PORTFOLIO ALLOCATION USING PEAD

A Data centric approach to portfolio allocation

BACKGROUND

- PEAD - post earnings announcement drift
- Tendency for a stock's cumulative abnormal returns to drift in the direction of an earnings surprise following an earnings announcement.

EXAMPLE

- What this means is when a company reports an earnings surprise, it has a tendency to continue in the direction of the price reaction for several months.

CONTEXT

- We are a team of quantitative analysts working in a multi-strategy investment fund
- Tasked with back testing how a $1 million portfolio
- Back test strategy - the PEAD strategy as applied on US microcap stocks over a chosen time period.
- The fund utilizes a core satellite portfolio management strategy, thus if successful, this strategy will be incorporate into the main fund under the satellite portfolio as an attempt to generate alpha.

PROJECT SCOPE

- Application of PEAD on US microcap stocks
  - Microcap – stocks with market capitalization of <300 million USD
  - Past academic studies suggested that the PEAD for small cap stocks tend to be larger than the PEAD of large cap stocks.
- Use of SUE model to predict earnings surprises
  - SUE - standardised unexpected earnings (requires the prediction of EPS)
  - Predict EPS (earnings per share) using time series predictive models.
- Backtest a strategy using PEAD strategy over a chosen time horizon
- Compare PEAD strategy with simple buy and hold strategy of the S&P500 index

STAKEHOLDERS

Primary audience:

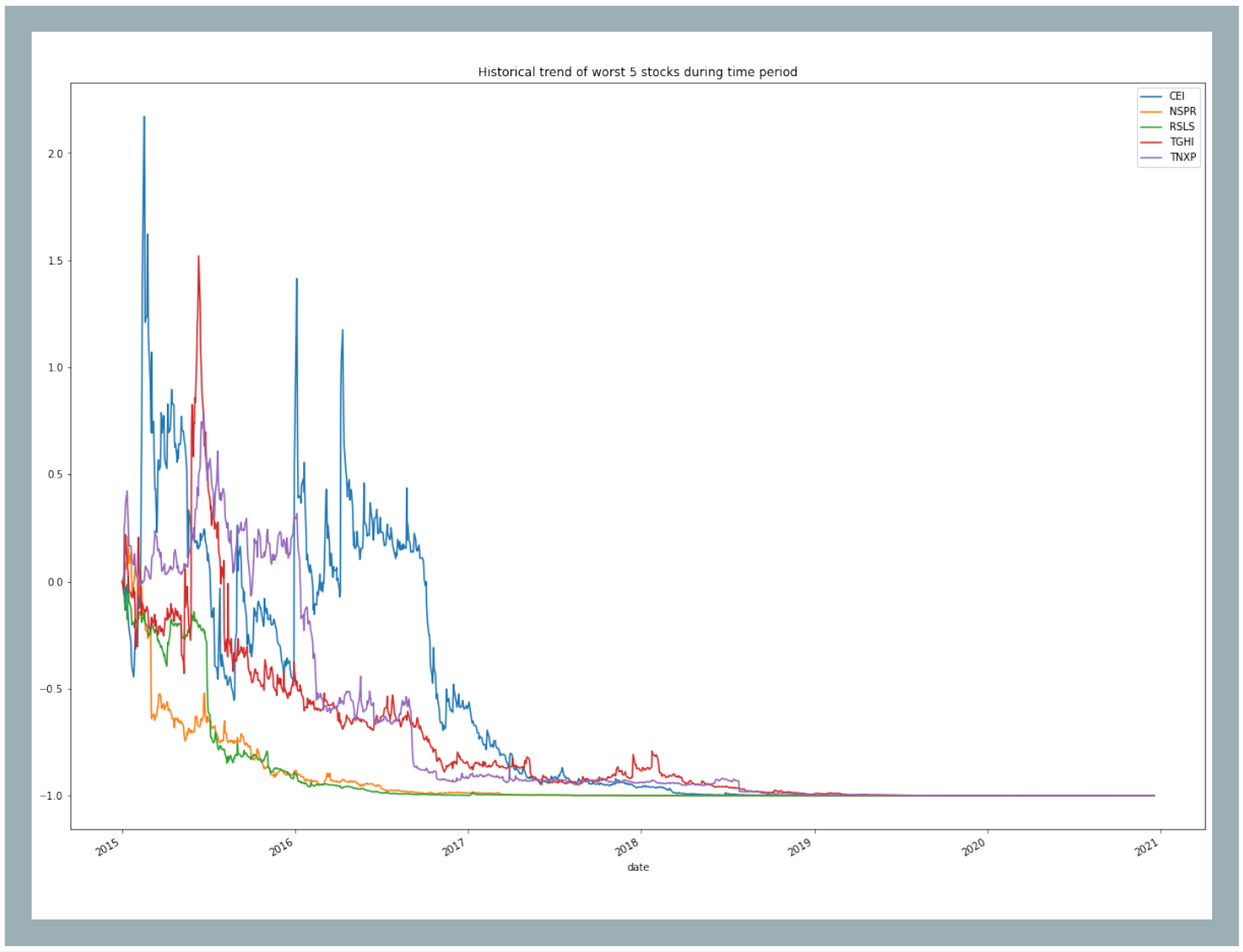
Portfolio manager of the quantitative team as he needs to understand if the results are significant enough to be incorporate as a strategy.

Secondary audience:

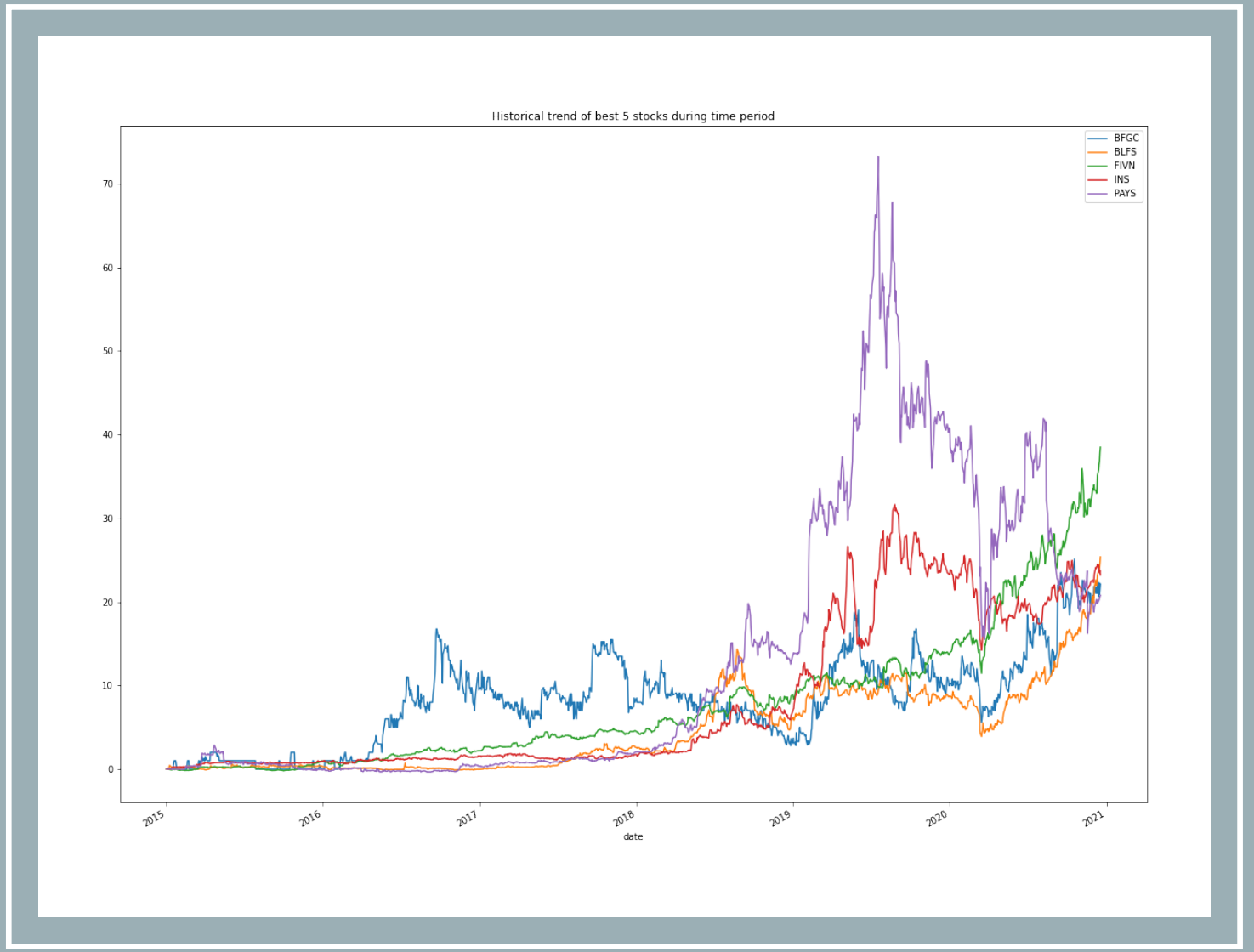
Both potential and existing investors in the fund that seek to understand or predict how this would impact the overall fund performance and risk profile.

EDA

5 WORST STOCKS (2015 JAN AND 2020 DEC)

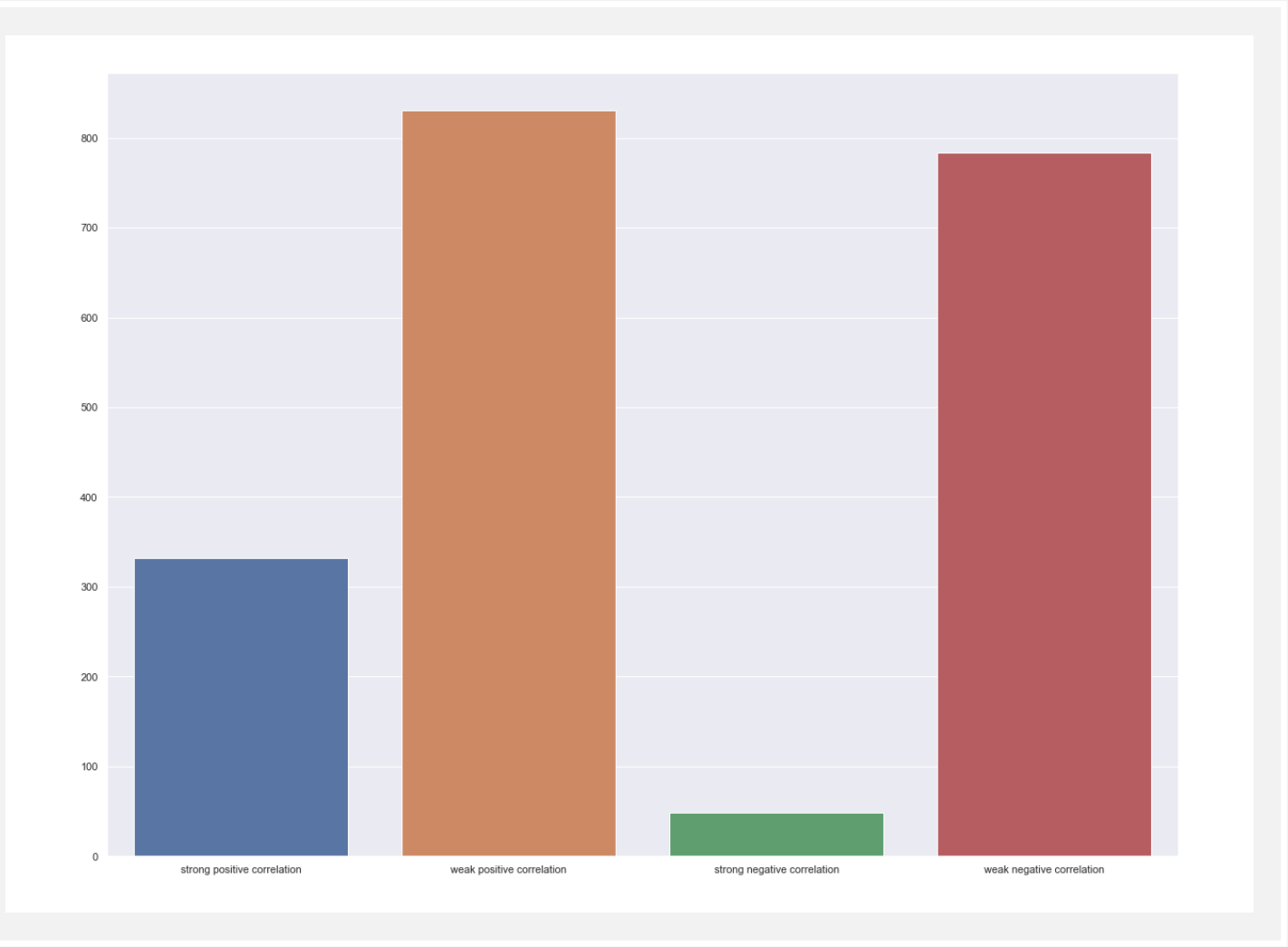


5 BEST STOCKS (2015 JAN AND 2020 DEC)



CORRELATION ANALYSIS

- Strong Positive corelation in the stock growth of1379 stocks out of 1948 stocks,
  - likely because microcap stocks as an asset class is highly sensitive to liquidity flight which occurs during periods of high market stress as investors unload stocks that are deemed as more risky in search of large cap stocks that can provide ample liquidity. this is also known as Flight-to-Safety
- Strong Negative corelation in the stock growth of 48 stocks
  - Could be because there are many micro cap stocks that have contrasting busniess models.
  - for example, One would expect that sustained high fuel costs would generally depress the profits of airlines, and thus their stocks' values.

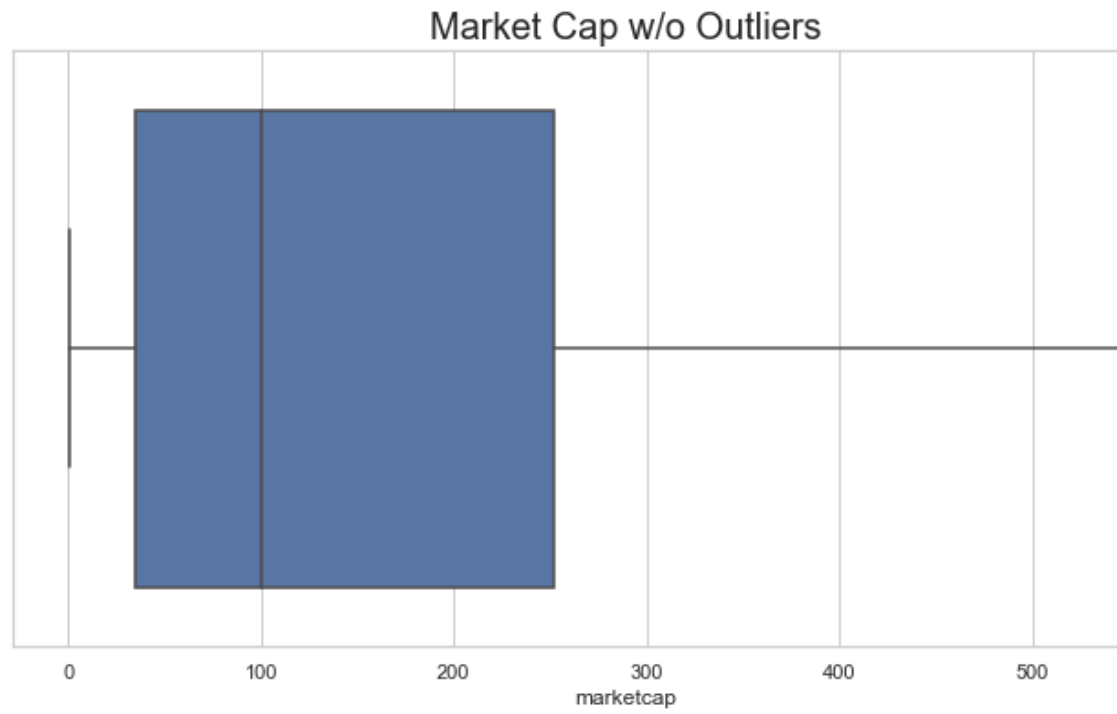


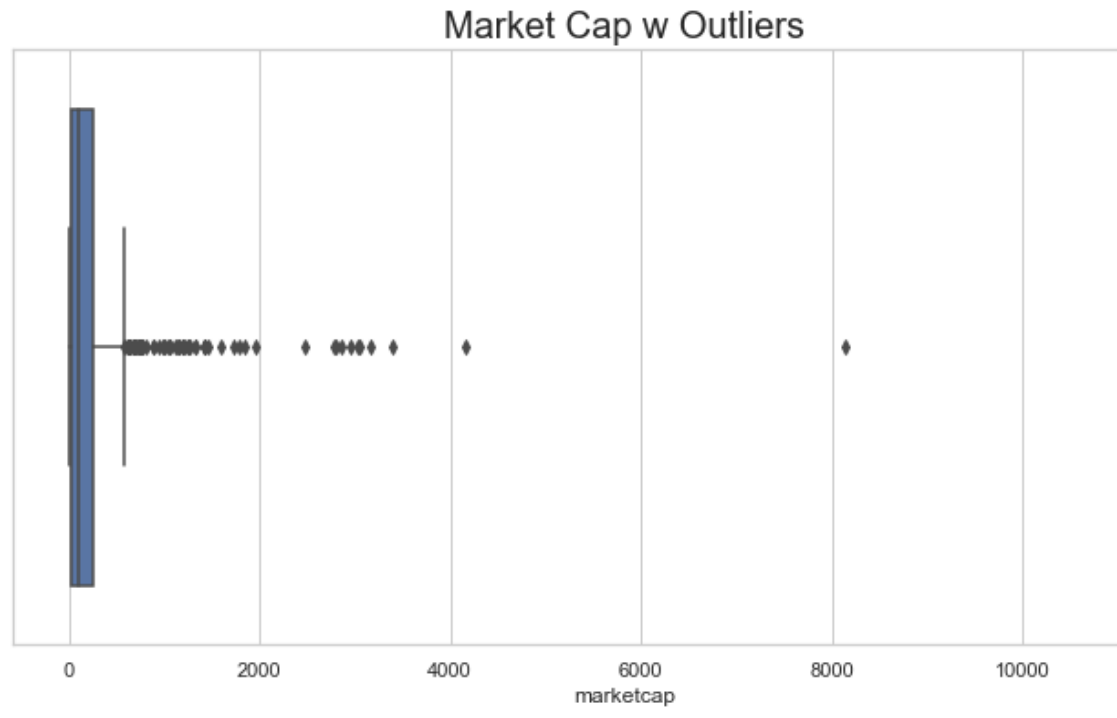
MARKET CAPITLISATION ON FINAL DAY (2020 DEC)

Some stocks managed to grow beyond the 300 million USD market cap

Some stocks or businesses either got delisted or went bankrupt

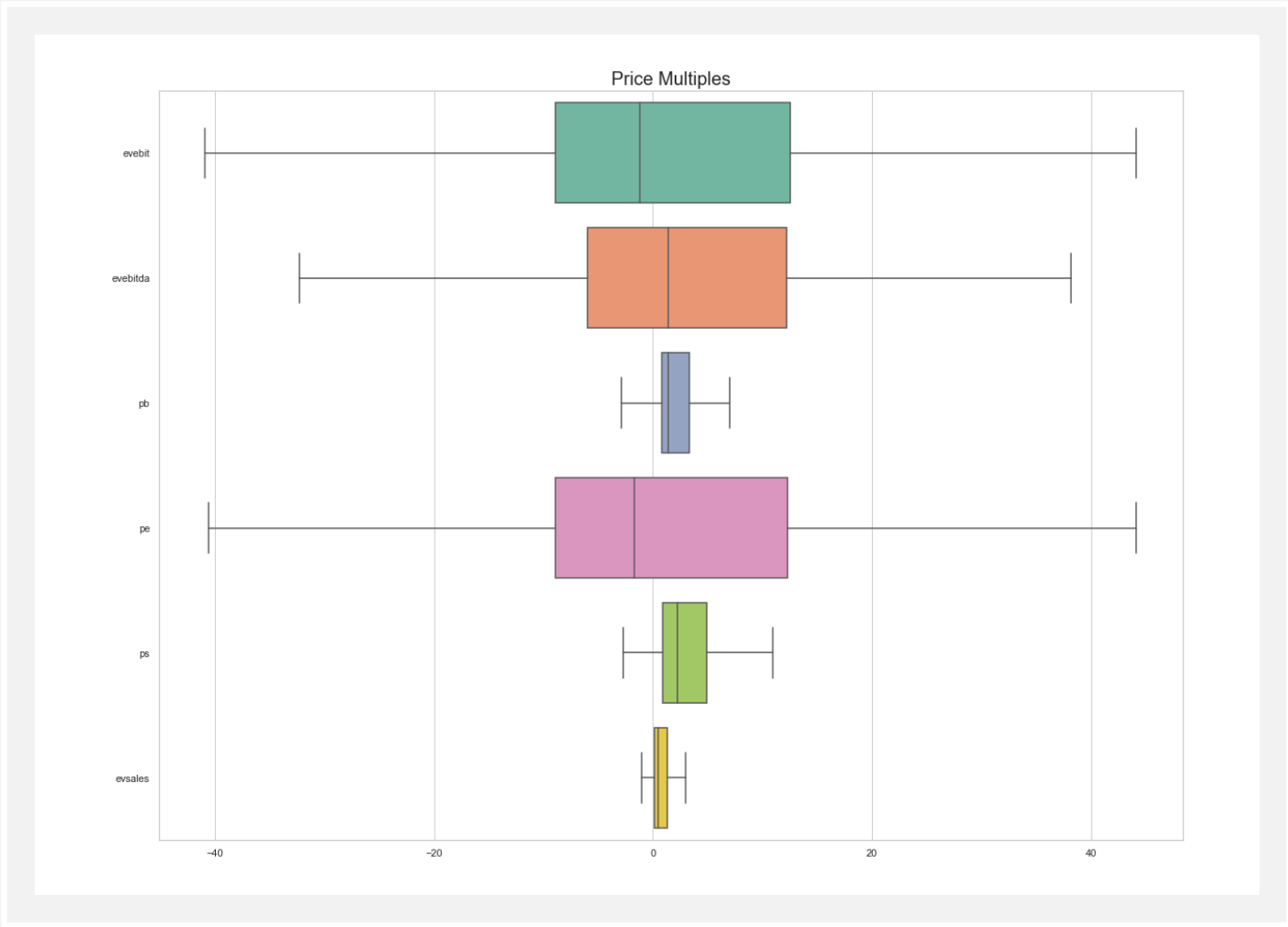
Most remain within the range





VALUATION MULTIPLES

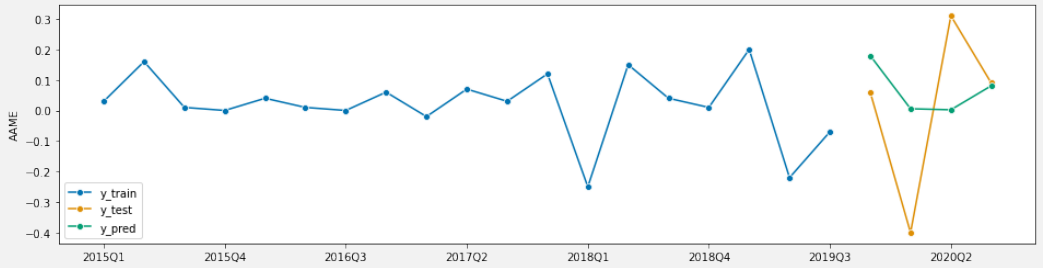
- Valuation multiples seem to be within a rather tight range

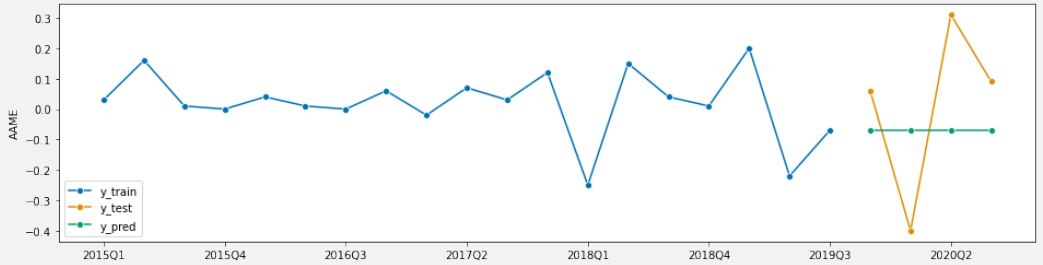


MODEL SELECTION

Forecast EPS (earnings per share)

- ARIMA model selected - Autoregressive integrated moving average
- SMAPE loss function - Symmetric mean absolute percentage error is an accuracy measure based on percentage (or relative) errors. Where a perfect SMAPE score is 0.0, and a higher score indicates a higher error rate.





COMPARING MODELS

Above EPS prediction using ARIMA

Below EPS prediction naïve model

For this example:

SMAPE of ARIMA: 1.269

SMAPE of naïve: 1.851

$$SUE = \frac{Eiq - Eiq4}{\sigma it} \qquad (1)$$

E*iq* =quarterly earnings per share that was the latest to be announced for the month *t* for the stock *i*

E*iq4* = EPS four quarters ago

σ*it* = standard deviation of E*iq*-E*iq*4 over the last 8 quarters

SUE (STANDARDIZED UNEXPECTED EARNINGS MODEL)

FINAL RESULTS : COMPARISON BETWEEN 2 STRATEGIES

RECALL

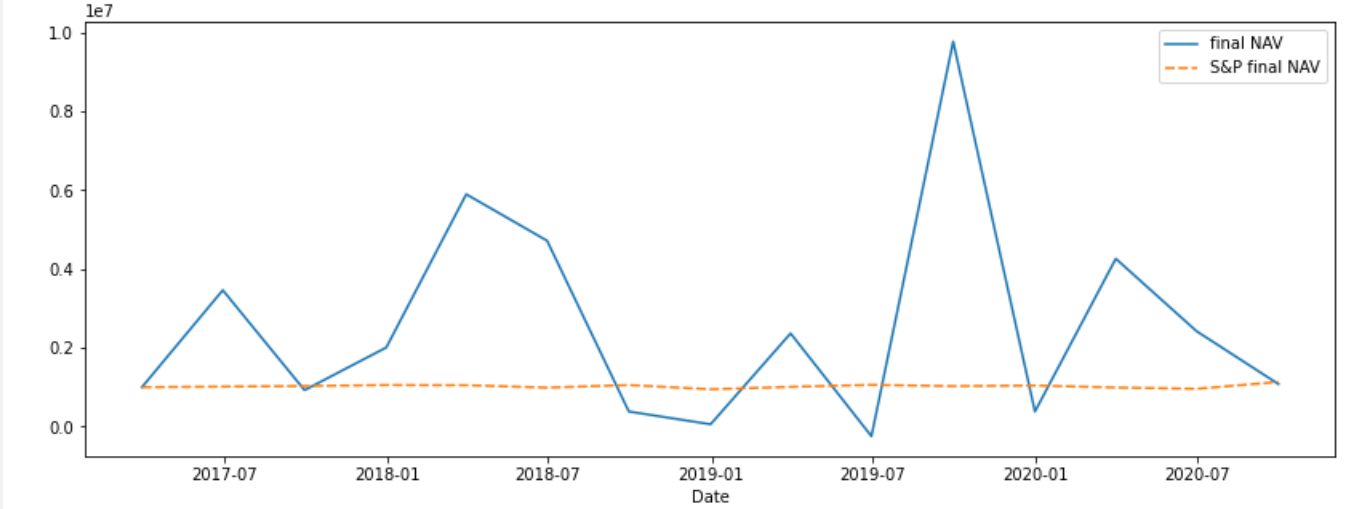
- Basic buy and hold strategy using the S&P500 index as reference
- PEAD strategy on microcap

Basis of comparison

- Cumulative returns of a $1 million portfolio -
- Rolling Sharpe ratio - the ratio of the expectation of the excess returns of the strategy to the standard deviation of those excess returns. Simply put, it captures the ratio of reward-to-risk, where risk is defined as returns volatility.

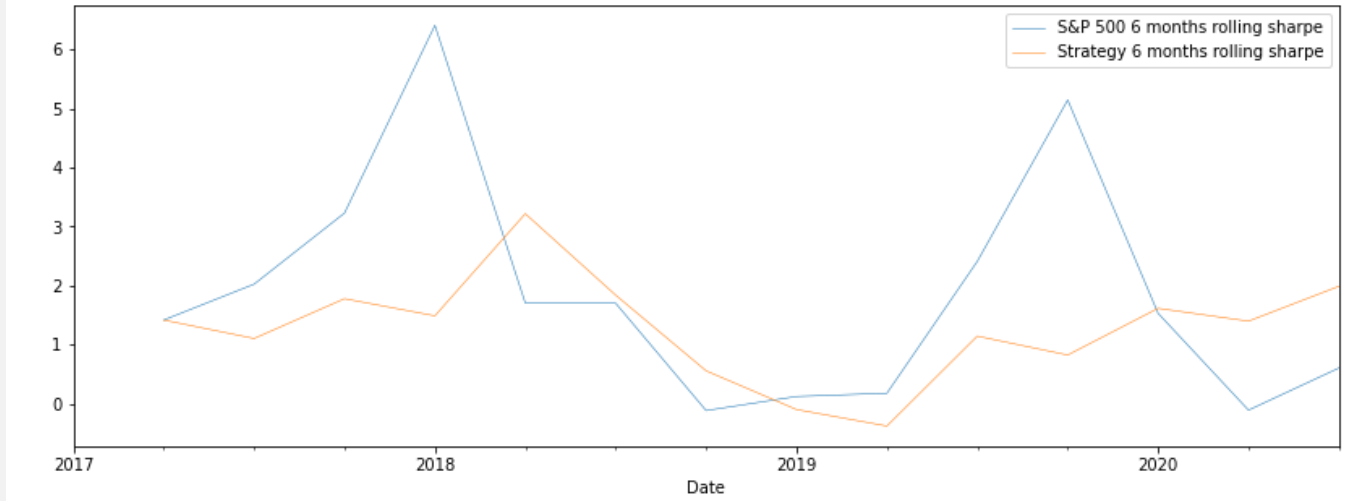
CUMULATIVE RETURNS

- Not much distinction between the 2 for the back tested time period
- S&P500 outperforms slightly



6 MONTHS ROLLING SHARPE RATIO

- S&P500 outperforms on average



KEY TAKEAWAYS & RECOMMENDATIONS

- The model is useful for predicting EPS of the subsequent quarter of each stock
- However, the model is also unlikely to outperform the S&P500 index as mentioned above.
- Thus, it is not recommended to include the PEAD strategy as a means of incorporating alpha into the core satellite portfokio

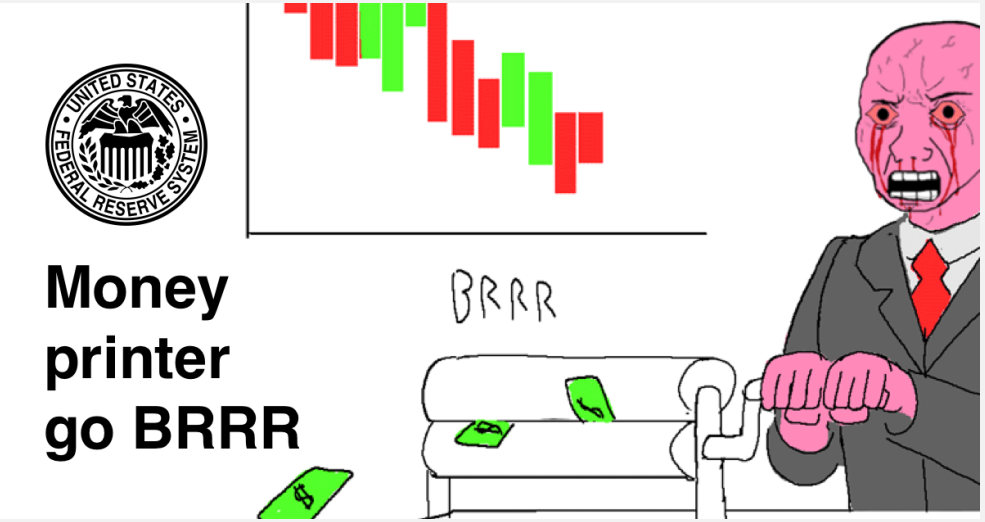
CONCLUSION AND LIMITATIONS

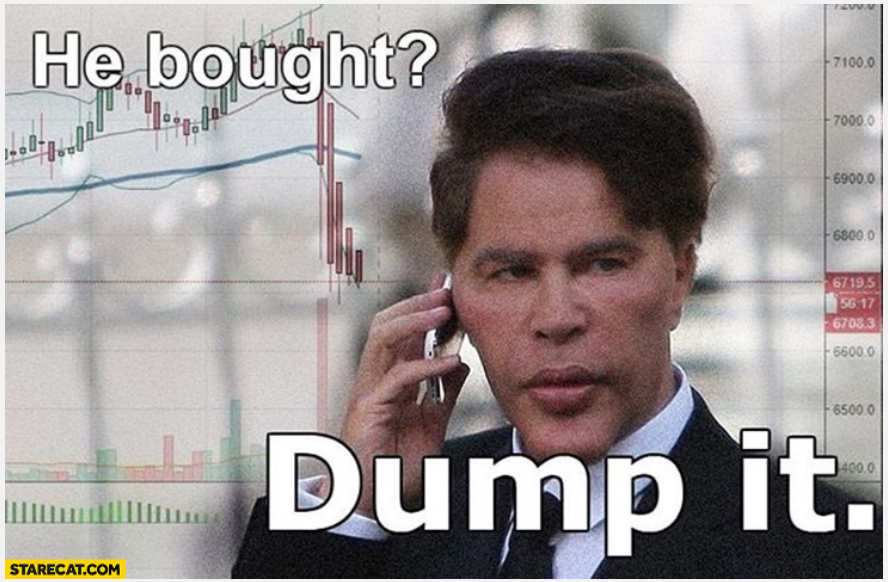
Prediction model:

- A major area of weakness of predicting the EPS is that it is essentially a backward looking model.
- Such that, the long term forecast eventually goes to be straight line and poor at predicting series with turning points

As a portfolio allocation strategy

- The liquidity of various microcap stocks may be limited due to the low float and daily traded volume for many of the stocks stated above.
- Thus, making this strategy infeasible for larger funds even if the strategy managed to create alpha.





THANK YOU

*Buy GME