

# **Development of a Forecasting Model to Predict the Downturn and Upturn of a Real Estate Market in the Inland Empire**

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Boca Raton

*Development of a Forecasting Model to Predict the Downturn and Upturn of a  
Real Estate Market in the Inland Empire*

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## **ABSTRACT**

Amidst the dramatic real estate fluctuations in the first decade of the twenty-first century, this study recognized that there is a necessity to create a real estate prediction model for future real estate ventures and prevention of losses such as the mortgage meltdown and housing bust. This real estate prediction model study sought to reinstall the integrity into the American building and development industry, which was tarnished by the sudden emergence of various publications offering get-rich-quick schemes.

In the fast-paced and competitive world of lending and real estate development, it is becoming more complex to combine current and evolving factors into a profitable business model. This prediction model correlated past real estate cycle pinpoints to economical driving forces in order to create an ongoing formula. The study used a descriptive, secondary interpretation of raw data already available. Quarterly data was taken from the study's seven independent variables over a 24-year span from 1985 to 2009 to examine the correlation over two real estate cycles. Public information from 97 quarters (1985-2009) was also gathered on seven topics: consumer confidence, loan origination volume, construction employment statistics, migration, GDP, inflation, and interest rates. The Null hypothesis underwent a test of variance at a .05 level of significance. Multiple regression analysis uncovered that four of seven variables have correlated and could predict movement in real estate cycle evidence from previous data, based in the Inland Empire. GDP, interest rates, loan origination volume, and inflation were the four economical driving variables that completed the Inland Empire's real estate prediction model and global test.

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Findings from this study certify that there is correlation between economical driving factors and the real estate cycle. These correlations illustrate patterns and trends, which can become a prediction model using statistics. By interpreting and examining the data, this study believes that the prediction model is best utilized through pinpointing an exact numerical location by running calculations through the established global equation, and recommends further research and regular update of quarterly trends and movements in the real estate cycle and specific variables in the formula.

## **ACKNOWLEDGEMENTS**

Thank you to my dissertation committee.

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## **Chapter 1: INTRODUCTION**

### **Introduction and Rationale**

Over the last few years, an extremely large number of the construction related workers in the California Inland Empire have been laid off and forced into unemployment, including those entry level and senior management. Thousands of employees and bosses were laid off in the masses. This drove the motivation to make sure an epidemic such as a real estate “bubble” explosion could be better forecasted in the next real estate cycle swing. This dissertation’s sole intention was to find out if there is a model that can predict a future potential real estate collapse in a specific region: the Inland Empire. Riverside and San Bernardino have both seen the real estate market decelerate dramatically due to lack of home sales.

To understand the Inland Empire’s real estate market, we must understand the broader California context that surrounds this topic. Like all 50 states, California experienced a real estate incline in early 21<sup>st</sup> century. Economic outlooks state, “In California, home prices nearly tripled between 1999 and 2006.” (Beacon Economics, p. 19, 2008) Californian banks were lending to various under-qualified borrowers. When the boom stopped and the bubble popped in 2006, many of these Californian borrowers were not able to make their mortgage payments. “In California, 2% of all mortgages went into foreclosure. More trouble lies ahead for the state: Over 3% of all mortgages in California are currently 60 to 90 days behind on Payment.” (Beacon Economics, p. 20, 2008)

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As two of California's fastest growing counties, San Bernardino and Riverside are linked to California's declining economic patterns. Although these down-sliding real estate markets can correlate similarly to California's trends as a whole, the Inland Empire is dramatically unique, contrary, and distinguishable from California's concurrent theme. This was a much-needed study that looks specifically into forecasting a prediction model for the Inland Empire, not just broader California. Research could not apply the Inland Empire's data to median findings in other California areas. Current economic outlook data proves the extreme differences in contrasting California regions. For example, "The median single family home price as of March 22, 2009 for San Francisco is \$853,381" (Altos Research, 2009). Our forecasting model was needed for the Inland Empire because "The median single family home price as of March 22, 2009 for San Bernardino is \$119,669." (Altos Research, 2009) There was a need for this study because we could not compare the Inland Empire to any other California arena.

There have been a few dissertations, theses, and researches performed to find positive and negative relationships in areas of California real estate trends prior to the market collapse of 2008. These studies have now become outdated. A 2005 dissertation explains, "Krainer (1999) finds statistical significance of the positive relationship between the effective mortgage rate and time on the market in his empirical study of the housing market over 1992-1998 real estate cycle in the Bay Area in Northern California" (Chernobai, p. 42, 2005). This was all right back then, but little has been written in 2008-2009. Our study has looked into current day and specific Inland Empire locations based on current data from economic outlooks. Many prior correlating dissertations are obsolete.

### **Background to the Study**

The Inland Empire, CA experienced a development boom within the last 7-9 years. Noted cities in the I.E. are San Bernardino, Riverside, Rancho Cucamonga, and Hemet. Many people moved out to the I.E. from denser populated areas like O.C. and L.A. to purchase larger homes for their dollar. The development, by builders of commercial and residential properties, in the I.E. also created employment from this construction. Job opportunities emerged in the retail, hotel, restaurant, and casino industries. This boom created such a demand that appraisal values went ridiculously high, yet banks were still willing to lend. In 2004, Yucaipa listed particular new homes for sale that contained septic tanks, for over a million dollars. The real estate bubble eventually popped and I.E. was hit arguably the hardest in CA. Having worked in the development industry for many years, this researcher was very passionate about this research model.

Construction employment rose as an economic indicator, cited in the Beacon Economics' Inland Empire 2008 report. Beacon Economics stated construction employment grew by 60% in the recent upturn. "In the Inland Empire, construction employment more than tripled, from 41,858 jobs in January 1995 to a peak of 133,043 positions in early 2006." (Beacon Economics, p. 49, 2008) In 2006, the Inland Empire's construction employment average nearly doubled the California average. This potential model shows that just as fast as the Inland Empire's construction employment rate increased, it decreased just as fast. In early 2006, Inland Empire's home sales slowed dramatically causing prices to drop and new permits nearly to cease. "The number of building permits issued in the Inland Empire has decreased by nearly 86 percent since

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the recent peak in the third quarter of 2005, draining the number of construction jobs available in the process.” (Beacon Economics, p. 37, 2008) The Inland Empire’s city boards were too eager in issuing new home building permits to developers, which led to a heavy inventory of new homes and increasing supply.

The additional background of the macro-broad study was that housing bubbles affect lives detrimentally worse than other market collapses. Stock market crashes, although tremendously large in magnitude towards the loss in people’s savings and retirements, do not force as many people into bankruptcy and chance of losing one’s largest asset; a home foreclosure. Many people in the Inland Empire were continuously forced through the foreclosure process. Studies show that even greater personal problems come well after a home loss. “The stress of adjusting to a sustainable, cash basis lifestyle can lead to divorces, depression and a host of related personal and family problems.” (Roberts, p. 6, 2008) The Inland Empire was a booming city that inflated in population by commuters, investors, and migrating workers.

A forecasting model that predicts downturn specific to the Inland Empire helps lenders and builders decrease their risks and losses in a declining market. Roberts (2008) suggests that there was a panic belief in lenders and borrowers, that they might miss an appreciating opportunity without realization of a plateau or peak in value. “The great housing bubble, like all asset bubbles, was driven by the belief in permanent, rapid house price appreciation, an unrealistic perception of risk involved, and the fear that waiting to buy would cause market participants to miss their opportunity to own a house” (Roberts, p. 6, 2008). Our forecasting model focused on this solution.



### **Problem Statement**

The Inland Empire should never again take an economic-real estate hit as it has over the last few years of 2006 to 2009. This study asked if we could develop a model to predict upturn and downturn of the real estate market of a geographical region. The focus was to predict downturn in order to decrease liability as well as upturn to maximize success based on our model. Events observed in the I.E. over the past few years have developed a need for our research question. “Between 2000 and 2006, 315,000 jobs were created and 815,000 new residents moved in. Home prices jumped 214% in Riverside County and 241% in San Bernardino County.” (Kelly, p. 2, 2008) This bubble observation led to people not being able to afford homes, but in this instance they still qualified for home loans. This model includes what variables were responsible such as skyrocketing appraisal values similar to this example as an indicator of a future downturn.

### **Purpose of the Study**

The purpose of the present study was to determine a method for future forecasts of appropriate times to build and to cease construction development in the Inland Empire over the next real estate cycle. Orange County, Los Angeles, and San Diego County have severely limited land acres left, available for construction. The Inland Empire holds much potential for future development opportunities surrounding these Southern Californian over-populated metropolitans, once our economy improves. The rationale for this study states: construction success comes from builders who follow variables such as employment, appraisal, migrations, consumer confidence, inflation, interest rates, GDP, and loan accessibility using statistical

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technique applicable to the Inland Empire real estate market.

The homebuilders and land developers in Inland Empire set themselves up to fail by not paying attention to market conditions. Why do repeatedly hundreds of developers every decade foreclose on construction loans and go into bankruptcy, even after having experienced success? Construction success is based primarily upon a timeline within market value, consumer confidence, and buying power. The housing bust of 2008 has triggered the economic downturn of the world including elevated unemployment rates in many sectors, investments declines (Oct - Nov 08' stock market crash), and deflated global consumer confidence. Financial institutions suffer in this order: banks (lenders), investors, and shareholders.

### **Significance of the Study**

This chapter argues that this study was significant and an original contribution to the development field and industry. This research was important to the academic literature surrounding construction theory. There was a need for updated formula model to better assist the real estate theory and practiced discipline. Previous real estate timelines and past construction related dissertations are outdated. Too many developers have built in the past with their time strategy and market entry focused on accessibility of land and money. Many other variables need to be measured on a going forward basis in a real estate cycle. "If real estate markets were perfectly correcting, cycles would not occur." (Ling, p. 178, 2005) Developers cannot look at the Inland Empire like every other region in California. "Riverside finds itself repeating the classic growth pattern of Southern California." (Newmann, p.1, 2008) This study ramified current approaches such that a booming region like Riverside must be domesticated thoroughly before being used for massive residential development.

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The intent of this study was to open the door towards more real estate research in the Inland Empire. This study resolved queries related to why the Inland Empire is worth researching. There is a massive amount of future potential opportunity within Inland Empire real estate and the way developers handle this potential will determine success or failure levels. This study enriches the general understanding of the methods in the construction field and as well as building theory. Many builders have taken Orange County or Los Angeles construction models to the Inland Empire and have failed. It is not a simple formula of net minus expense equals profit. Real estate principle books recommended to our schools are incorrectly superseded. “Builders and developers watch real estate values, and when the market value of their product exceeds its construction cost, it is profitable for them to build.” (Ling, p. 178, 2005) Inland Empire investors, lenders, and developers all stood corrected after the housing bust of 2008 due to previous construction models, strategies, and plans. This study shows just how particularly unparalleled the Inland Empire can be.

This study contrasts with past studies, theses and dissertations. A real estate dissertation from UC Santa Barbara states “As was noted earlier, it has been widely agreed upon by researchers in the real estate field that housing illiquidity has two components, the first one being the time and the second one being the price component” (Chernobai, p. 24, 2005), focusing cycles primarily on time and price. This is false and under looked. In 2005, it was effortless to analyze real estate fairly easier when the marker accelerated quickly with little research and variable usage. This study focused on how real estate cycle and development industry was evolving at a fast pace.

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This study presents alternative practices for examining the Inland Empire's real estate cycle and timeline. Where builders have failed is focusing on price only, and not location, economics, surrounding localities, and freeway accessibility. A Riverside source says "Affordably priced housing is dramatically boosting the size of the (Inland Empire) population in the region by 100,000 people annually." (Newmann, p.1, 2008) Most foreclosures in the Inland Empire have been affordable; however, going back and forth these are areas take huge amount of effort. The significance of this study derives from detailing a forecasting model with one of California's most profitable terrains.

### **Overview of Methodology**

This research study uses statistical technique to see if there is a model, which anticipates the next real estate cycle upswing and decline est. 2011-2019. Evidence included in this research came from quarterly data and historical information from 1985 to 2009 dealing with home prices, employment, foreclosures, consumer confidence and spending, migration, growth, assets etc. The current ending real estate cycle was very unique both in its peak and in its bottom-out point. Many people may say that the lack of financial regulation and supervision by city, state, and federal led to the most inflated real estate bubble our country has ever seen. For our economy's sake, government must implement laws to avoid repeating history. "The only way to avoid these problems is to prevent the bubble from inflating in the first place through some form of intervention in the mortgage market." (Roberts, p. 173, 2008) The current ending timeline cycle showed every economic sector profiting from this inflation including brokers, residents, lenders, developers, communities, government, and especially Wall Street.

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This dissertation investigation will use applicable statistical technique from I.E. observations, symptoms, and problems. A coefficient correlation between variables within economic driving forces was used to see if there is a model that can predict real estate bubble inflations and deflations. The subsequent questions that found answers towards this potential prediction model include statistics within the I.E.'s construction employment, home prices, lending, migrant commuters, and consumer confidence. Research has shown the I.E. up and downturns. "Riverside and San Bernardino counties experienced unprecedented growth followed by a spectacular crash." (Kelly, p. 2, 2008) Observation lead to facts, concepts, and constructs towards the hypothesis being found. This research study took a quantitative approach towards developer subjects, statistic and financial measures, and operating procedures within public and private builders. There was luckily an abundance of economic outlook information to compliment our model. This study was one of the most needed research topics in 2009. "The value of real estate plays an important role in the wealth of the United States. We estimate that the total market value of non government-owned real estate is approximately \$22 trillion." (Ling, 2005, p. 8) This intended dissertation reactively audited the recent real estate cycle to prevent proactively similar losses in our next fiscal decade.

### **Research Questions**

Since this was a quantitative dissertation, the research questions were pursuing numerical findings. These research questions prided themselves on being specific and most important, researchable. The substance was the economic variables in the Inland Empire, and the form was types of questions, which dictate the methodology.

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The main research question was: what economic driving forces help develop a forecasting model that predict the downturn and upturn of a real estate market in a geographic area such as the Inland Empire i.e. San Bernardino and Riverside Counties? Economic factors tested were consumer confidence, current appraisal values, types of employment (construction related), interest rates, GDP, inflation, migration and commuting, and mortgage loan accessibility. These economic forces were tested through statistical technique in the form of seven research hypotheses. All seven independent variables / research questions were tested against the dependent variable (appraisal value) to find historical correlation. The dependent variable is the quarterly appraisal records that came from the National Association of Realtors, which gave the quarterly appraisal averages for I.E. counties. Below are the sub-research questions for this study:

1. Can consumer confidence predict upturn and downturn of the real estate market in the Inland Empire? This first research question focuses on finding a correlation between consumer confidence (1<sup>st</sup> Independent variable) and appraisal value (Dependent variable).

X Independent variable = Consumer Confidence (national)

Y Dependent variable = Appraisal Value (sample average)

Independent Variable #1 - Consumer Confidence. Quarterly samples from consumer confidence came from the Consumer Confidence Index.

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2. Can real estate loan origination volume and accessibility predict upturn and downturn of the real estate market in the Inland Empire? The second research question focuses on finding a correlation between loan origination volume (2nd independent variable) and appraisal value (dependent variable):

X Independent variable = Loan Volume and Accessibility (national)

Y Dependent variable = Appraisal Value (sample average)

Independent Variable #2 - Loan Origination Volume. Quarterly data from the Mortgage Banker Association.

3. Can (construction) employment rates predict upturn and downturn of the real estate market in the Inland Empire? The third research question focuses on finding a correlation between construction employment rates (3rd independent variable) and appraisal value (dependent variable).

X Independent variable = Construction Employment Rates (national)

Y Dependent variable = Appraisal Value (sample average)

Independent Variable #3 - Construction Employment Statistics: Quarterly samples came from the Bureau of Labor Statistics.

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4. Can migration / commuter levels predict upturn and downturn of the real estate market in the Inland Empire? The fourth research question focuses on finding a correlation between migration / commuter levels (4th independent variable) and appraisal value (dependent variable).

X Independent variable = Migration / Commuting (regional)

Y Dependent variable = Appraisal Value (sample average)

Independent Variable #4 - Migration & Commuting statistics: The samples in this experiment came from quarterly data from California Department of Finance.

5. Can GDP predict upturn and downturn of the real estate market in the Inland Empire? The fifth research question focuses on finding a correlation between GDP (5th independent variable) and appraisal value (dependent variable).

X Independent variable = GDP (national)

Y Dependent variable = Appraisal Value (sample average)

Independent Variable #5 - GDP: This study measured quarterly GDP samples from the Bureau of Economic Analysis.



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6. Can inflation predict upturn and downturn of the real estate market in the Inland Empire? The sixth research question focuses on finding a correlation between inflation (6th independent variable) and appraisal value (dependent variable).

X Independent variable = Inflation (national)

Y Dependent variable = Appraisal Value (sample average)

Independent Variable #6 - Inflation: Quarterly data for inflation was extracted from the Consumer Price Index.

7. Can interest rates predict upturn and downturn of the real estate market in the Inland Empire? The seventh research question focuses on finding a correlation between interest rates (7th independent variable) and appraisal value (dependent variable).

X Independent variable = Interest Rates (national)

Y Dependent variable = Appraisal Value (sample average)

Independent Variable #7 - Interest Rates: This study measured quarterly interest rate data from the Federal Reserve and from Federal Funds Rates.