Home Prices and Election Years

David Selemba

EC420

Research Question

How does the instability of election years impact the US housing market?

Motivation

- Recent surges in the market due to surrounding economic/political factors
- Election years often associated with less political stability
- “Lame duck” Presidents/Congress members leading to less policy being passed
- What impact does rental prices have on this/how are they impacted by election years?
- Could understanding how political parity effects the market allow us to optimize time of purchase?

Data

The data frame used in the models was the combination of three different sources on Kaggle and St. Louis Federal Reserve, with the variables as follows:

HPI - Housing Price Index, index that measures the movement of a single family home over a period of time, with the first quarter as the base(Dependent variable in models)
DATE - current quarterly date at time of observation
UNEM_RATE - current unemployment rate during the quarter
MORTGAGE - current mortgage rate during the quarter
GDPC1 - real GDP adjusted for inflation during the quarter
FORECLOSURES - foreclosures per 100 mortgages per quarter
Inflation.Rate - current inflation rate per quarter
Effective.Federal.Funds.Rate - current federal funds rate per quarter
Year - current year
CPI - Consumer Price Index for cost of renting a home

Glimpse of Data

Description: df [6 × 10]

	DATE <date>	UNEM_RATE <dbl>	MORTGAGE <dbl>	GDPC1 <dbl>	FORECLOSURES <dbl>	HPI <dbl>	Inflation.Rate <dbl>	Effective.Federal.Funds.Rate <dbl>
1	2000-01-01	4.03	8.26	12935.25	1.95	101.34	2.0	5.45
2	2000-04-01	3.93	8.32	13170.75	1.97	103.67	2.3	6.02
3	2000-07-01	4.00	8.02	13183.89	2.09	105.79	2.5	6.54
4	2000-10-01	3.90	7.62	13262.25	2.23	108.27	2.5	6.51
5	2001-01-01	4.23	7.01	13219.25	2.34	110.48	2.6	5.98
6	2001-04-01	4.40	7.13	13301.39	2.41	112.20	2.6	4.80

6 rows | 1-9 of 10 columns

Initial Multivariate Model

```
Call:
lm(formula = HPI ~ UNEM_RATE + MORTGAGE + Real.GDP..Percent.Change. +
    Inflation.Rate + FORECLOSURES, data = housing)

Residuals:
    Min      1Q  Median      3Q     Max
-32.669 -14.673  -1.438  11.760  36.313

Coefficients:
                             Estimate Std. Error t value Pr(>|t|)
(Intercept)                 2.668e+02  2.638e+01  10.112 9.69e-15
UNEM_RATE                  -3.220e+00  3.331e+00  -0.967    0.337
MORTGAGE                   -1.497e+01  2.767e+00  -5.412 1.07e-06
Real.GDP..Percent.Change. -9.462e-01  1.006e+00  -0.941    0.351
Inflation.Rate              6.303e-04  6.949e+00   0.000    1.000
FORECLOSURES               -2.588e+00  1.810e+00  -1.430    0.158

(Intercept)                ***
UNEM_RATE
MORTGAGE                   ***
Real.GDP..Percent.Change.
Inflation.Rate
FORECLOSURES
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 19.03 on 62 degrees of freedom
  (1 observation deleted due to missingness)
Multiple R-squared:  0.3901,    Adjusted R-squared:  0.3409
F-statistic:  7.93 on 5 and 62 DF,  p-value: 7.96e-06
```

Initial Model Analysis

- Most significant factor in HPI is the mortgage rate (Negative correlation)
- Estimators that have a larger impact on the predicted HPI include GDP change and foreclosures per 100
- Current inflation rate not significant/nearly zero

Election Year Dummy Model

```
Call:
lm(formula = HPI ~ UNEM_RATE + MORTGAGE + Real.GDP..Percent.Change. +
    FORECLOSURES + election_year, data = housing)

Residuals:
    Min      1Q  Median      3Q     Max
-37.204 -12.155   0.232  12.866  33.153

Coefficients:
                          Estimate Std. Error t value Pr(>|t|)
(Intercept)               274.8498    19.3299  14.219  < 2e-16 ***
UNEM_RATE                  -4.4912     2.9643  -1.515    0.135
MORTGAGE                  -14.9019     2.6086  -5.713 3.39e-07 ***
Real.GDP..Percent.Change.  -1.1678     0.9626  -1.213    0.230
FORECLOSURES               -2.1324     1.7531  -1.216    0.228
election_year              -8.5625     5.2387  -1.634    0.107
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 18.63 on 62 degrees of freedom
  (1 observation deleted due to missingness)
Multiple R-squared:  0.4153,    Adjusted R-squared:  0.3681
F-statistic: 8.806 on 5 and 62 DF,  p-value: 2.348e-06
```

Election Year Model Analysis

- Large negative correlation in estimator of HPI for election year
- P-value just misses 10% significance level, how could additional years of data improve this model?
- Only a minor shift in r-squared value for the model- small factor in explaining variance or need to be interacted?

Rentals Model

```
Call:
lm(formula = HPI ~ UNEM_RATE + MORTGAGE + Real.GDP..Percent.Change. +
    FORECLOSURES + election_year + Rent_CPI, data = housing_rentals)

Residuals:
    Min      1Q  Median      3Q     Max
-21.439 -10.101  -1.459   9.203  25.261

Coefficients:
                           Estimate Std. Error t value Pr(>|t|)
(Intercept)              -185.23161   55.94259  -3.311  0.00156 **
UNEM_RATE                   8.23691    2.52371   3.264  0.00180 **
MORTGAGE                    9.21133    3.36121   2.740  0.00804 **
Real.GDP..Percent.Change.  -0.02839    0.67173  -0.042  0.96643
FORECLOSURES               -8.29852    1.40265  -5.916 1.62e-07 ***
election_year              -5.31781    3.60219  -1.476  0.14501
Rent_CPI                    1.17818    0.13920   8.464 7.03e-12 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 12.74 on 61 degrees of freedom
  (1 observation deleted due to missingness)
Multiple R-squared:  0.7311,    Adjusted R-squared:  0.7046
F-statistic: 27.64 on 6 and 61 DF,  p-value: 1.124e-15
```

Rental Model Results

- Large shift in r-squared value, could be most valuable feature in explaining variance
- Rent CPI has positive correlation (higher rent price = positive HPI movement)
- Signs change on unemployment and mortgage rate change, why?

Conclusion and Further Questions

- Election years seemingly has a negative correlation with HPI, more data needed to confirm significance
- Rental prices play a large part in HPI estimates due to being impacted by similar economic factors
- How could data that is grouped by demographic of homebuyer or location of home shift results? Could this add bias to these models?
- How does the rate at which homes/apartments are being built impact the market?

Works Cited/Data Sources

- https://www.kaggle.com/datasets/ankitsharma0467/factors-influence-the-home-prices-across-us
- https://www.kaggle.com/datasets/neelgajare/usa-cpi-inflation-from-19132022
- https://fred.stlouisfed.org/series/CUUR0000SEHA

Thanks for watching,
any questions?