quarter Home Sold Dummy Variables)

Market Characteristics

Market Characteristics include the variable that describes the percentage of foreclosed homes that sold in the same zip code as each property within the 18-month period of this study. The data used to derive the foreclosure rate variable came from the MLS database. Dividing the number of foreclosures per zip code by the total number of home sales per zip code generates this key variable and allows for comparisons based on the number and concentration of foreclosed properties for sale. The study's value is held in the ability to compare sales prices based on foreclosure and control for other variables so it is important to ensure that a variable indicating the foreclosure status of the property be included.

The variable of days on the market has become an increasingly significant figure in light of the current state of the real estate market. The market is unstable and prices continue to fall at an unheard of rate. The number of days on the market is a significant figure, because in all likelihood the longer a property sits on the market, the more likely the sales prices of the property will drop and the house will be worth less.

Stable neighborhoods are more appealing to potential homebuyers because they limit the next independent variable, the number of vacant units. A number of factors including foreclosures, renter turnover and homes remaining on the market after the owner has moved affect the number of vacant units. This is an important factor when it comes to the price of a property because of the close relationship between blight and the

level of vacancy since unoccupied homes are likely to fall into disarray. The 2000 U.S. Census provided the vacancy data for this study (U.S. Census, 2000a).

Property Characteristics

Property characteristics include the variables that describe the structure of the property include. Each of these factors is a measurable feature that is absolute and comparable between properties. Square Footage is a measure that is usually a good prediction of cost to build, but this figure becomes less accurate as the scope of the study expands. A home in midtown Sacramento will come at a much higher price tag than a larger home in a suburb like Carmichael because of the location. Square footage is a good predictor, but can be less accurate when other factors are considered and similarly for lot size in square footage. Price per square foot tends to decrease the farther the property is from the center of the closest major city.

The age of a property can be a key factor in value of a home. Newer homes sell at a premium to buyers who do not want to worry about improvements and are seeking a ready to move in home. Other buyers may be willing to pay a premium for a historic property. There is likely to be a higher price tag for properties that fall on both sides of the age spectrum and lower prices for properties that fall in the middle.

Bedrooms and baths have a significant impact on the price of a home. Other factors can reduce the significance of them, but the effects are still notable. Larger square footage homes usually allocate the space to having more bedrooms and baths. Buyers

usually see multiple bathrooms as an asset because multiple people can use bathrooms at the same time.

Central heat and air add value to properties. Central air is especially an asset in Sacramento County because of the warm climate. Both central heating and air conditioning maybe correlated to the age of a home. Some older homes may only have wall furnaces or window air conditioning instead of central heating and air systems.

Other factors about the property that can have an affect on the price of the property are whether there are Home Owner's Association (HOA) dues, the number of fireplaces, and the number of garage spaces. Roofing materials may also play a role in the price of a home due to aesthetics and durability. The most common forms of roofing in Sacramento County are tile, composite and shake. The other roof type that as excluded from the list of variables for analysis was shake. These factors may not be as significant as the ones mentioned above, but they do have an affect on the sales price of a property holding all else equal.

An element of housing that may pay a larger roll in price adjustment in Sacramento than in other areas is whether the home has an in-ground pool. Sacramento has a hot arid climate and for many buyers a pool is a valuable asset. However, some buyers may see a pool as a disincentive because of the potential danger, liability and maintenance costs. It is unclear what the overall effect of having a pool will have on the final selling price.

Household Demographics

Other factors affect the price besides the physical features of a property. The household demographics describe the composition of a neighborhood can affect the demand for homes and the price buyers are willing to pay such as median income, poverty rate, median household income and highest level of education. The 2000 Census provides this data grouped by zip code (U.S. Census, a, b). People with similar backgrounds are likely to gather and decide to reside in similar areas because of shared values. Additionally, income limitations may cause people to cluster in a specific area because of the cost of housing.

Racial composition is another characteristic that may have an effect on housing prices. New data has come out that has tied higher concentrations of subprime lending to minorities. These factors are less likely to affect the price of properties in a neighborhood greatly, but the study can use them to control for other factors.

Location

The final category of variables is location characteristics, which includes the dummy variables for cities. A zip code variable is valuable because it allows for a rough estimation of proximity to other homes. Location is likely the most important factor when considering the value of a property. It can counteract the effects of a number of other independent variables. This variable will interact with the main dependent variable of market characteristics.

Time Period

There is a strong relationship of the concepts of time-period and market characteristics. Housing sales can vary dramatically in as short a time-period as three months. The time quantum used for home sales is quarters of a year. Five quarters will be included in the analysis from the six that are present in the time-period covered by the data set, all four quarters of 2008 and the first quarter of 2009.

Data Used

The data set used is a combination of data from the Multiple List Service (MLS) (2009) and the 2000 Census. The Multiple List Service (MLS) information includes all of the pertinent information about the property including the final sales date and price. The data set included information about the structural elements of the house, the square footage of the structure and property, as well as zoning elements. The Registrar's data also included information about washer and dryer facilities and the type of water service. The level of data included spanned a large gamut of information.

The study excludes some of the data when it is incomplete, such as when a case does not include data for all of the variables expected to influence differences in home prices. For instance, the study eliminated data from the 95757 zip code because the properties did not exist in 2000 and hence no data is available from the 2000 Census.

The 2000 Census data, organized by zip code, included overall population, population by age and population by race. Additional information about the size of households, average income and level of education was also included.

Data Analysis

The researcher predicted the effects of the variables prior to completing the regression and included a description of the excepted results along with the rationale. Table 3.1 below describes the expected direction of effect on the dependent variable for each of the specific variables identified above based on the literature in this area. Additionally, a summary of the descriptive statistics for each of the variables and the correlates is given.

Table 3-1

Expected Direction of Effect for Specific Variables

Variables	Expected Direction	Description
MARKET CHARACTERISTICS		
Foreclosed Status	-	This study assumes that the home will sell for less being a bank owned property.
Foreclosure Rate	-	The more foreclosed homes in a neighborhood, the increase in negative externalities.
Days on Market (DOM)	-	Longer a property sits on the market the more likely the sales price will be lower.
Vacant Properties*	-	A historical account of the number of vacant properties in a neighborhood in 2000. Vacant units are more likely to have blight, which will decrease home values.
HOUSEHOLD CHARACTERISTICS		
Square Footage	+	Square footage would have a negative correlation and drive home prices up. Bigger houses are more expensive.
Lot Size - Sq Ft	+	Larger lots usually mean bigger homes, but this may not be the case in Sacramento because homes that are more central are likely to have smaller lots.
Age in 2010	-	Newer homes usually sell at a premium. This coefficient would be negative because it represents an inverse relationship, lower age and higher price.

Table 3-1 continued

Variables	Expected Direction	Description
Bedrooms	+	More bathrooms will likely lead to higher home prices.
Bathrooms - Full	+	Larger homes normally have more bedrooms and would likely fetch a higher sales price.
Bathrooms - Half	+	Bathrooms add value, but less value than full bathrooms.
Central Heat / Air	+	Homes with central heat are sold at a higher price.
HOA Dues	-	HOA dues come with newer homes, but some buyers may view HOA fees as a disincentive
Number of Fireplaces	+	Houses with more fireplaces are likely larger and likely nicer, so they would fetch a higher dollar value.
Number of Garage Spaces	+	Larger and newer houses are likely to have more garage spaces.
Pool Dummy	-	Sacramento has a arid climate and a pool could be seen as an asset that buyers would be willing to pay a premium.
Roof: Tile	+	Aesthetically appealing and durable.
Roof: Composite	+	Increased durability.
Roof: Shake	-	Not as long lasting as other forms of roofing material.
HOUSEHOLD DEMOGRAPHICS		
Level of Education*	+	Higher the level of income, likely leads to higher incomes and more buying power.
Poverty Rate*	-	The lower the income level the more likely someone is to purchase a lower priced house.
Median Age*	+	Older individuals are less likely to be buying their first home and have more buying power.
Median Income*	+	Higher median levels of income indicate a higher level of buying power.
Percentage Black*	-	Minorities are more likely to live in less expensive homes.
Percentage Asian*	-	Minorities are more likely to live in less expensive homes.
Percentage Latino*	-	Minorities are more likely to live in less expensive homes.
Percentage White*	+	Whites are more likely to live in more expensive homes.

* Data retrieved from U.S. Census (2000a, b).

The following table displays descriptive statistics about each of the variables including the minimum, maximum, and mean values as well as the standard deviation.

Table 3-2

Frequencies

	Minimum	Maximum	Mean	Std. Deviation
Selling Price	6053	2700000	209663.71	144680.770
Foreclosure Status	0	1	0.67	0.471
Foreclosure Rate	0.11	0.88	0.6694	0.18925
DOM	0	605	52.59	64.292
Vacancy	12	1214	594.14	320.235
Square Footage	400	9652	1557.45	628.067
Lot Size	0	333974520	47666.30	3.627E6
Age 2010	1	130	35.72	23.355
Beds	0	9	3.24	.763
Baths-Full	1	7	1.89	.638
Baths- Half	0	5	.19	.400
Stories	1	3	1.26	.445
Heat / Air Dummy	0	1	.87	.332
HOA Dues	0	605	12.80	40.283
Fireplaces	0	4	.77	.539
Garage Spaces	0	8	1.76	.765
Pool Dummy	0	1	.11	.315
Roof: Tile	0	1	.27	.445
Roof: Composite	0	1	.63	.484
Roof: Shake	0	1	.05	.226
Level of Education	5.17	44.02	19.5868	10.3929
Poverty Rate	3.28	33.98	16.8496	87.7358
Median Income	25970	73240	43981.44	13186.826
Median Age	22.2	43.5	32.380	4.1851
Asian	2.59	30.12	11.4289	6.7957
Black	.89	25.06	11.8207	7.0621
Latino	6.38	35.85	18.7037	8.40625
White	14.19	89.20	53.2822	20.8076
Antelope	0	1	.04	.192
Carmichael	0	1	.04	.187
Citrus Heights	0	1	.03	.171
Elk Grove	0	1	.04	.207
Fair Oaks	0	1	.02	.126
Folsom	0	1	.03	.183
Gold River	0	1	.01	.111
North Highlands	0	1	.05	.217
Orangevale	0	1	.01	.109

Rancho Cordova	0	1	.06	.238
Rio Linda	0	1	.02	.128

Table 3-2 continued

	Minimum	Maximum	Mean	Std. Deviation
Sacramento	0	1	.65	.477
Quarter 1 2008	0	1	.10	.299
Quarter 2 2008	0	1	.18	.387
Quarter 3 2008	0	1	.21	.411
Quarter 4 2008	0	1	.17	.380
Quarter 1 2009	0	1	.17	.373
Quarter 2 2009	0	1	.16	.368

The correlation matrix in Appendix represents displays the results of the Pearson Test. The results of this test show the relationship between two variables independently of other factors. A positive coefficient indicates that the variables increase or decrease with each other while a negative coefficient indicates the variables move in opposite directions. Multicollinearity occurs when two variables measure similar attributes and the variables essentially cancel each other out concerning their effects on the dependent variable, sales price. Analyzing correlates and identifying multicollinearity is the first step in addressing multicollinearity occurs. The Pearson Test generates an indicator for Multicollinearity called correlates.

Chapter 4

RESULTS

There are two sections of Chapter 4. The first section contains a presentation of the data generated in the regression centered on three tables: the unaltered results of all the functional forms, the log-log results corrected for heteroskedasticity, and the confidence intervals along with the elasticities corrected for heteroskedasticity. The second section is a general discussion of the results and descriptions of the magnitudes and expected versus observed elasticity trends.

Forms of Regression

There are some situations where the coefficients are linear and the variables are not. Because of the different variable forms, there are three functional forms of regression analysis: lin-lin, log-log, and lin-log.

Linear-linear (lin-lin) regressions analyze variables in their original form. Logarithmic-logarithmic (log-log) regressions analyze altered variables by taking their natural log, which is only possible when the variable is a positive number. Linear-logarithmic (lin-log) regressions are a hybrid approach where the regression includes the log of the independent variable and all other variables remain in linear form.

Elasticities are the output of regressions, which are ratios of percent change in the dependent variable to one unit change of the independent variable. The variables require transformation by the log function if the model indicates that elasticities are constant and

slopes are not. When the slopes are constant and the elasticities are not, the variables should remain unchanged (Studenmund, 2006, p. 210).

Unaltered Regression Results

The regression coefficient describes the slope of the equation derived from the data points; it represents the effects of one unit of increase by the independent variable (Studenmund, 2006, p. 14). This value indicates the direction and magnitude of the interaction between variables. The t-statistic is the regression coefficient divided by its standard error. R-squared denotes the level of fit that is the percentage of the data represented by the model. The Variance Inflation Factor (VIF) is the primary measure of multicollinearity, a statistical anomaly in regressions, and is the focus of discussion later in this chapter.

Table 4.1 includes the unaltered regression coefficients for all three functional forms, the standard error and the VIF values for the log-log regression results. Asterisks below the table denote the degree of confidence that a regression coefficient is statistically significant from zero. Additionally, the table includes the standard error in parentheses below the regression coefficients.

Table 4-1

All Forms of Regression Results

Variable	Log-log Results	Lin-log Results	Lin-lin Results	log-log VIFs
Constant	5.976*** (0.324)	12.262*** (0.61)	270275.628*** (-14897.6)	N/A
Foreclosure Rate	-0.501*** (0.012)	-1.330*** (0.040)	-363390.656*** (9928.987)	5.733
Foreclosure Dummy	-0.241*** (0.005)	-0.256*** (0.005)	-51001.869*** (1211.172)	1.288
DOM	-0.011*** (0.002)	-0.0003*** (0.00003)	-49.277*** (8.051)	1.065
Vacancy	-0.026*** (0.004)	0.00002* (0.00002)	18.243*** (2.599)	2.847
Square Footage	0.616*** (0.013)	0.0003*** (0.000007)	127.396*** (1.706)	5.662
Lot Size	0.146*** (0.006)	0.000006*** (0.0000002)	1.703*** (0.069)	1.766
Age in 2010	-0.089*** (0.004)	-0.003*** (0.0002)	-60.247*** (41.478)	4.009
Beds	-0.029* (0.012)	0.009* (0.004)	-13433.707*** (978.486)	2.253
Baths-Full	0.069*** (0.010)	0.048*** (0.006)	14969.349*** (1494.909)	3.172
Baths-Half	0.033*** (0.006)	0.041*** (0.007)	16751.644*** (1640.856)	1.606
Stories	-0.034** (0.010)	-0.025*** (0.007)	-22984.125*** (1686.702)	2.257
Heat/Air Dummy	0.216*** (0.007)	0.241*** (0.007)	16098.782*** (1752.389)	1.330
HOA Dues	0.0002** (0.00005)	0.00007 (0.00006)	50.881*** (15.185)	1.552
Fireplaces	0.083*** (0.005)	0.094*** (0.005)	12143.804*** (1135.078)	1.524

Table 4-1 continued

Variable	Log-log Results	Lin-log Results	Lin-lin Results	log-log VIFs
Garage Spaces	0.049*** (0.003)	0.053*** (0.004)	7590.319*** (888.004)	1.799
Pool Dummy	0.062*** (0.007)	0.063*** (0.007)	22716.973*** (1707.531)	1.158
Roof Tile	0.026** (0.009)	0.056*** (0.009)	-4049.510 (2163.615)	3.067
Roof Composite	-0.044*** (0.007)	-0.053*** (0.007)	-14876.484*** (1815.912)	4.017
College Education	0.207*** (0.012)	0.008*** (0.001)	-147.2 (200.513)	12.860
Poverty Rate	0.081*** (0.009)	0.002*** (0.001)	1787.385*** (149.809	8.015
Median Household Income	0.024 (0.026)	0.000002*** (0.000006)	0.74207*** (0.146)	14.273
Median Age	-0.180*** (0.042)	-0.013*** (0.001)	-1973.015*** (326.313)	7.324
Population Asian	-0.021** (0.008)	-0.001** (0.00005)	-571.835*** (121.973)	6.675
Population Black	-0.001 (0.008)	-0.001* (0.001)	-429.362** (148.388)	9.915
Population Latino	-0.023* (0.010)	-0.003*** (0.0005)	-175.0362 (114.955)	5.370
Carmichael	-0.046* (0.020)	0.010 (0.019)	-24416.160*** (4737.363)	3.405
Citrus Heights	0.135*** (0.020)	0.197*** (0.019)	8112.073 (4735.002)	2.855
Elk Grove	0.015 (0.015)	0.002 (0.017)	15896.139*** (4128.774)	2.438
Fair Oaks	-0.011 (0.022)	0.020 (0.021)	-9468.512 (5252.939)	1.869
Folsom	-0.329*** (0.022)	-0.408*** (0.024)	-65676.506*** (5782.493)	3.960

Table 4-1 continued

Variable	Log-log Results	Lin-log Results	Lin-lin Results	log-log VIFs
Gold River	0.051* (0.023)	0.076** (0.024)	-4758.956 (5816.634)	1.729
North Highlands	0.086*** (0.022)	0.137*** (0.018)	9882.141 (4326.638)	5.986
Orangevale	0.118*** (0.025)	0.165*** (0.023)	-436.008* (5741.473)	1.799
Rancho Cordova	-0.075*** (0.016)	-0.045** (0.015)	-41818.233*** (3778.579)	3.508
Rio Linda	0.131*** (0.025)	0.203*** (0.024)	6406.533 (5823.308)	2.723
Sacramento	-0.046** (0.015)	0.082*** (0.014)	9716.0613** (3522.883)	13.434
Quarter 1 2008	0.355*** (0.008)	0.358*** (0.008)	60835.470*** (2956.869)	1.484
Quarter 2 2008	0.295*** (0.007)	0.299*** (0.007)	47860.706*** (1729.855)	1.772
Quarter 3 2008	0.229*** (0.007)	0.230*** (0.007)	35912.972*** (1664.163)	1.855
Quarter 4 2008	0.129*** (0.007)	0.131*** (0.007)	21725.024*** (1744.557)	1.739
Quarter 1 2009	0.017* (0.007)	0.017* (0.007)	6467.204*** (1759.152)	1.707
R-Squared	0.850820525	0.839554877	0.803533306546172	
Number of Observation	16090	16090	16291	

*Significant at an 85% confidence level (based on a two-tailed test)
** Significant at a 90% confidence level (based on a two-tailed test)
*** Significant at a 99% confidence level (based on a two-tailed test)

Selecting the Functional Form

This thesis uses the Logarithmic-Logarithmic (log-log) functional form because it has more statistically significant variables than the lin-lin or lin-log functional forms.

Additionally, the HOA dues and Carmichael location variables were not statistically significant in the lin-lin or lin-log forms. The R-squared values are not comparable across functional forms so the number of statistically significant variables was the best way to choose.

Problems with Regression Analysis

Statistical anomalies are a real possibility for regression results; require testing and correction if present. Tests for multicollinearity and heteroskedasticity occurred using the results from Table 4.1.

Multicollinearity. Multicollinearity occurs when two or more variables track each other closely, which complicates determining causal relationships. Multicollinearity can be a problem because it biases the standard errors of regression coefficients upward and, thus, if present may indicate that a regression coefficient is not statistically significant from zero when it really is (Studenmund, 2006, p. 254). The first step in testing for multicollinearity is to conduct a full regression analysis comparing all of the variables to each other and the regression coefficient, significance, and generating VIF values. The main method used to identify multicollinearity is to evaluate the VIF of all of the variables within the regression. A VIF value above five warrants further investigation since it exceeds the threshold for severe multicollinearity (Studenmund, 2006, p. 271). Specifically, examining the correlations displayed in the Appendix, correlation tables describe how variables interact with each other and if any correlate pairs have a value of above 0.80, which indicates multicollinearity (Studenmund, 2006, p. 258). If all the

variables are significant, no action is required when multicollinearity is present. If multicollinearity tests are positive and the affected variables are not significant, the results call for possible elimination of those variables.

In Table 4.1, eight variables had VIF values over five. However, all of those values were also significant at 99%. Because of the high level of statistical significance, there is no requirement for further remediation.

Heteroskedasticity. Heteroskedasticity occurs when residuals are not constant between observations. Heteroskedasticity occurs more frequently in cross-section studies than time series because of increased diversity in information sources. Previous hedonic method studies highlight variables that often cause heteroskedasticity, suggesting they have a higher testing priority over other variables.

The Park Test identifies heteroskedasticity and the following steps describe how to conduct it. First, save the unstandardized residuals from the log-log regression and square the log of the residuals. Then, use the log of the residuals squared as the dependent variable in another regression including all the independent variables. The next step is to examine the t statistics outputted as part of the regression results and compare them to the value obtained from the t table. If the value of the critical t-statistic is higher than the value listed on the t-table, than the data indicates rejection of the null hypothesis for heteroskedasticity.

The Weighted Least Squares method corrects for heteroskedasticity. To perform, divide the independent variable chosen as the focus of the examination and all the

remaining explanatory variables by a weighting factor to account for the inconsistency of the residuals. The weight used in the calculation is determined by using the weight estimator function of SPSS, which creates a new value to be included in another regression analysis and used to weigh the results.

Previous studies suggest square footage is a likely candidate for heteroskedasticity. For this thesis, the Park Test focused on the square footage of homes and resulted with a t statistic of -20.112, indicating heteroskedasticity. Weighted least squares corrected for heteroskedasticity and the Table 4.2 displays the results.

Table 4-2

Log-log Results After Weighted Least Squares

Variable	log-log Results	Weighted log-log Results
Constant	5.976*** (0.324)	6.191*** (0.316)
Foreclosure Rate	-0.501*** (0.012)	-0.496*** (0.011)
Foreclosure Dummy	-0.241*** (0.005)	-0.223*** (0.004)
DOM	-0.011*** (0.002)	-0.011*** (0.002)
Vacancy	-0.026*** (0.004)	-0.028*** (0.003)
Square Footage	0.616*** (0.013)	0.613*** (0.012)
Lot Size	0.146*** (0.006)	0.149*** (0.006)
Age in 2010	-0.089*** (0.004)	-0.089*** (0.004)
Beds	-0.029* (0.012)	-0.044*** (0.012)

Table 4-2 continued

Variable	log-log Results	Weighted log-log Results
Baths-Full	0.069*** (0.010)	0.085*** (0.010)
Baths-Half	0.033*** (0.006)	0.037*** (0.005)
Stories	-0.034** (0.010)	-0.038*** (0.009)
Heat/Air Dummy	0.216*** (0.007)	0.220*** (0.007)
HOA Dues	0.0002** (0.00005)	0.0002*** 0.00005
Fireplaces	0.083*** (0.005)	0.075*** (0.004)
Garage Spaces	0.049*** (0.003)	0.045*** (0.003)
Pool Dummy	0.062*** (0.007)	0.066*** (0.006)
Roof Tile	0.026** (0.009)	0.017* (0.008)
Roof Composite	-0.044*** (0.007)	-0.055*** (0.007)
College Education	0.207*** (0.012)	0.211*** (0.12)
Poverty Rate	0.081*** (0.009)	0.083*** (0.008)
Median Household Income	0.024 (0.026)	-0.013 (0.025)
Median Age	-0.180*** (0.042)	-0.13** (0.025)
Population Asian	-0.021** (0.008)	-0.025*** (0.008)
Population Black	-0.001 (0.008)	0.0003 (0.008)
Population Latino	-0.023* (0.010)	-0.033*** (0.009)

Table 4-2 continued

Variable	log-log Results	Weighted log-log Results
Carmichael	-0.046* (0.020)	-0.066*** (0.018)
Citrus Heights	0.135*** (0.020)	0.118*** (0.018)
Elk Grove	0.015 (0.015)	0.014 (0.014)
Fair Oaks	-0.011 (0.022)	-0.029 (0.020)
Folsom	-0.329*** (0.022)	-0.325*** (0.020)
Gold River	0.051* (0.023)	0.047* (0.021)
North Highlands	0.086*** (0.022)	0.066** (0.022)
Orangevale	0.118*** (0.025)	0.093*** (0.023)
Rancho Cordova	-0.075*** (0.016)	-0.084*** (0.014)
Rio Linda	0.131*** (0.025)	0.097*** (0.025)
Sacramento	-0.046** (0.015)	-0.047** (0.014)
Quarter 1 2008	0.355*** (0.008)	0.332*** (0.008)
Quarter 2 2008	0.295*** (0.007)	0.274*** (0.006)
Quarter 3 2008	0.229*** (0.007)	0.215*** (0.006)
Quarter 4 2008	0.129*** (0.007)	0.125*** (0.007)
Quarter 1 2009	0.017* (0.007)	0.019** (0.007)

Table 4-2 continued

Variable	log-log Results	Weighted log-log Results
R-Squared	0.851	0.866
Number of Observation	16090	16048

*Significant at an 85% confidence level (based on a two-tailed test)
** Significant at a 90% confidence level (based on a two-tailed test)
*** Significant at a 99% confidence level (based on a two-tailed test)

Correcting for heteroskedasticity for the log-log functional form decreased the number of significant variables by one (the dummy variable for tile roofs) and increased R-squared from 0.851 to 0.866.

Regression Analysis Discussion

The following section includes a general overview of the regression results. First, there will be a description of the variables that are significant and their confidence intervals. Second, there is a discussion of the significant coefficients and the magnitude of the elasticities. Third, there is a review of the expected direction of the results and the actual direction of the results. Lastly, this chapter concludes with an exploration of why the results do not match predictions in Chapter 3.

Confidence Intervals

Confidence intervals, reported in terms of elasticities, indicate the level of assurance in the estimates. Table 4.3 displays the regression coefficients after correction for heteroskedasticity, the confidence intervals at 90%, and the elasticities. Elasticities are the unit of log-log form coefficients. However, dummy variables require conversion since the log-log functional form cannot accept them. The equation to convert linear dummy

variable coefficients to elasticities is 100 times (exp (coefficient of dummy) minus 1) (Halvorsen & Palmquist, 1980).

Table 4-3

Confidence Intervals and Elasticities

Variable	Weighted log-log Results	90% Confidence Interval for Regression Coefficients	Elasticities
Constant	6.191*** (0.316)		
Foreclosure Rate	-0.496*** (0.011)	-0.515 to -0.478	-0.496
Foreclosure Dummy	-0.223*** (0.004)	-19.998 to -19.973	-19.989
DOM	-0.011*** (0.002)	-0.013 to -0.008	-0.011
Vacancy	-0.028*** (0.003)	-0.033 to -0.022	-0.028
Square Footage	0.613*** (0.012)	0.593 to 0.633	0.613
Lot Size	0.149*** (0.006)	0.139 to 0.158	0.149
Age in 2010	-0.089*** (0.004)	-0.095 to -0.082	-0.089
Beds	-0.044*** (0.012)	-0.064 to -0.025	-0.044
Baths-Full	0.085*** (0.010)	0.069 to 0.101	0.085
Baths-Half	0.037*** (0.005)	0.028 to 0.046	3.769
Stories	-0.038*** (0.009)	-0.052 to -0.024	-0.38

Table 4-3 continued

Variable	Weighted log-log Results	90% Confidence Interval for Regression Coefficients			Elasticities
Heat/Air Dummy	0.220*** (0.007)	24.588	to	125.111973	24.614
HOA Dues	0.0002*** 0.00005	0.0001	to	0.0003	0.020002
Fireplaces	0.075*** (0.004)	0.068	to	0.081	7.788
Garage Spaces	0.045*** (0.003)	0.039	to	0.050	4.602
Pool Dummy	0.066*** (0.006)	6.835	to	6.850	6.840
Roof Tile	0.017* (0.008)	1.721	to	1.744	1.731
Roof Composite	-0.055*** (0.007)	-5.357	to	-5.333	-5.357
College Education	0.211*** (0.12)	0.192	to	0.231	0.083
Poverty Rate	0.083*** (0.008)	0.070	to	0.096	0.083
Median Household Income	-0.013 (0.025)	-0.054	to	0.029	-0.013
Median Age	-0.13** (0.025)	-0.198	to	-0.62	-0.013
Population Asian	-0.025*** (0.008)	-0.038	to	-0.012	-0.13
Population Black	0.0003 (0.008)	-0.013	to	0.014	-0.025
Population Latino	-0.033*** (0.009)	-0.049	to	-0.018	0
Carmichael	-0.066*** (0.018)	-6.359	to	-6.313	-6.359

Table 4-3 continued

Variable	Weighted log-log Results	90% Confidence Interval for Regression Coefficients			Elasticities
Citrus Heights	0.118*** (0.018)	12.485	to	12.545	12.514
Elk Grove	0.014 (0.014)	1.387	to	1.440	1.418
Fair Oaks	-0.029 (0.020)	-2.866	to	-2.812	-2.843
Folsom	-0.325*** (0.020)	-27.799	to	-27.735	-27.767
Gold River	0.047* (0.021)	4.825	to	4.892	4.857
North Highlands	0.066** (0.022)	6.816	to	6.886	6.850
Orangevale	0.093*** (0.023)	9.734	to	9.808	9.770
Rancho Cordova	-0.084*** (0.014)	-8.136	to	-8.074	-8.098
Rio Linda	0.097*** (0.025)	10.147	to	10.211	10.170
Sacramento	-0.047** (0.014)	-4.665	to	-4.601	-4.624
Quarter 1 2008	0.332*** (0.008)	39.363	to	39.399	39.386
Quarter 2 2008	0.274*** (0.006)	31.454	to	31.477	31.467
Quarter 3 2008	0.215*** (0.006)	24.022	to	24.043	24.033
Quarter 4 2008	0.125*** (0.007)	13.352	to	13.373	13.362
Quarter 1 2009	0.019** (0.007)	1.956	to	1.978	1.967

Table 4-3 continued

Variable	Weighted log-log Results	90% Confidence Interval for Regression Coefficients	Elasticities
R-Squared	0.866		
Number of Observation	16048		

*Significant at an 85% confidence level (based on a two-tailed test)
** Significant at a 90% confidence level (based on a two-tailed test)
*** Significant at a 99% confidence level (based on a two-tailed test)

All of the independent variables, except for the dummy location variables are significant at 90% and had high levels of significance.

Magnitude of Elasticities

The values discussed below are the effect of the independent variable on the price of a house, holding all else constant. The weakness of this form of analysis is that the influence of variables is inflated but the strength is that the influence of the variables is comparable between dummy and non-dummy variables. The discussion below presents the variables in five categories: market characteristics, property characteristics, neighborhood demographics, location dummy variables and time dummy variables.

Market characteristics. The foreclosure rate and foreclosure status variables have relatively large effects by deflating the price of a foreclosed house by nearly 20% and decreasing for the surrounding home prices by 0.496% per 1% change in the foreclosure rate. Chapter 5 includes a discussion of the effects of these results on public policy. The level of vacancy, denoted in the 2000 Census, had a small negative effect causing a

0.028% decrease in property values. The number of days on the market does not have a significant effect with a magnitude of -0.011%.

Property characteristics. The square footage of a house increases the sales price by 0.613% per unit. A house having central heating and air conditioning has a positive effect of 24.614% per unit. The number of bedrooms has a surprising, but marginal, effect lowering the sales price by 0.044% and the number of bathrooms increased the selling price by 0.085%. The number of fireplaces would increase the selling price by 7.788% per fireplace and number of stories decreases the selling price by 0.038%. The number of garage spaces only affects the sales price by 0.046% per space. The lowest magnitude of coefficients is HOA dues at 0.0003%.

Neighborhood demographics. The neighborhood demographics with the highest magnitudes are the percentage of college-educated residents and poverty rates at 0.211% and 0.083%, respectively. Median Household Income decreases the sales price by 0.013% and Median Age decreases the sales price by 0.13%.

Location dummy variable. A property being located in Citrus Heights has a positive effect of 12.514% per unit more than home in the comparison location, Antelope. Locations that are also favorable to Antelope include: Elk Grove (1.418% per unit), Rio Linda (10.186% per unit), and Orangevale (9.770% per unit). The rest of the municipalities in Sacramento County have increasingly smaller impacts on home sales prices. Negative effects of location are experienced in Folsom (-27.767% per unit),

Rancho Cordova (-8.098% per unit), Carmichael (-6.359% per unit), the City of Sacramento (-4.624% per unit), and Fair Oaks (-2.843% per unit).

Time period dummy variables. Housing prices continue to decrease in Sacramento County. Housing prices were highest in the first quarter of 2008 compared to the second quarter of 2009. The sales prices decreased in comparison to the second quarter of 2009, continuously each quarter.

Figures 4.1 and 4.2 display the elasticities of all the variables. Figure 4.1 displays the magnitudes of all of the variables examined in log form and Figure 4.2 displays the magnitudes of all of the variables examined in linear form.

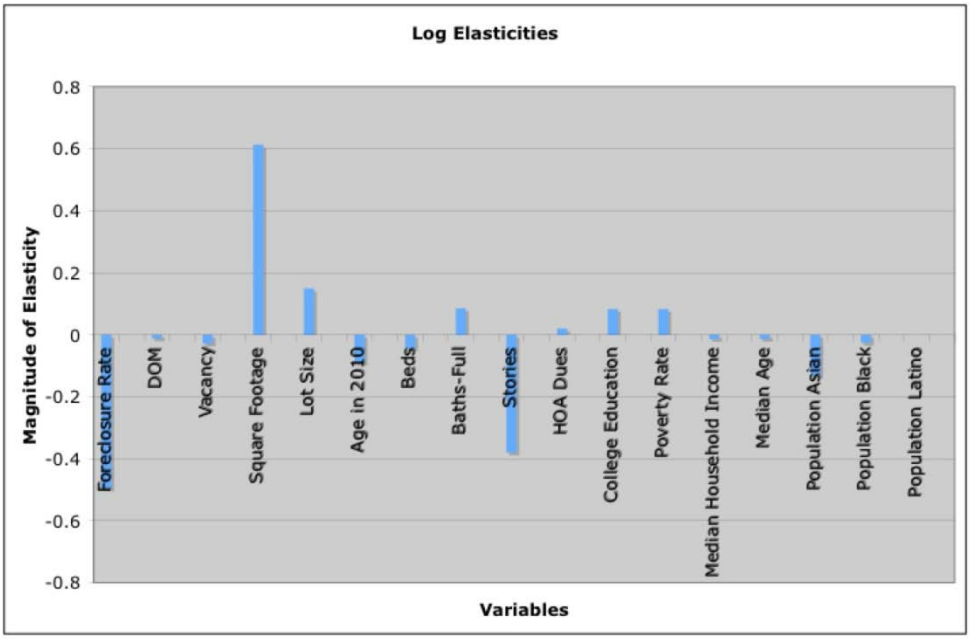


Figure 4-1. Log Elasticities.

The log variable with the largest positive magnitude is square footage. The log variable with the largest negative magnitude is the foreclosure rate.

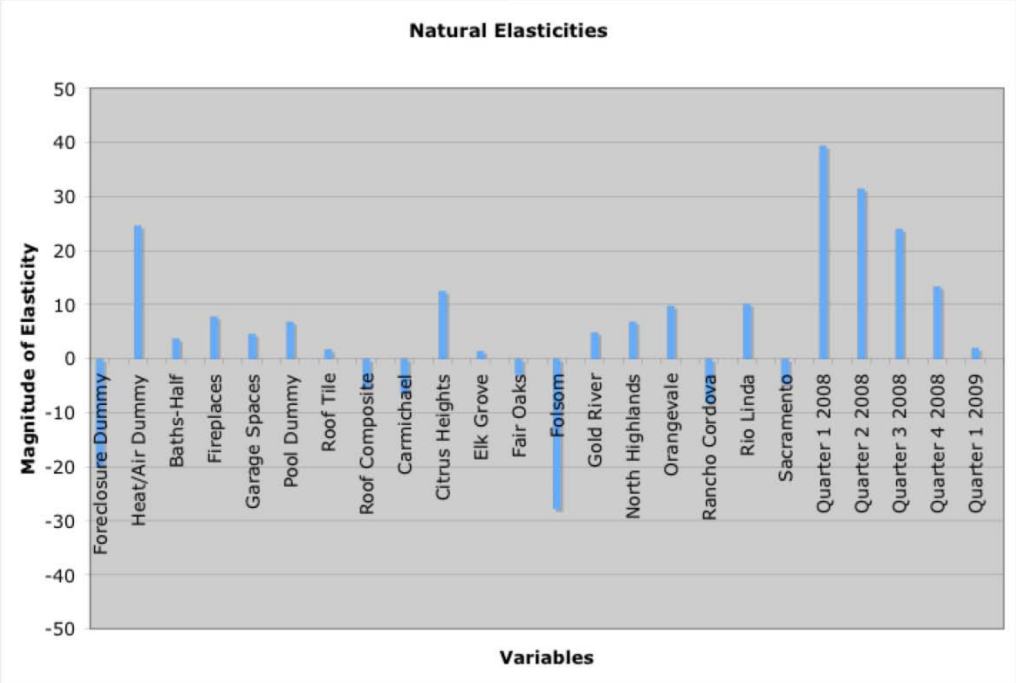


Figure 4-2. Linear Elasticities.

The linear variables with the largest positive magnitude are the heat/air dummy variable and the time period dummy variables. The linear variables with the largest negative magnitude are the foreclosure status dummy and the Folsom location dummy.

Expected Versus Observed Elasticity Trends

Table 4.4 compares the expected results from Chapter 3 to the observed results for all of the statistically significant variables.

Table 4-4

Expected vs. Observed Elasticity Trends

Variables	Expected Direction	Actual Direction
MARKET CHARACTERISTICS		
Foreclosed Status	-	-
Foreclosure Rate	-	-
Days on Market (DOM)	-	-
Vacant Properties	-	-
HOUSEHOLD CHARACTERISTICS		
Square Footage	+	+
Lot Size - Sq Ft	+	+
Age in 2010	-	-
Bedrooms	+	-
Bathrooms - Full	+	+
Bathrooms - Half	+	+
Stories	-	-
Central Heat / Air	+	+
HOA Dues	-	+
Number of Fireplaces	+	+
Number of Garage Spaces	+	+
Pool Dummy	?	+
Roof: Tile	+	+
HOUSEHOLD DEMOGRAPHICS		
Level of Education	+	+
Poverty Rate	-	+
Median Age	+	-
Median Income	+	-
Percentage Asian	-	-
Percentage Latino	-	-

Surprisingly, the number of bedrooms decreases the selling price of a home. It is likely that a house with more rooms than another with the same square footage would feel more cramped which buyers might not prefer.

HOA dues had a very small positive impact on the sales price. While HOA dues add to the reoccurring costs of a home, HOA fees normally accompany newer homes. HOA dues do not significantly affect the selling price of a home. The effect of a pool was undecided in Chapter 3. Buyers find more benefit the cost in owning a home with a pool, which has a positive effect on the selling price.

Regarding the poverty rate and median household income, neighborhoods with higher poverty rates and lower median household incomes have higher selling prices, all else held equal. An explanation for this phenomenon cited by the U.S. Department of Housing and Urban Development study in 1998, in which people who lived in low-income neighborhoods were observed to be three times more likely to have a subprime loan than those living in other neighborhoods.

Median age led to decrease in the sales price of homes. One theory of why median selling price is higher for younger individuals is that older individuals may be more likely to purchase lower priced homes because they are on a fixed income. Another theory is that older individuals with more life experience are less likely to buy homes they cannot afford. After examining the relationship between age and foreclosures, younger homeowners are 203% more likely to lose their homes to foreclosure than older homeowners are.

Chapter 5

CONCLUSION

This thesis followed a scientific method using regression to justify public policy. Chapter 1 provides motivation for this thesis and surveys existing and proposed public policies, Chapter 2 outlines previous works' methodologies, Chapter 3 details the model used for the regression, and Chapter 4 presents the regression results and discusses them. This chapter begins by relating the regression results with the spillover effects of foreclosures on surrounding home prices hypothesis, then justifies government intervention followed by a discussion of how the regression results apply to public policies and concludes with an exploration of improvements for future studies.

Research Question Summary

The purpose of this thesis was to understand the effects of foreclosures on surrounding housing prices by examining all the property sales within an 18-month time-period. The regression results show that foreclosures have a negative effect on the selling price of the house in foreclosure and the selling price of surrounding properties. Specifically, homes in foreclosure experience a selling price decrease of 19.989% and decrease the selling price of surrounding properties by 0.496% per unit change in the foreclosure rate. For example, if the foreclosure rate increases by 2.019%, as it did between 2007 and 2008 in Sacramento County (RealtyTrac, 2009), the result is a 1.00% decrease in selling prices. This represents a one-year loss in home equity of $2,304.10 from 2007 to 2008, based on the mean selling price and holding all else equal. (Mean

home value from this thesis' data.) Because of foreclosure spillover effects Sacramento County homes have aggregately decreased in price by $162,705,096. This measurement was calculated from the sum of all the zip codes foreclosure rate multiplied by the foreclosure coefficient and the selling price of the property. This dollar value only covers the 5,770 properties that sold as non-foreclosures between January 2008 and July 2009. The dollar value lost for all the sales of property in Sacramento County would be much larger. The social benefits would be great for avoiding the negative externalities of foreclosure.

The elasticities of foreclosure status and rate of foreclosures ranked very highly on impact to sales price directly behind home square footage and the heat and air dummy (excluding time and location dummy variables).

Public Policy Implications

Many criticize broad foreclosure prevention policies because of the large allocation of taxpayer dollars, but they often overlook the scale of adverse effects to the neighborhood and community. Previous studies document the negative externalities associated with foreclosures. The externalities place a burden on neighbors and the local government. Based on the Munger Triangle, foreclosures violate efficiency and equity policies. Foreclosures are not efficient for the market and individual decisions do not lead to socially desirable outcomes. Foreclosures depress the market by decreasing the value of surrounding properties, lower the tax base, and likely increase the level of blight. Foreclosures have a negative effect on the market and cause decreases that are not

efficient. Additionally, they may violate equity policies if they fall upon certain communities greater than they fall upon others.

Figure 5-1 shows the relationship between foreclosure rates, and minority populations in relation to zip codes. In some cases, there are positive relationships between minority levels and foreclosure rates.

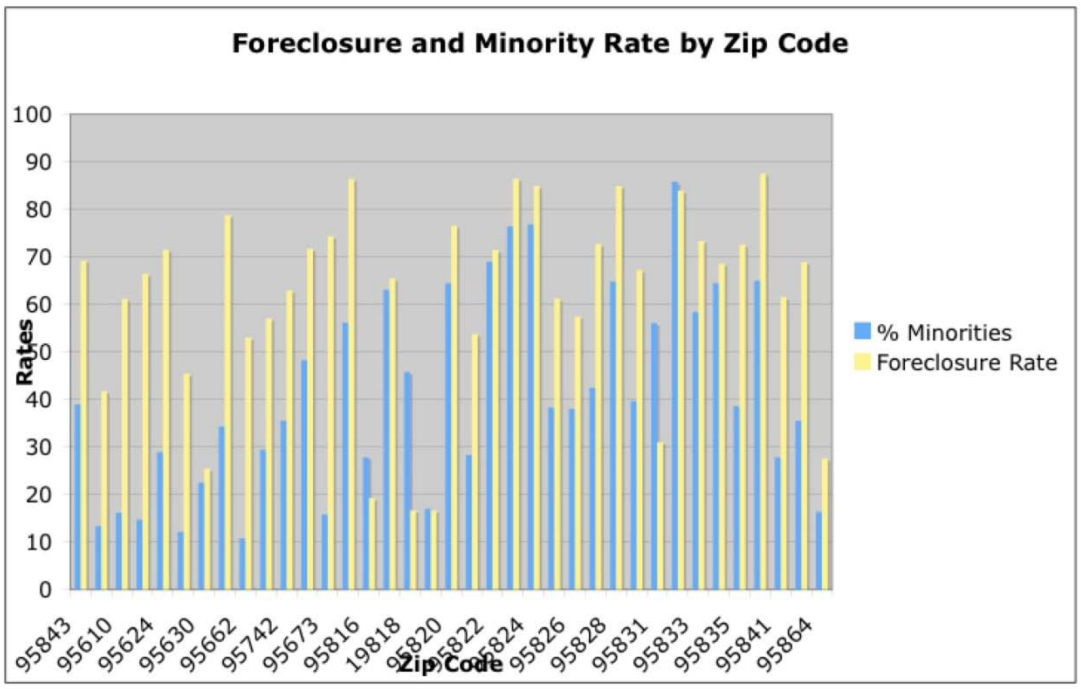
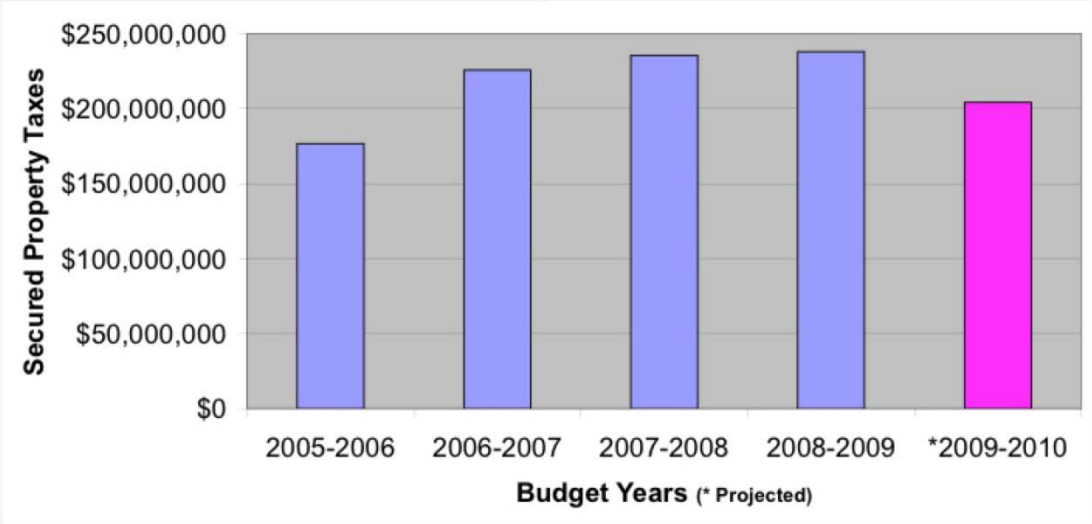


Figure 5-1. Foreclosure and Minority Rates by Zip Code.

There are wide varieties of foreclosure and minority rates, but there is a relationship between the two. Generally, the percentage of the level of foreclosures in a zip code tracks with the minorities. Foreclosures receive more attention at the local government level when they start to affect property tax revenue.

Figure 5.2 shows the levels of secured property taxes for Sacramento County per fiscal year, from 2005 to present**.**



Source: Data obtained from the Sacramento County Budget Office

Figure 5-2. Sacramento County Secured Property Tax Revenue.

The secured property tax totals continued to rise through 2008-2009 but the data projects a decrease in 2009-2010 because decreased sales prices will lead to lower property values decreasing property tax revenue. Additionally, property tax revenue is also affected by the public having their home's reassessed to decrease their property taxes, further reducing property tax revenues. Foreclosures not only affect the selling price of homes not in foreclosure, but also reduce property tax revenue. If the county reassessed all the homes in the City of Sacramento to their current value, the spillover

effects of foreclosure would cause property taxes to decrease by approximately $38.7 million. This is a large dollar figure and hit to the City's operating budget because of spillover effects of foreclosures.

Impact to Legislators

There have been a number of state and federal measures proposed and passed to address the causes of foreclosures to limit the number of foreclosures. Broader policies like the Troubled Asset Relief Program cost $75 billion this year (U.S. Department of the Treasury, 2009a). This is a broad sweeping plan to stabilize the housing market. Another broad attempt to address the crisis is the Housing and Economic Recovery Act that comes with a $300 billion price tag (U.S. Department Housing and Urban Development, 2009b). The program includes many smaller more focused programs like Hope for Homeowners, which assists homeowners in refinancing their homes at a low cost. Another promising refinancing assistance program is the Homeowner Affordability and Stability Plan of 2009, which helps homeowners to refinance at a lower cost, requires $75 billion in federal funding (U.S. Department of the Treasury, 2009).

These policies focus on providing affordable loan modification alternatives and additional time for homeowners to explore alternatives to foreclosures before filing. Smaller numbers of foreclosures will temper the negative externalities that affect neighborhoods. Decreasing foreclosure rate addresses two problems at once: fewer people lose their homes and the neighborhoods remain intact.

Another approach to fighting the spillover effects of foreclosures is the Neighborhood Stabilization Program. The program allocates $2 billion to redevelopment agencies to purchase foreclosed homes for renovation or redevelopment (U.S. Department Housing and Urban Development, 2009a). This is part of the large $787 billion American Recovery and Reinvestment Act that serves as a large stimulus package to many sectors of the economy (American Recovery and Reinvestment Act, 2009). Additionally, the Neighborhood Stabilization Program focuses on the effects of foreclosures instead of the causes, limiting the spillover effects.

These are not the only foreclosure mitigation programs, but they are the highest price tag, public policies. Taxpayers paid at a little over $450 billion for housing programs at a cost of $1479.97 per capita. In comparison, Sacramento residents could stand to lose $85,279.83 per capita because of the spillover effects of foreclosures. Paying more taxes to maintain property values is a rational decision when faced with the possibility of losing a great deal of money due to the negative effects of foreclosure.

Summary

Foreclosures do have an effect on the sales price of surrounding properties at a decreasing rate of 0.496 for every unit increase in foreclosure rate. Taxpayers should not ignore this conclusion when considering voting for policies to reduce foreclosures. Foreclosures affect all homeowners and they will benefit from public policy efforts to prevent them.

Possible Improvements and Expansions

This is one of many localized studies to understand the effects of foreclosures in a specific region. Future works could expand this study to provide a broader base of knowledge about foreclosures and their spillover effects.

Another improvement would be to expand the study to be a time series or multiple sale regression that would allow it to be more inclusive concerning housing trends. Additionally, comparing the effects of foreclosures in recent history to the levels in 2008 to 2009 would provide additional information about the scale for the foreclosure crisis and highlight other differences from the 2007 subprime mortgage crisis.

Future studies might also benefit from more precise distance measurements since this study focused on municipalities. Mapping property locations with programs such as Geographic Information System (GIS) software would make their measurements more precise relative to other property prices.

Completing studies over longer periods of time and in a smaller area would be helpful to isolate the effects of foreclosures on neighboring sales prices, potentially providing additional insights.

APPENDIX

Table A1

Correlation Matrix

	Foreclosure Rate	Foreclosure Dummy	DOM	Vacancy	Square Footage	Lot Size
Foreclosure Rate	1	.401**	-.008	.159**	-.237**	-.066**
Foreclosure Dummy	.401**	1	-.190**	.069**	-.148**	-.043**
DOM	-.008	-.190**	1	-.013	.046**	.002
Vacancy	.159**	.069**	-.013	1	-.297**	-.033**
Square Footage	-.237**	-.148**	.046**	-.297**	1	.125**
Lot Size	-.066**	-.043**	.002	-.033**	.125**	1
Age 2010	-.118**	-.001	.004	.274**	-.518**	.079**
Beds	-.022**	.000	.005	-.180**	.672**	.064**
Baths-Full	-.098**	-.071**	.015	-.203**	.742**	.052**
Baths- Half	-.088**	-.066**	.038**	-.113**	.302**	-.020*
Stories	-.084**	-.045**	.037**	-.219**	.584**	-.065**
Heat / Air Dummy	-.115**	-.126**	-.022**	-.105**	.283**	-.031**
HOA Dues	-.112**	-.122**	.016*	-.202**	.350**	-.043**
Fireplaces	-.260**	-.144**	.004	-.090**	.464**	.085**
Garage Spaces	-.113**	-.111**	-.012	-.160**	.532**	.070**
Pool Dummy	-.196**	-.120**	-.001	-.021**	.236**	.089**
Roof: Tile	-.066**	-.083**	.002	-.365**	.528**	-.073**
Roof: Composite	.121**	.105**	-.010	.303**	-.522**	.044**
Roof: Shake	-.081**	-.048**	.027**	.048**	.083**	.028**
Level of Education	-.797**	-.321**	.004	-.214**	.341**	.018*
Poverty Rate	.543**	.220**	.009	.339**	-.408**	-.087**
Median Income	-.490**	-.197**	-.006	-.415**	.484**	.047**
Median Age	-.790**	-.320**	.008	-.104**	.167**	.144**
Asian	.429**	.162**	.009	.190**	-.105**	-.108**
Black	.599**	.239**	.001	.404**	-.200**	-.133**
Latino	.620**	.245**	.003	.269**	-.263**	-.157**
White	-.662**	-.259**	-.006	-.330**	.229**	.166**
Antelope	.024**	.005	-.008	-.145**	.038**	-.020*
Carmichael	-.257**	-.099**	.016*	.167**	.084**	.090**
Citrus Heights	-.014	-.019*	-.017*	-.020**	-.027**	-.003
Elk Grove	.055**	.020*	-.007	-.113**	.128**	.003
Fair Oaks	-.142**	-.056**	.011	-.095**	.055**	.077**
Folsom	-.417**	-.165**	.002	.106**	.189**	.027**
Gold River	-.059**	-.066**	-.001	.082**	.056**	-.005
North Highlands	.142**	.062**	-.032**	-.041**	-.148**	-.007
Orangevale	-.081**	-.018*	.005	-.108**	.005	.063**
Rancho Cordova	-.103**	-.020*	.002	-.050**	.139**	-.020*
Rio Linda	.051**	.023**	.008	-.168**	-.052**	.259**

Table A1 continued

	Foreclosure Rate	Foreclosure Dummy	DOM	Vacancy	Square Footage	Lot Size
Sacramento	.275**	.108**	.013	.128**	-.183**	-.127**
Quarter 1 2008	-.081**	-.072**	.071**	-.024**	.044**	-.001
Quarter 2 2008	-.056**	-.027**	.014	-.016*	.033**	-.008
Quarter 3 2008	-.018*	.005	-.029**	.002	.011	.004
Quarter 4 2008	.030**	.045**	-.037**	.040**	-.023**	-.005
Quarter 1 2008	.077**	.069**	-.004	.008	-.045**	-.003
Quarter 2 2009	.035**	-.036**	.001	-.016*	-.013	.013

**. Correlation is significant at the 0.1 level (2-tailed).

Table A1 continued

	Age in 2010	Beds	Baths - Full	Baths - Half	Stories	Heat / Air Dummy	HOA Dues
Foreclosure Rate	-.118**	-.022**	-.098**	-.088**	-.084**	-.115**	-.112**
Foreclosure Status	-.001	.000	-.071**	-.066**	-.045**	-.126**	-.122**
DOM	.004	.005	.015	.038**	.037**	-.022**	.016*
Vacancy	.274**	-.180**	-.203**	-.113**	-.219**	-.105**	-.202**
Square Footage	-.518**	.672**	.742**	.302**	.584**	.283**	.350**
Lot Size	.079**	.064**	.052**	-.020*	-.065**	-.031**	-.043**
Age 2010	1	-.454**	-.600**	-.237**	-.417**	-.398**	-.337**
Beds	-.454**	1	.635**	.179**	.442**	.269**	.130**
Baths-Full	-.600**	.635**	1	.033**	.491**	.365**	.253**
Baths- Half	-.237**	.179**	.033**	1	.500**	.113**	.171**
Stories	-.417**	.442**	.491**	.500**	1	.168**	.263**
Heat / Air Dummy	-.398**	.269**	.365**	.113**	.168**	1	.111**
HOA Dues	-.337**	.130**	.253**	.171**	.263**	.111**	1
Fireplaces	-.243**	.258**	.381**	.106**	.173**	.257**	.123**
Garage Spaces	-.545**	.400**	.525**	.178**	.282**	.351**	.226**
Pool Dummy	-.068**	.130**	.181**	.113**	.120**	.098**	.163**
Roof: Tile	-.650**	.340**	.443**	.223**	.432**	.217**	.372**
Roof: Composite	.579**	-.309**	-.430**	-.231**	-.417**	-.203**	-.357**
Roof: Shake	-.011	.014	.068**	.048**	.049**	.057**	.042**
Level of Education	-.144**	.126**	.251**	.164**	.221**	.213**	.159**
Poverty Rate	.398**	-.269**	-.384**	-.183**	-.246**	-.303**	-.232**
Median Income	-.498**	.292**	.430**	.201**	.337**	.285**	.303**
Median Age	.144**	.002	.054**	.076**	.005	.090**	.044**
Asian	-.039**	-.027**	-.036**	-.038**	-.024**	-.048**	-.108**
Black	-.017*	-.060**	-.081**	-.053**	-.061**	-.068**	-.133**
Latino	.137**	-.171**	-.236**	-.070**	-.066**	-.231**	-.112**
White	-.038**	.110**	.146**	.064**	.057**	.144**	.142**
Antelope	-.142**	.042**	.071**	.034**	.072**	.062**	-.064**
Carmichael	.044**	.041**	.043**	.046**	-.033**	.043**	-.024**
Citrus Heights	-.006	.011	.019*	-.014	-.032**	.050**	-.030**

Table A1 continued

	Age in 2010	Beds	Baths - Full	Baths - Half	Stories	Heat / Air Dummy	HOA Dues
Elk Grove	-.189**	.099**	.136**	.064**	.145**	.080**	.065**
Fair Oaks	.015	.036**	.032**	.034**	.026**	.024**	.016*
Folsom	-.161**	.097**	.156**	.039**	.107**	.069**	.163**
Gold River	-.050**	.005	.025**	.006	.006	.031**	.268**
North Highlands	.147**	-.032**	-.151**	-.069**	-.123**	-.057**	-.072**
Orangevale	.007	.012	.006	-.002	-.015*	.011	-.016*
Rancho Cordova	-.120**	.120**	.127**	.017*	.055**	.058**	.156**
Rio Linda	.011	-.032**	-.026**	-.046**	-.051**	-.028**	-.040**
Sacramento	.182**	-.167**	-.175**	-.044**	-.071**	-.132**	-.143**
Quarter 1 2008	-.022**	.003	.019*	.024**	.024**	.020*	.030**
Quarter 2 2008	-.018*	.018*	.027**	.000	.021**	.021**	.023**
Quarter 3 2008	-.004	.018*	.007	-.008	.002	.003	.010
Quarter 4 2008	.019*	-.014	-.016*	-.006	-.019*	-.011	-.025**
Quarter 1 2009	.008	-.018*	-.032**	-.010	-.014	-.026**	-.021**
Quarter 2 2009	.013	-.008	-.002	.005	-.010	-.005	-.012

**. Correlation is significant at the 0.1 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A1 continued

	Fireplaces	Garage Spaces	Pool Dummy	Roof:Tile	Roof: Comp	Roof: Shake	College Educated
Foreclosure Rate	-.260**	-.113**	-.196**	-.066**	.121**	-.081**	-.797**
Foreclosure Status	-.144**	-.111**	-.120**	-.083**	.105**	-.048**	-.321**
DOM	.004	-.012	-.001	.002	-.010	.027**	.004
Vacancy	-.090**	-.160**	-.021**	-.365**	.303**	.048**	-.214**
Square Footage	.464**	.532**	.236**	.528**	-.522**	.083**	.341**
Lot Size	.085**	.070**	.089**	-.073**	.044**	.028**	.018*
Age 2010	-.243**	-.545**	-.068**	-.650**	.579**	-.011	-.144**
Beds	.258**	.400**	.130**	.340**	-.309**	.014	.126**
Baths-Full	.381**	.525**	.181**	.443**	-.430**	.068**	.251**
Baths- Half	.106**	.178**	.113**	.223**	-.231**	.048**	.164**
Stories	.173**	.282**	.120**	.432**	-.417**	.049**	.221**
Heat / Air Dummy	.257**	.351**	.098**	.217**	-.203**	.057**	.213**
HOA Dues	.123**	.226**	.163**	.372**	-.357**	.042**	.159**
Fireplaces	1	.392**	.199**	.200**	-.260**	.143**	.329**
Garage Spaces	.392**	1	.155**	.376**	-.361**	.074**	.254**
Pool Dummy	.199**	.155**	1	.055**	-.105**	.084**	.214**
Roof: Tile	.200**	.376**	.055**	1	-.791**	-.146**	.257**
Roof: Composite	-.260**	-.361**	-.105**	-.791**	1	-.309**	-.315**
Roof: Shake	.143**	.074**	.084**	-.146**	-.309**	1	.121**

Table A1 continued

	Fireplaces	Garage Spaces	Pool Dummy	Roof:Tile	Roof: Comp	Roof: Shake	College Educated
Level of Education	.329**	.254**	.214**	.257**	-.315**	.121**	1
Poverty Rate	-.358**	-.403**	-.213**	-.334**	.371**	-.114**	-.723**
Median Income	.350**	.430**	.197**	.505**	-.513**	.095**	.768**
Median Age	.246**	.093**	.209**	-.017*	-.051**	.087**	.716**
Asian	-.056**	-.028**	-.093**	-.031**	.018*	.014	-.293**
Black	-.168**	-.097**	-.156**	-.115**	.137**	-.038**	-.530**
Latino	-.277**	-.285**	-.189**	-.088**	.149**	-.107**	-.559**
White	.206**	.175**	.181**	.094**	-.123**	.054**	.548**
Antelope	.067**	.083**	-.012	.050**	-.133**	.137**	.094**
Carmichael	.100**	.060**	.129**	-.041**	-.012	.079**	.193**
Citrus Heights	.036**	.041**	.024**	-.061**	.070**	-.015	-.061**
Elk Grove	.094**	.133**	.047**	.198**	-.230**	.080**	.318**
Fair Oaks	.038**	.044**	.071**	-.032**	.026**	.006	.180**
Folsom	.131**	.172**	.108**	.202**	-.179**	.000	.285**
Gold River	.056**	.071**	.047**	.032**	-.083**	.092**	.041**
North Highlands	-.155**	-.126**	-.060**	-.136**	.145**	-.048**	-.285**
Orangevale	.017*	.031**	.027**	-.032**	.040**	-.009	.030**
Rancho Cordova	.054**	.115**	.024**	.136**	-.100**	-.031**	-.004
Rio Linda	-.038**	-.018*	-.025**	-.063**	.069**	-.016*	-.148**
Sacramento	-.144**	-.226**	-.130**	-.127**	.170**	-.094**	-.232**
Quarter 1 2008	.036**	.028**	-.006	.035**	-.045**	.044**	.074**
Quarter 2 2008	.032**	.023**	.005	.028**	-.024**	-.008	.056**
Quarter 3 2008	.017*	.013	.027**	.001	-.008	.010	.020*
Quarter 4 2008	-.022**	-.011	-.004	-.012	.008	.003	-.027**
Quarter 1 2009	-.045**	-.033**	-.024**	-.031**	.039**	-.011	-.075**
Quarter 2 2009	-.014	-.018*	-.001	-.014	.022**	-.030**	-.037**

**. Correlation is significant at the 0.1 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A1 continued

	Poverty Rate	Median Income	Median Age	% Asian	% Black	% Latino	% White
Foreclosure Rate	.543**	-.490**	-.790**	.429**	.599**	.620**	-.662**
Foreclosure Status	.220**	-.197**	-.320**	.162**	.239**	.245**	-.259**
DOM	.009	-.006	.008	.009	.001	.003	-.006
Vacancy	.339**	-.415**	-.104**	.190**	.404**	.269**	-.330**
Square Footage	-.408**	.484**	.167**	-.105**	-.200**	-.263**	.229**
Lot Size	-.087**	.047**	.144**	-.108**	-.133**	-.157**	.166**
Age 2010	.398**	-.498**	.144**	-.039**	-.017*	.137**	-.038**
Beds	-.269**	.292**	.002	-.027**	-.060**	-.171**	.110**
Baths-Full	-.384**	.430**	.054**	-.036**	-.081**	-.236**	.146**
Baths- Half	-.183**	.201**	.076**	-.038**	-.053**	-.070**	.064**

Table A1 continued

	Poverty Rate	Median Income	Median Age	% Asian	% Black	% Latino	% White
Stories	-.246**	.337**	.005	-.024**	-.061**	-.066**	.057**
Heat / Air Dummy	-.303**	.285**	.090**	-.048**	-.068**	-.231**	.144**
HOA Dues	-.232**	.303**	.044**	-.108**	-.133**	-.112**	.142**
Fireplaces	-.358**	.350**	.246**	-.056**	-.168**	-.277**	.206**
Garage Spaces	-.403**	.430**	.093**	-.028**	-.097**	-.285**	.175**
Pool Dummy	-.213**	.197**	.209**	-.093**	-.156**	-.189**	.181**
Roof: Tile	-.334**	.505**	-.017*	-.031**	-.115**	-.088**	.094**
Roof: Composite	.371**	-.513**	-.051**	.018*	.137**	.149**	-.123**
Roof: Shake	-.114**	.095**	.087**	.014	-.038**	-.107**	.054**
College Educated	-.723**	.768**	.716**	-.293**	-.530**	-.559**	.548**
Poverty Rate	1	-.814**	-.539**	.427**	.535**	.672**	-.656**
Median Income	-.814**	1	.477**	-.236**	-.519**	-.549**	.532**
Median Age	-.539**	.477**	1	-.496**	-.701**	-.599**	.727**
Asian	.427**	-.236**	-.496**	1	.631**	.458**	-.817**
Black	.535**	-.519**	-.701**	.631**	1	.517**	-.855**
Latino	.672**	-.549**	-.599**	.458**	.517**	1	-.810**
White	-.656**	.532**	.727**	-.817**	-.855**	-.810**	1
Antelope	-.262**	.230**	-.099**	.008	-.058**	-.190**	.074**
Carmichael	-.151**	.025**	.379**	-.238**	-.230**	-.269**	.310**
Citrus Heights	-.180**	-.012	.132**	-.227**	-.220**	-.192**	.269**
Elk Grove	-.305**	.393**	.011	.178**	-.054**	-.085**	-.004
Fair Oaks	-.145**	.157**	.242**	-.136**	-.186**	-.185**	.208**
Folsom	-.208**	.422**	.160**	-.125**	-.158**	-.211**	.221**
Gold River	-.042**	.016*	.036**	-.048**	-.054**	-.098**	.093**
North Highlands	.156**	-.192**	-.118**	-.218**	.005	-.043**	.135**
Orangevale	-.134**	.086**	.124**	-.136**	-.170**	-.150**	.189**
Rancho Cordova	-.203**	.063**	-.052**	-.158**	-.089**	-.198**	.183**
Rio Linda	-.043**	.002	.094**	-.154**	-.183**	-.129**	.194**
Sacramento	.562**	-.440**	-.268**	.439**	.467**	.627**	-.655**
Quarter 1 2008	-.041**	.067**	.051**	-.020**	-.048**	-.051**	.049**
Quarter 2 2008	-.047**	.056**	.041**	-.033**	-.044**	-.045**	.051**
Quarter 3 2008	-.025**	.022**	.016*	-.020*	-.013	-.016*	.021**
Quarter 4 2008	.034**	-.023**	-.025**	.023**	.021**	.032**	-.029**
Quarter 1 2009	.048**	-.072**	-.065**	.038**	.063**	.049**	-.063**
Quarter 2 2009	.028**	-.041**	-.010	.011	.015	.024**	-.023**

**. Correlation is significant at the 0.1 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A1 continued

	Antelope	Carmichael	Citrus Heights	Elk Grove	Fair Oaks	Folsom	Gold River
Foreclosure Rate	.024**	-.257**	-.014	.055**	-.142**	-.417**	-.059**
Foreclosure Status	.005	-.099**	-.019*	.020*	-.056**	-.165**	-.066**
DOM	-.008	.016*	-.017*	-.007	.011	.002	-.001
Vacancy	-.145**	.167**	-.020**	-.113**	-.095**	.106**	.082**
Square Footage	.038**	.084**	-.027**	.128**	.055**	.189**	.056**
Lot Size	-.020*	.090**	-.003	.003	.077**	.027**	-.005
Age 2010	-.142**	.044**	-.006	-.189**	.015	-.161**	-.050**
Beds	.042**	.041**	.011	.099**	.036**	.097**	.005
Baths-Full	.071**	.043**	.019*	.136**	.032**	.156**	.025**
Baths- Half	.034**	.046**	-.014	.064**	.034**	.039**	.006
Stories	.072**	-.033**	-.032**	.145**	.026**	.107**	.006
Heat / Air Dummy	.062**	.043**	.050**	.080**	.024**	.069**	.031**
HOA Dues	-.064**	-.024**	-.030**	.065**	.016*	.163**	.268**
Fireplaces	.067**	.100**	.036**	.094**	.038**	.131**	.056**
Garage Spaces	.083**	.060**	.041**	.133**	.044**	.172**	.071**
Pool Dummy	-.012	.129**	.024**	.047**	.071**	.108**	.047**
Roof: Tile	.050**	-.041**	-.061**	.198**	-.032**	.202**	.032**
Roof: Composite	-.133**	-.012	.070**	-.230**	.026**	-.179**	-.083**
Roof: Shake	.137**	.079**	-.015	.080**	.006	.000	.092**
Level of Education	.094**	.193**	-.061**	.318**	.180**	.285**	.041**
Poverty Rate	-.262**	-.151**	-.180**	-.305**	-.145**	-.208**	-.042**
Median Income	.230**	.025**	-.012	.393**	.157**	.422**	.016*
Median Age	-.099**	.379**	.132**	.011	.242**	.160**	.036**
Asian	.008	-.238**	-.227**	.178**	-.136**	-.125**	-.048**
Black	-.058**	-.230**	-.220**	-.054**	-.186**	-.158**	-.054**
Latino	-.190**	-.269**	-.192**	-.085**	-.185**	-.211**	-.098**
White	.074**	.310**	.269**	-.004	.208**	.221**	.093**
Antelope	1	-.039**	-.035**	-.043**	-.026**	-.038**	-.023**
Carmichael	-.039**	1	-.034**	-.042**	-.025**	-.037**	-.022**
Citrus Heights	-.035**	-.034**	1	-.038**	-.023**	-.034**	-.020*
Elk Grove	-.043**	-.042**	-.038**	1	-.028**	-.041**	-.024**
Fair Oaks	-.026**	-.025**	-.023**	-.028**	1	-.024**	-.014
Folsom	-.038**	-.037**	-.034**	-.041**	-.024**	1	-.021**
Gold River	-.023**	-.022**	-.020*	-.024**	-.014	-.021**	1
North Highlands	-.045**	-.044**	-.040**	-.049**	-.029**	-.043**	-.026**
Orangevale	-.022**	-.021**	-.019*	-.024**	-.014	-.021**	-.012
Rancho Cordova	-.051**	-.049**	-.045**	-.055**	-.032**	-.048**	-.029**
Rio Linda	-.026**	-.025**	-.023**	-.028**	-.017*	-.025**	-.015
Sacramento	-.272**	-.263**	-.240**	-.294**	-.174**	-.259**	-.153**
Quarter 1 2008	.031**	-.006	-.011	.009	.010	.062**	.010
Quarter 2 2008	.007	.015	.019*	.023**	.003	.065**	-.009

Table A1 continued

	Antelope	Carmichael	Citrus Heights	Elk Grove	Fair Oaks	Folsom	Gold River
Quarter 3 2008	-.007	-.003	.011	.003	.013	.035**	-.002
Quarter 4 2008	.008	-.006	-.010	-.013	-.010	.011	.018*
Quarter 1 2009	-.010	-.008	-.009	-.002	-.019*	-.085**	-.020*
Quarter 2 2009	-.022**	.007	-.004	-.019*	.005	-.083**	.004

**. Correlation is significant at the 0.1 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A1 continued

	North Highlands	Orange-vale	Rancho Cordova	Rio Linda	Sacramento	Q1 2008	Q2 2008
Foreclosure Rate	.142**	-.081**	-.103**	.051**	.275**	-.081**	-.056**
Foreclosure Status	.062**	-.018*	-.020*	.023**	.108**	-.072**	-.027**
DOM	-.032**	.005	.002	.008	.013	.071**	.014
Vacancy	-.041**	-.108**	-.050**	-.168**	.128**	-.024**	-.016*
Square Footage	-.148**	.005	.139**	-.052**	-.183**	.044**	.033**
Lot Size	-.007	.063**	-.020*	.259**	-.127**	-.001	-.008
Age 2010	.147**	.007	-.120**	.011	.182**	-.022**	-.018*
Beds	-.032**	.012	.120**	-.032**	-.167**	.003	.018*
Baths-Full	-.151**	.006	.127**	-.026**	-.175**	.019*	.027**
Baths- Half	-.069**	-.002	.017*	-.046**	-.044**	.024**	.000
Stories	-.123**	-.015*	.055**	-.051**	-.071**	.024**	.021**
Heat / Air Dummy	-.057**	.011	.058**	-.028**	-.132**	.020*	.021**
HOA Dues	-.072**	-.016*	.156**	-.040**	-.143**	.030**	.023**
Fireplaces	-.155**	.017*	.054**	-.038**	-.144**	.036**	.032**
Garage Spaces	-.126**	.031**	.115**	-.018*	-.226**	.028**	.023**
Pool Dummy	-.060**	.027**	.024**	-.025**	-.130**	-.006	.005
Roof: Tile	-.136**	-.032**	.136**	-.063**	-.127**	.035**	.028**
Roof: Composite	.145**	.040**	-.100**	.069**	.170**	-.045**	-.024**
Roof: Shake	-.048**	-.009	-.031**	-.016*	-.094**	.044**	-.008
Level of Education	-.285**	.030**	-.004	-.148**	-.232**	.074**	.056**
Poverty Rate	.156**	-.134**	-.203**	-.043**	.562**	-.041**	-.047**
Median Income	-.192**	.086**	.063**	.002	-.440**	.067**	.056**
Median Age	-.118**	.124**	-.052**	.094**	-.268**	.051**	.041**
Asian	-.218**	-.136**	-.158**	-.154**	.439**	-.020**	-.033**
Black	.005	-.170**	-.089**	-.183**	.467**	-.048**	-.044**
Latino	-.043**	-.150**	-.198**	-.129**	.627**	-.051**	-.045**
White	.135**	.189**	.183**	.194**	-.655**	.049**	.051**
Antelope	-.045**	-.022**	-.051**	-.026**	-.272**	.031**	.007
Carmichael	-.044**	-.021**	-.049**	-.025**	-.263**	-.006	.015

Table A1 continued

	North Highlands	Orange-vale	Rancho Cordova	Rio Linda	Sacramento	Q1 2008	Q2 2008
Citrus Heights	-.040**	-.019*	-.045**	-.023**	-.240**	-.011	.019*
Elk Grove	-.049**	-.024**	-.055**	-.028**	-.294**	.009	.023**
Fair Oaks	-.029**	-.014	-.032**	-.017*	-.174**	.010	.003
Folsom	-.043**	-.021**	-.048**	-.025**	-.259**	.062**	.065**
Gold River	-.026**	-.012	-.029**	-.015	-.153**	.010	-.009
North Highlands	1	-.025**	-.058**	-.030**	-.309**	.005	.004
Orangevale	-.025**	1	-.028**	-.014	-.149**	-.004	.002
Rancho Cordova	-.058**	-.028**	1	-.033**	-.345**	.003	-.005
Rio Linda	-.030**	-.014	-.033**	1	-.177**	-.016*	-.006
Sacramento	-.309**	-.149**	-.345**	-.177**	1	-.038**	-.047**
Quarter 1 2008	.005	-.004	.003	-.016*	-.038**	1	-.157**
Quarter 2 2008	.004	.002	-.005	-.006	-.047**	-.157**	1
Quarter 3 2008	.000	-.001	.018*	.001	-.027**	-.174**	-.248**
Quarter 4 2008	.013	-.013	-.016*	-.003	.009	-.153**	-.218**
Quarter 1 2009	.000	.001	.002	.001	.052**	-.148**	-.212**
Quarter 2 2009	-.021**	.015	-.003	.021**	.047**	-.145**	-.207**

**. Correlation is significant at the 0.1 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

TableA1 continued

	Q3 2008	Q4 2008	Q1 2009	Q2 2009
Foreclosure Rate	-.018*	.030**	.077**	.035**
Foreclosure Status	.005	.045**	.069**	-.036**
DOM	-.029**	-.037**	-.004	.001
Vacancy	.002	.040**	.008	-.016*
Square Footage	.011	-.023**	-.045**	-.013
Lot Size	.004	-.005	-.003	.013
Age 2010	-.004	.019*	.008	.013
Beds	.018*	-.014	-.018*	-.008
Baths-Full	.007	-.016*	-.032**	-.002
Baths- Half	-.008	-.006	-.010	.005
Stories	.002	-.019*	-.014	-.010
Heat / Air Dummy	.003	-.011	-.026**	-.005
HOA Dues	.010	-.025**	-.021**	-.012
Fireplaces	.017*	-.022**	-.045**	-.014
Garage Spaces	.013	-.011	-.033**	-.018*
Pool Dummy	.027**	-.004	-.024**	-.001
Roof: Tile	.001	-.012	-.031**	-.014

TableA1 continued

	Q3 2008	Q4 2008	Q1 2009	Q2 2009
Roof: Composite	-.008	.008	.039**	.022**
Roof: Shake	.010	.003	-.011	-.030**
Level of Education	.020*	-.027**	-.075**	-.037**
Poverty Rate	-.025**	.034**	.048**	.028**
Median Income	.022**	-.023**	-.072**	-.041**
Median Age	.016*	-.025**	-.065**	-.010
Asian	-.020*	.023**	.038**	.011
Black	-.013	.021**	.063**	.015
Latino	-.016*	.032**	.049**	.024**
White	.021**	-.029**	-.063**	-.023**
Antelope	-.007	.008	-.010	-.022**
Carmichael	-.003	-.006	-.008	.007
Citrus Heights	.011	-.010	-.009	-.004
Elk Grove	.003	-.013	-.002	-.019*
Fair Oaks	.013	-.010	-.019*	.005
Folsom	.035**	.011	-.085**	-.083**
Gold River	-.002	.018*	-.020*	.004
North Highlands	.000	.013	.000	-.021**
Orangevale	-.001	-.013	.001	.015
Rancho Cordova	.018*	-.016*	.002	-.003
Rio Linda	.001	-.003	.001	.021**
Sacramento	-.027**	.009	.052**	.047**
Quarter 1 2008	-.174**	-.153**	-.148**	-.145**
Quarter 2 2008	-.248**	-.218**	-.212**	-.207**
Quarter 3 2008	1	-.241**	-.234**	-.229**
Quarter 4 2008	-.241**	1	-.206**	-.201**
Quarter 1 2009	-.234**	-.206**	1	-.196**
Quarter 2 2009	-.229**	-.201**	-.196**	1

**. Correlation is significant at the 0.1 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

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