UCLA Anderson School of Management

Time Series Analysis and Forecasting

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Assignment 2

A. Predicting Median Home Price for the U.S. Metros

- In Assignment 1, we learned how we can find additional variables/predictors to help improve Zillow's Zestimator. In fact, that is a forecast from a **micro** perspective. That is, we use features/characteristics of each individual house to predict its market value (In Assignment 1, it is the prediction error).
- Now we will learn how to predict home values from a **macro** perspective. In particular, we will use features/characteristics of a metro to predict the median home value of a metro.
- Go to https://www.zillow.com/research/data/ to check out all the Zillow data.
- Go to "Home Values" Category and in the Data Type, choose "Zillow All Homes Time Series ($)" and then on the right Geography "Metro & U.S." click Download.
- This is the series for the dependent variable (home price). To ensure stationarity, we will focus on forecasting **home price return** (diff(log(home price))), let's call it **zhpr**.
- For zhpr, you get to decide whether you want to forecast monthly returns or monthly year-over-year returns (accumulating 12-month monthly returns) or annul returns. Think: what are pros and cons of using monthly yoy returns or annual returns?
- The train-set period is from January 2010 to December 2017. The test-set period is from January 2018 to date. If some variables have shorter data for train set, it is OK to use it.
- For simplicity, we only forecast **the largest 30 metros**.
- In the class, we learned that there is some degree of autocorrelation of home price returns. That said, we can simply use the past home price returns to predict the future's. The equation could be written as $zhpr_t = a + b* zhpr_{t-1} + e_t$.
- Now your assignment is to find if there are any additional predictors (X) to help improve **zhpr**. That is, you find statistically significant **b₂** in the equation: $\mathbf{zhpr_t = a + b_1* zhpr_{t-1} + b_2*X_{t-1} + e_t}$.
- In the same website, you can find many other housing related indicators, such as median list price, listings with price cut, median price cut, for-sale inventory, days on Zillow, sale-to-list ratio etc. (in Home Listing and Sales category). Try to explore all the possible variables in this Zillow website.