

What Drives the Housing Market in America?

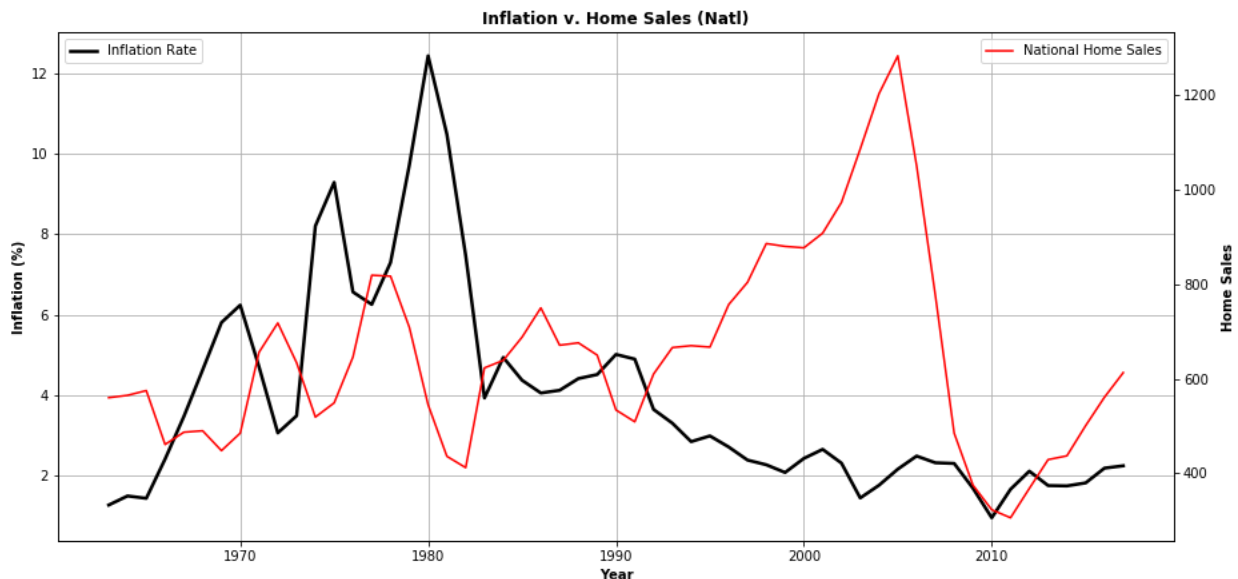
Hypothesis

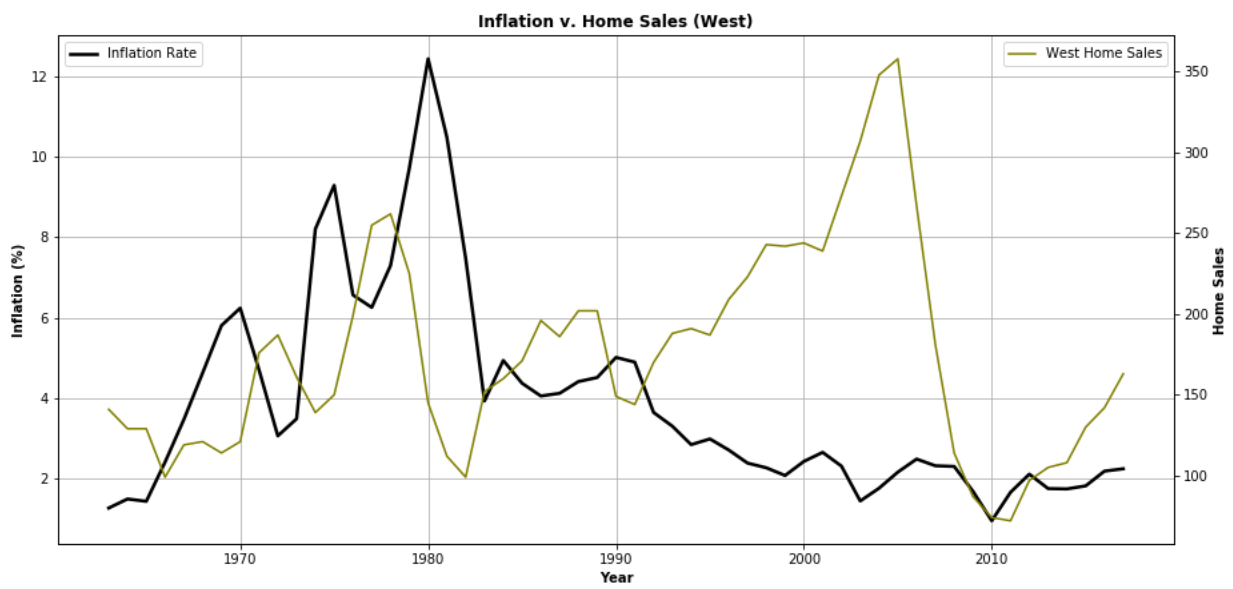
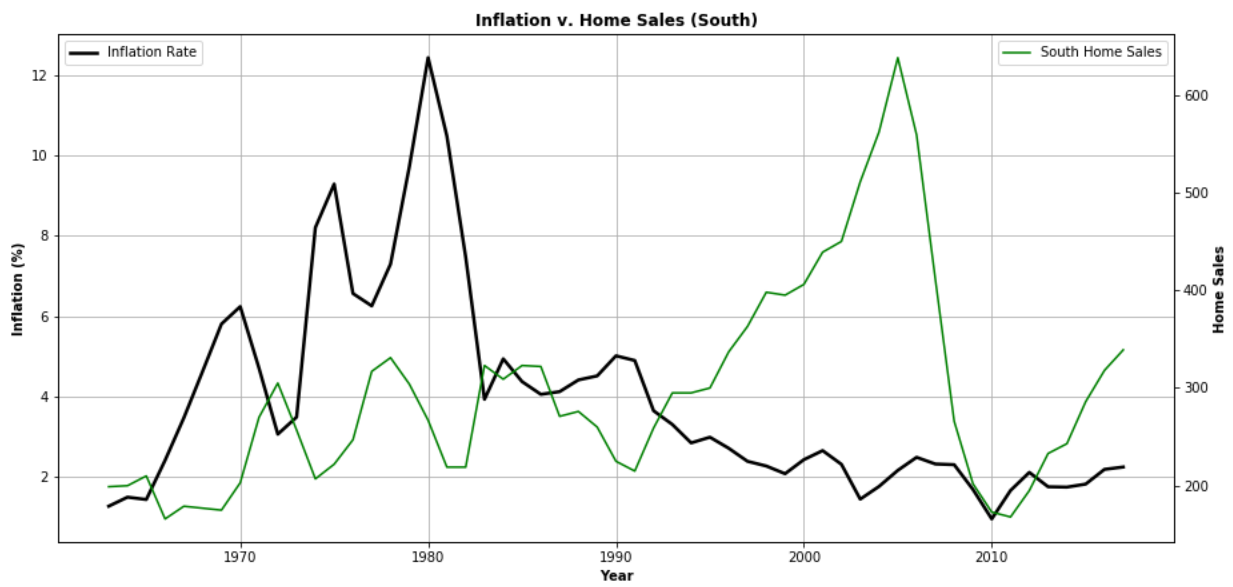
The three factors of inflation, unemployment, and Fed Funds Rate have a correlation to housing sales both nationally and regionally (South and West regions).

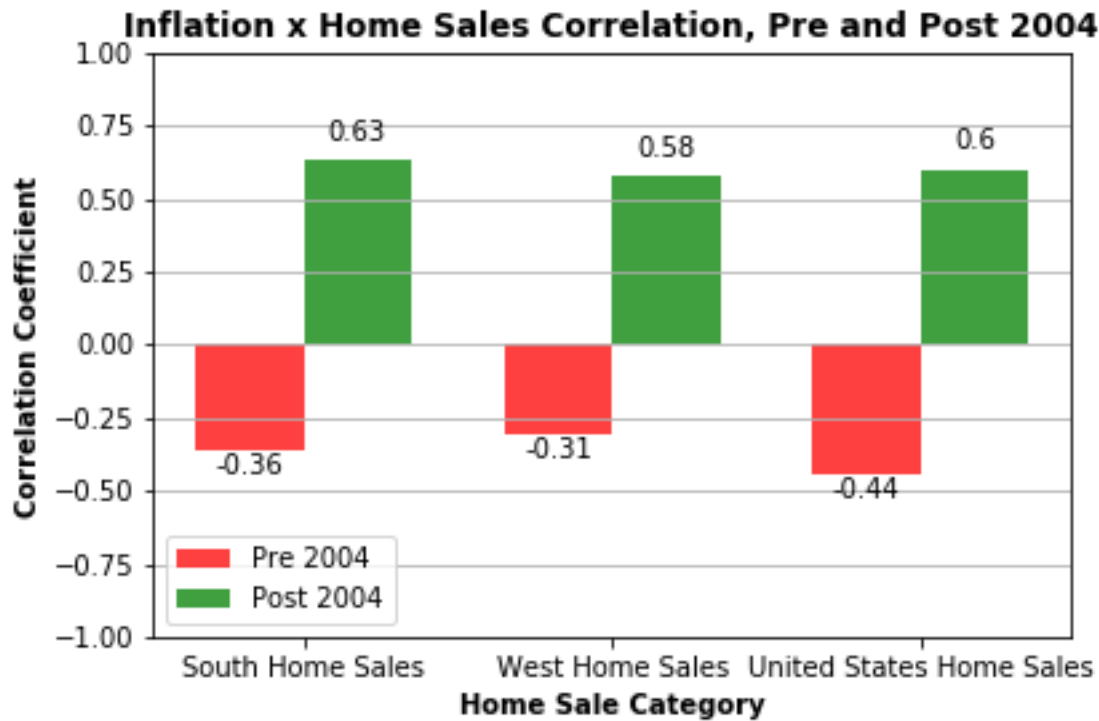
Data Cleanup & Exploration

- We got our data from the following sources:
 - Federal Reserve: <https://www.kaggle.com/federalreserve/interest-rates>
 - Iowa State University: <https://www.icip.iastate.edu/tables/employment/unemployment-states>
 - Census: https://www.census.gov/construction/nrs/historical_data/index.html
- Historical Federal Reserve data from Kaggle has the unemployment rate, interest rate, and fed funds rate by month
- Census data gave us the historic home sales for the different regions by year.
 - Census data was a excel file, so we had to grab the columns necessary for us and save it as a csv
- Iowa State gave us the historic unemployment rate for every state.
- We had to group our Federal Reserve data by year and pull out the columns we are looking for (Fed Funds, Inflation, and Unemployment) and save them into separate data frames
- We merged those data frames for our values with the home sale rate of National, West, and South
- State Unemployment rate had to be grouped by region done by a weighted average on population to be used for comparing regional unemployment with Sales.

Does inflation effect home sales?



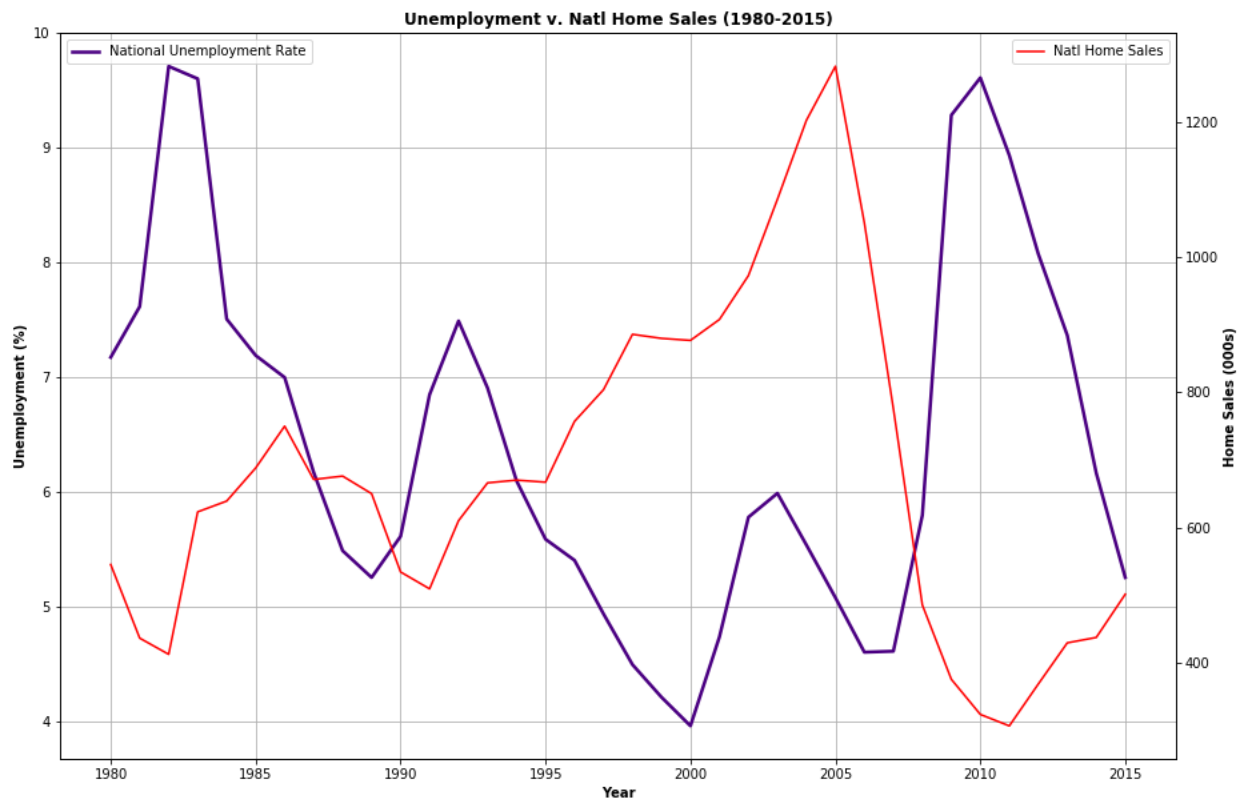


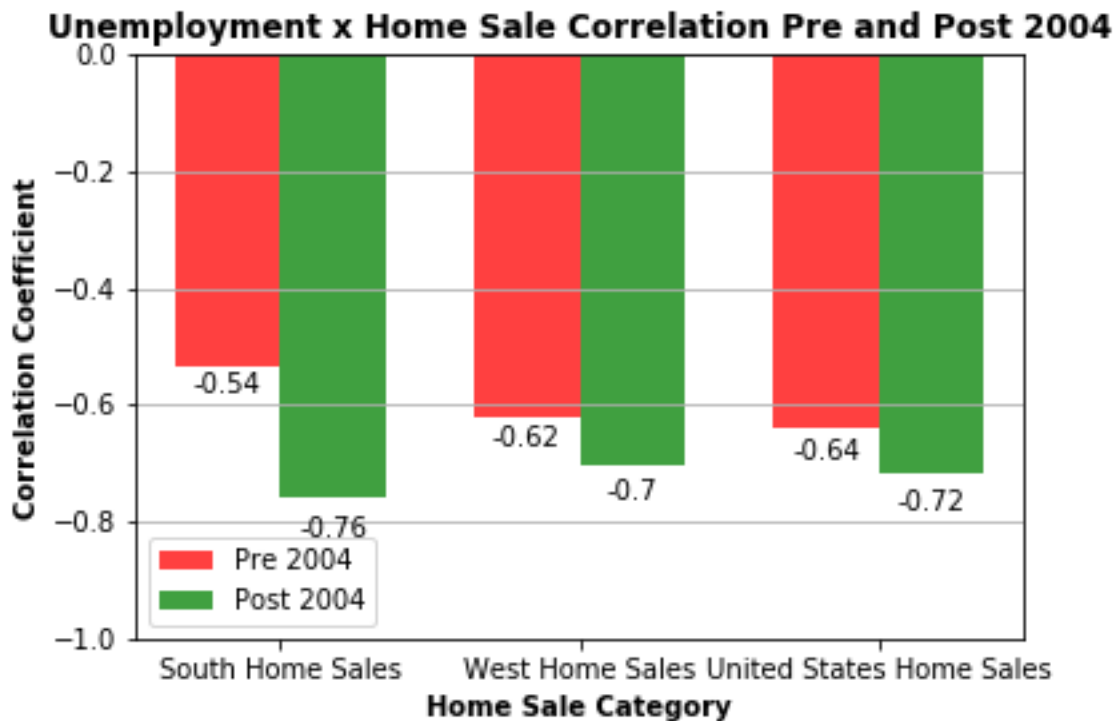
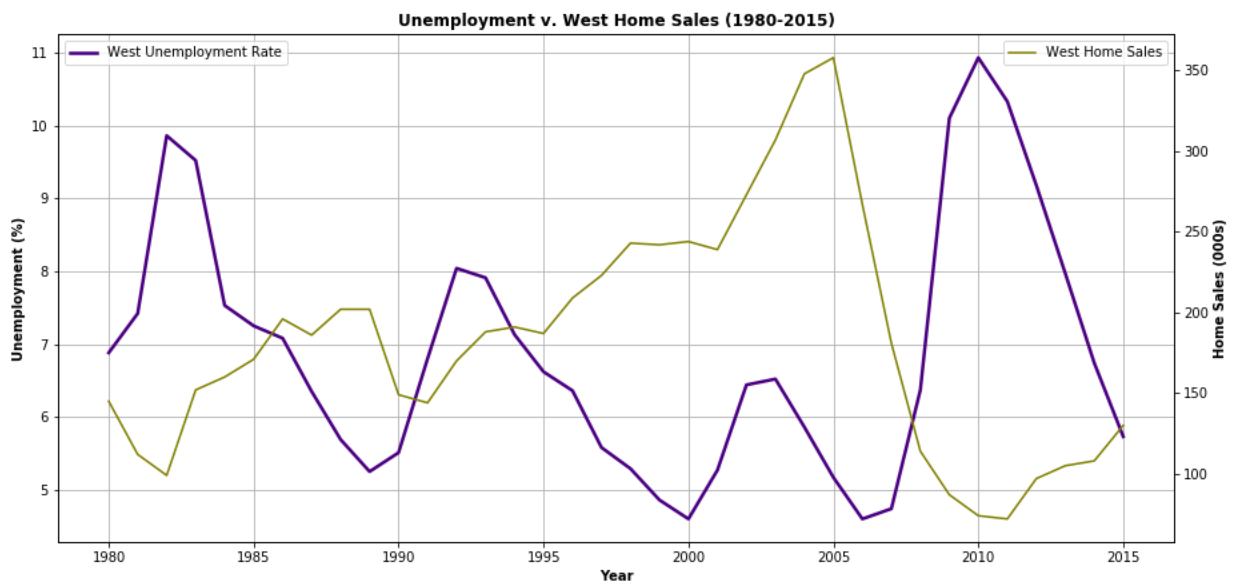


Observations

- Pre-housing crash there is a negative correlation between Inflation and house sales
- Post housing crash there is a positive correlation
- South and West home sales follow a similar pattern as the National
- Inflation is not the only factor that influences housing sales

Does Unemployment effect home sales?

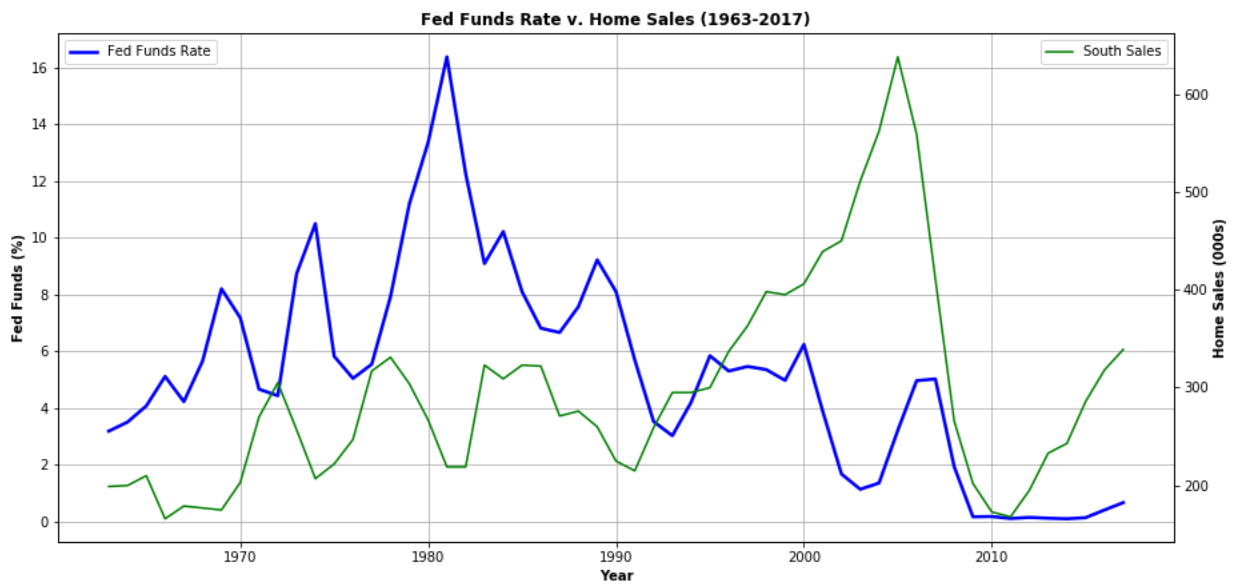
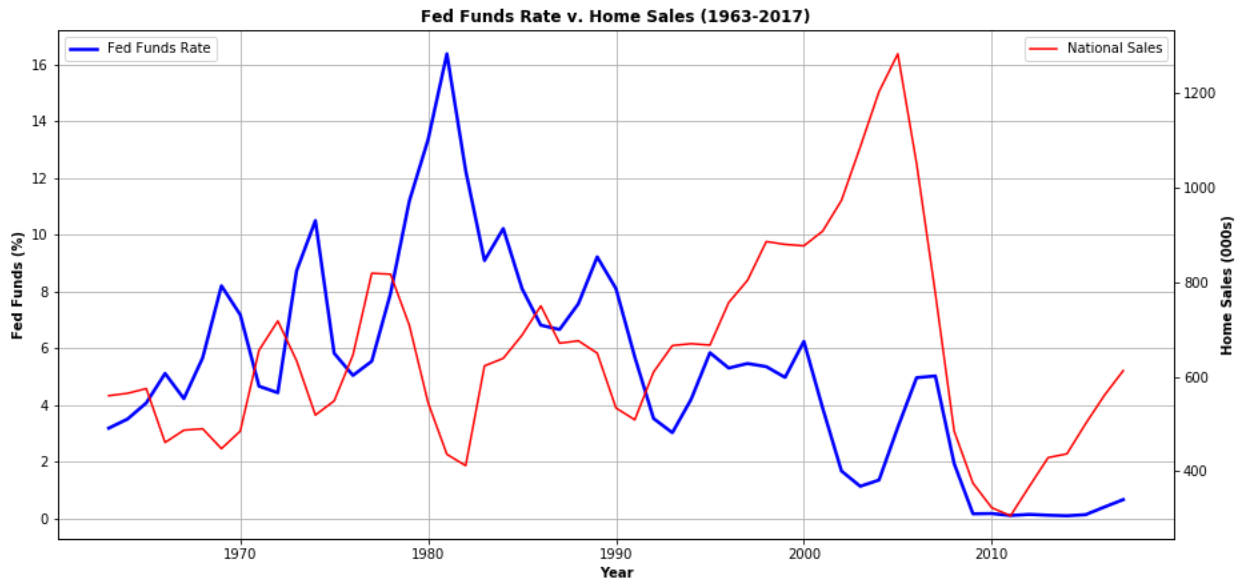


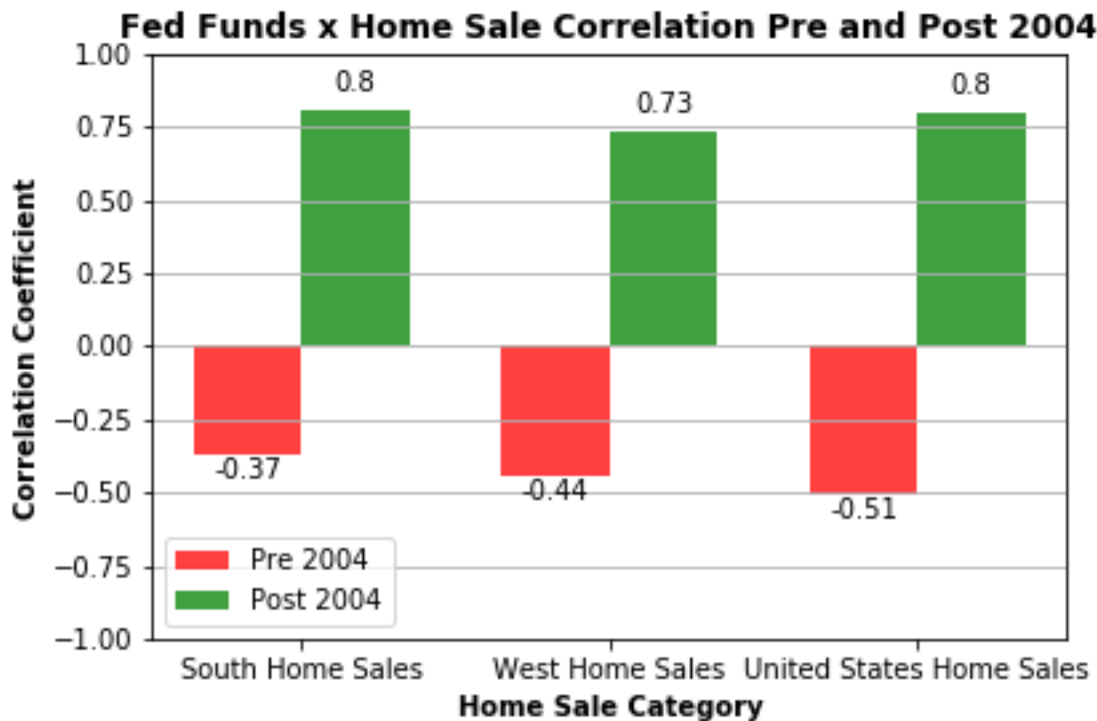
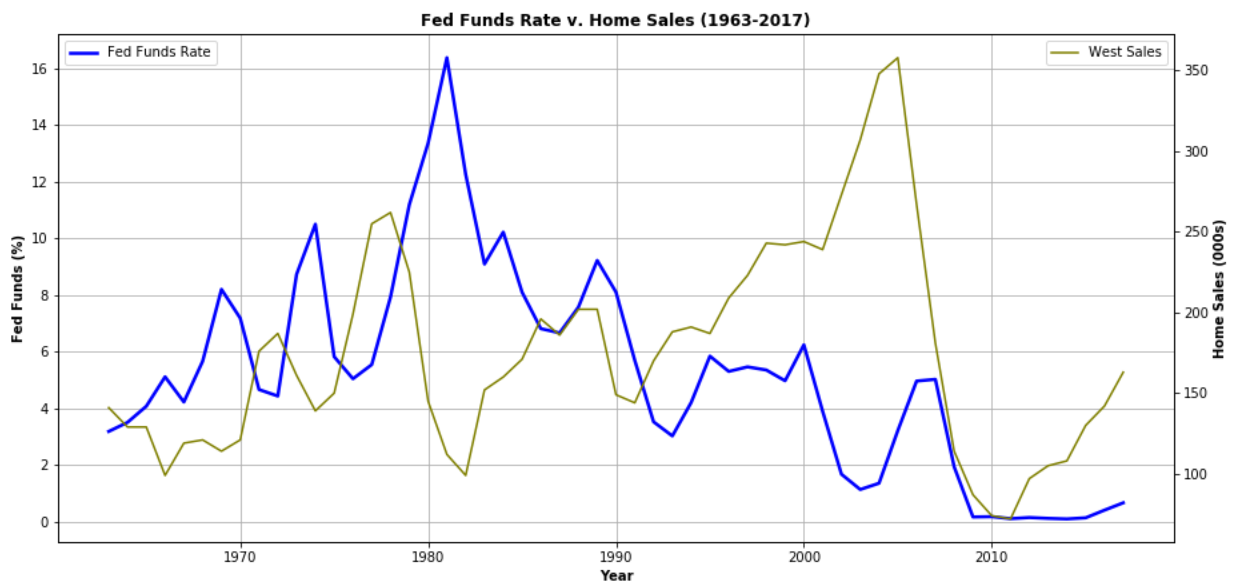


Conclusions

- A comparison was made between the national/south region/west region unemployment rate and home sales nationally and regionally.
- The only reliable regional unemployment data we could find starts in 1980 and is most current to 2015. Therefore, the analysis was constrained to this 35-year period.
- A strong negative correlation can be measured before the housing crisis which becomes even more closely correlated after the housing crisis.
- The correlation is always negative, showing an inverse relation between unemployment and housing sales.
- This makes logical sense, as more individuals rejoin the workforce, earn steady income and gain confidence to purchase a home, lenders are more confident to finance a mortgage.

Does the Feds Funds Rate effect home sales?





Conclusions

- Using the average effective fed funds rate and home sales levels for each year in the period from 1963 to 2017 we have discovered evidence of correlation between the rate and the number of sales that has shifted since the housing crisis.
- The Fed Funds rate seems to have had a significant change in correlation to the level of home sales since the crisis
- There was a negative correlation before 2004 and a positive correlation since then the positive correlation appears to be related to the rate being at a lower bound of zero and unable to go lower
- Both factors were at historical lows and likely had only one direction to go as the economy improved
- The Fed Funds rate doesn't appear to be the single motivating factor behind home sales but there is a historical relationship that may have been broken by the housing crisis

- If time allowed, we would have looked into how the correlation changed over even more time periods we also would have considered these factors over other regions as well

Post Mortem

- We needed to calculate regional unemployment rates, which proved to be quite difficult using Pandas. Carlos used a weighted average of state yearly unemployment data and was able to overcome this challenge within excel.
- Originally, we were going to use Fannie Mae API for housing data, but currently the API is only available for companies with accounts and what is available to the public is in Beta and does not allow you to make API calls from outside the website.
- A correlation heatmap (table with a color spectrum) was made which expressed the same information as our bar chart, but we weren't able to exclude specific columns that were misrepresenting the data.
- Some questions that came up that we weren't able to answer due to time restraints was the impact of GDP on housing sales, cutting the data into smaller time frames to find short-term patterns.