

## Impact of Employment and Interest Rates on the Selling Price of Residential Property

Stephen Caples\* Michael Hanna William Jens

### Abstract

There are two very important factors impacting the changes in housing prices over time, they are the employment levels and mortgage interest rates. To investigate the impact of these, data were collected on the sales of single family housing units from 2005 to 2014 on residential sales in Lake Charles, Louisiana. Data were also collected on mortgage interest rates, number of people employed, the unemployment rate, and the consumer price index (CPI) for the same years. The purpose of this study is to determine how the final selling price of a house is impacted by these variables. Data is currently being analyzed, and the results are quite interesting.

**Keywords:** interest rates, property prices, employment, residential real estate

### I. Introduction

Numerous studies have pointed to myriad forces that influence residential real estate value. There can be social forces such as population trends, family composition, environment consciousness and the aging of America's population. There are economic forces like income levels, employment, construction costs and interest rates. Physical and environmental forces that factor in can include location, transportation, topography and climate. Finally, there are governmental forces that play a roll such as taxes, federal monetary policy and quality of schools and services. Because of the number of different variables and the potential interaction thereof, it is not feasible to construct a model which could capture all these factors even if the data were available. However daunting the task might be, the value of a predictive model for real estate pricing can easily be seen as one of the lessons learned from the real estate collapse in 2008. After reviewing prior studies and data, we concluded that two very important factors impacting the changes in housing prices over time are the employment levels and mortgage interest rates. To investigate the impact of these, we collected data from 2006 to 2014 on residential sales in a medium-sized city in Louisiana. Data was collected on the selling prices, interest rates, number of people employed, and the unemployment rate for these years. Our objective was to determine how the final selling price of a house is impacted by each of these variables and to see if we could derive a model that provided an acceptable level of predictability while holding down the number of variables.

### II. Literature Review

Peyton and Pierzak (2016) note that Real estate is an important component of an overall investment portfolio as it acts as a source of diversification providing strong cash flows, risk adjusted total returns and a potential hedge against inflation or deflation. Rising interest rates cause real estate market investment to fall and weaken total returns. But historical data shows that property performance has often remain strong in spite of rising rates as a number of other factors such as real estate fundamentals, capital inflows and investor risk appetite influence real estate market. Thus, the impact of rising interest rates on real estate is difficult to predict. Painter and Redfearn (2002) found interest rates play little direct role in changing homeownership rates. They contend that interest rates may affect the timing of changes in tenure status from renter to owner, but the long-run ownership rate appears independent of interest rates. They found housing starts are sensitive to changes in the interest rate. They contend that housing supply is sensitive to interest rates. They also include an interesting

discussion about whether other instruments, such as low down payment loans and improved technology for assessment of credit risk, may potentially be better suited to increasing long-term home ownership.

Jorda, Schularick and Taylor (2015) studied the link between interest rates, mortgage lending and house prices to against leveraged asset price boom in practice. Mortgage lending and housing prices are sensitive to interest rates. The threat to the stability of financial system should be dealt separately through financial regulations and stability; however, policymakers disagree over using interest rates to restraint leverage and asset price boom. The experiment conducted here found that using higher interest rate policy causes less bidding on house prices that may ultimately boost unemployment and push down inflation.

Clapp and Giaccotto (2002) report that house prices, unlike stock prices, appear to be predictable. They use an autoregressive process to model the behavior of the house price index and forecast one-quarter ahead of prices. They also used nonparametric smoothing to improve the forecast accuracy.

Kusisto (2015) concluded that interest rates matter for the strength of the housing market as higher rates boost mortgage payments, making home less affordable. As interest rates rise, mortgage rates rise, triggering problems in pricier cities like San Francisco, Los Angeles and San Diego. The consequences of an overpriced market lead to a bouncy housing market. These big cities should brace for a gradual end to the boom cities.

Birch and Sunderman (2003) report that having an accurate price series is useful and sometimes critical for researchers, as well as for real estate practitioners. A price series is often needed to adjust the sales price of a house to either an earlier or later time period. On other occasions, knowledge of precise movement of prices is important. They also make a conclusion on the development and application of a two-way exponential smoothing system for effectively estimating true market movements in residential property prices. The advantage of this method is that it is neither too rigid nor too flexible, containing a procedure that is designed to accurately find the systematic movement evidence by the observed price time series.

An article in The First Tuesday Journal of California Real Estate (2016) stated that employment has played major role in affecting California real estate in good economic times, times of economic recession and times of financial crisis. Unemployment is low in 2016 and is not expected to return to more normal levels until 2018 in California. Labor force participation (LFP) is increasing steadily. Higher LFP supposes people to think that they will surely get a job which leads to boom in real estate market. However, there is chance that labor participation will increase in a fast pace than job creation increasing wages and eventually raising home sales volume.

Nguyen (2016) concluded that the four factors that had the greatest influence on real estate pricing were demographics, interest rates, the economy, government policies and subsidies. He also pointed out that, while these were the strongest factors, others may play a complex part and that interrelationships between these are not always predictable.

Ziering and Hughes (2004) analyzed the driving demand for real estate and the attributes that make it a compelling investment in today's capital market environment. They concluded that real estate is the only asset that can deliver diversification with stocks and bonds, strong and

consistent yield, downside protection, and the potential for appreciation in line with inflation, simultaneously.

Another article in The First Tuesday Journal of California Real Estate (2016) showed that California employment has surpassed the number of jobs held prior to the Great Recession. Jobs are rising steadily but wages haven't increased at the same rate. It's good to have more employees in the job market which gives probability of higher wages but there is high chance that increased labor force is likely to outpace job growth and offset wage increment. The creation of jobs builds up homebuyer confidence to invest in housing in 2016; however, increases in interest rates may soon slow down home sales in 2017.

### III. Data

The median monthly selling price for single family residences in the Lake Charles, LA (a medium sized city in that state) obtained from Realtor.com were gathered from August, 2006 to December, 2015. The economic data consisting of employment and unemployment figures for the area were gathered from the Louisiana Department of Labor. The mortgage interest rate figures were gathered from the Federal Reserve and the consumer price index (CPI) was obtained from the Bureau of Labor Statistics.

The median selling price was adjusted using the CPI to August, 2006 dollars. This was to take out the impact of inflation on changes in the selling prices. Once this was done, it became possible to measure the impact of the employment, interest rate, and unemployment rate changes on the price of the properties.

### IV. The Study

Figure 1 shows the median selling price over time for the years 2006 to 2015. A steady increase is seen over this time period with the understanding that this could be due, in part, to inflation. Figure 2 shows the median selling price adjusted to 2006 dollars. We would expect this to be very stable over time, unless there are other factors affecting the housing prices. In this study, we considered employment numbers, unemployment rates, and mortgage interest rates to determine their impacts on these adjusted median selling prices.

Our a priori assumption is that, when the economy is good and jobs are plentiful, potential homebuyers feel more secure about their financial future. This may cause more people to enter the home-buying market, increasing the demand for houses, thus driving up prices. When there is uncertainty about potential layoffs in the future and job market is unstable, the opposite is true.

Figure 3 shows the number of people employed from 2006 to 2015. The number of people employed in the Lake Charles area decreased in late 2008 and 2009, and this was occurring nationally at the same time. Figure 4 shows the unemployment rates which began at 4.1% in 2006 and ended at 4.2% in 2014. While the beginning and ending rates were almost the same, there was significant variation over the ten year period.

A period of prosperity and growth in the number of jobs in the Lake Charles area was observed until the latter part of 2008. Because of this, more workers moved into the area and the labor force increased. This contributed to the rising unemployment rate, which peaked in 2010 before the economy began a slow recovery. This recovery was probably fueled by both stronger economic conditions within the oil and gas industry, particularly when the embargo

against off-shore drilling platforms was lifted, and the growth of the gambling industry which supplied the demand for much of SE Texas.

Figure 5 provides the monthly mortgage interest rate. The graph shows that interest rates were generally declining until the middle of 2012 when they began to rise. Mortgage rates are a function of numerous factors including economic growth, inflation, Federal Reserve Board policies, and the money supply. The trend as seen is a function of all of these factors but predominantly the Federal Reserve actions which have forces rates to remain at or near record lows.

### V. Statistical Analysis

In performing further analysis on this data, we used regression analysis to predict the median monthly selling price – both adjusted by the CPI for inflation and unadjusted. The variables we considered to predict the selling price are the following: (1) actual number of jobs; (2) unemployment rate; and (3) mortgage interest rate. In developing the model, the variables are defined as:

- SP = median selling price
- SPA = median selling price in 2006 dollars
- E = employment (number of jobs)
- M = mortgage rate

Stepwise regression models were developed using Minitab. Table I provides information about the models for predicting the unadjusted median selling price. Surprisingly, this model had the mortgage interest rate as the single most important variable with an  $r^2$  of about 53.5% and significant at the 0.001 level. Adding employment as the second variable,  $r^2$  increased to 68.3%. Finally, when the unemployment rate was added,  $r^2$  increased to 78.4%.

Table II provides information about the models for predicting the median selling price adjusted for inflation using the CPI. The results were similar to the results from Table I with the models predicting the unadjusted median selling price. This model also had the mortgage interest rate as the single most important variable with an  $r^2$  of about 67.0% and significant at the 0.001 level. Adding employment as the second variable,  $r^2$  increased to 82.1%. Finally, when the unemployment rate was added,  $r^2$  increased to 86.2%.

**Table I. Models Predicting Unadjusted Selling Price**

Variables in Model	Observed Level	Significance	r-squared
Mortgage rate	< 0.001		0.535
Mortgage rate, Employment	< 0.001		0.683
Mortgage rate, Employment, Unemployment Rate	< 0.001		0.784

**Table II. Models Predicting Adjusted Selling Price**

Variables in Model	Observed Level	Significance	r-squared
Mortgage rate	< 0.001		0.670
Mortgage rate, Employment	< 0.001		0.821
Mortgage rate, Employment, Unemployment Rate	< 0.001		0.862

## VI. Conclusion

Using the median selling price for the years 2006 to 2015, we investigated the impact of total employment, mortgage interest rates, and the unemployment rate on the selling price of residential real estate. We endeavored to develop a model which offered acceptable predictability which holding down the number of variables. Our R-squared (a statistical measure of how close the data are to the fitted regression line also known as the coefficient of determination) of 86.2% on the inflation adjusted data suggests that we were successful in achieving this objective. Of further interest is the fact that, of the three variables included in the model, the mortgage rate was clearly the most influential variable. At a time when the Federal Reserve is signaling a willingness to raise interest rates, this relationship could have a significant impact on residential real estate pricing in the near future.

## References

- Birch, John W. and Mark Sunderman, “Estimating Price Paths for Residential Real Estate,” *Journal of Real Estate Research*, Issue 3 2003, 277-299.
- Clapp, John M. and Carmelo Giaccotto, “Evaluating House Price Forecast,” *The Journal of Real Estate Research*, Issue 1 2002, 1-26.
- “Jobs Move Real Estate”, *First Tuesday Journal of California Real Estate*, September 21, 2016.
- Jorda, O., Schularick, M. and Taylor, A., “Interest Rates and Housing Process: Pill or Poison?” *FRBSF Economic Letter*, August 3, 2015.
- Kusisto, L., “Rising Mortgage Rates to Test Housing Market’s Strength”, *Wall Street Journal*, June 21, 2015.
- Nguyen, J., “4 Key Factors that Drive the Real Estate Market”, *Investopedia*, October 11, 2016.
- Painter, Gray and Christian L. Redfearn, “The Role of Interest Rates in Influencing Long-Run Homeownership Rates,” *The Journal of Real Estate Finance and Economics*, September-December, 2002, 243-267.
- Peyton, M and Pierzak, E, “Real Estate: The Impact of Rising Interest Rates”, *TIAA*, Summer 2016.
- “Unemployment Fluctuates” *First tuesday Journal of California Real Estate*, October 21, 2016.
- Ziering, Barry and William Hughes, Jr., “Real Estate Pricing—It’s All Relative,” *The Journal of Real Estate Portfolio Management*, September-December, Issue 3 2004, 259-265.

## Authors

### Stephen Caples\* Ph.D

Professor of Finance, McNeese State University, USA, [scaples@mcneese.edu](mailto:scaples@mcneese.edu)

### Michael Hanna

Professor of Management Science, University Of Houston – Clear Lake

### William Jens

Associate Professor of Accounting, McNeese State University, USA

\*corresponding author





