Gold Price Prediction

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Goals

The goal of this project is to produce a predictive model for gold price by examining indicators of uncertainty or stress in capital markets. The model is built upon the common understanding that individual investors flee equity markets to gold in periods of uncertainty or distress.

Challenges

The largest challenge has to do with lack of data. Many of the features used are only available for the past 10-15 years. The price fluctuations I want to track are tied to the overall market cycle which takes approximately 7 years. In the last 15 years only 2 economic downturns have occurred.

A secondary challenge is the irregular length of the business cycle.

Unemployment rate

Shading denotes NBER-dated recessions

Source: NBER.org

Success Criteria

Root Mean Squared Error (RMSE):

Baseline = 0.008861

Data

- Data for this project is sourced from FRED2, a service of the Federal Reserve Bank.
- 2 features are VIX-like volatility measures of 2 gold ETFs
- Differenced S&P 500
- BoA high-yield, option-adjusted, bond spread
- London gold prices with prices at market open and close. These points were used to extrapolate daily open-close difference and a rolling-30-day mean

Modeling Approach

Because this is a time series problem and interpretability is important, I used the ARIMAX model.

For this model, features were carefully scaled and stationality was accessed.

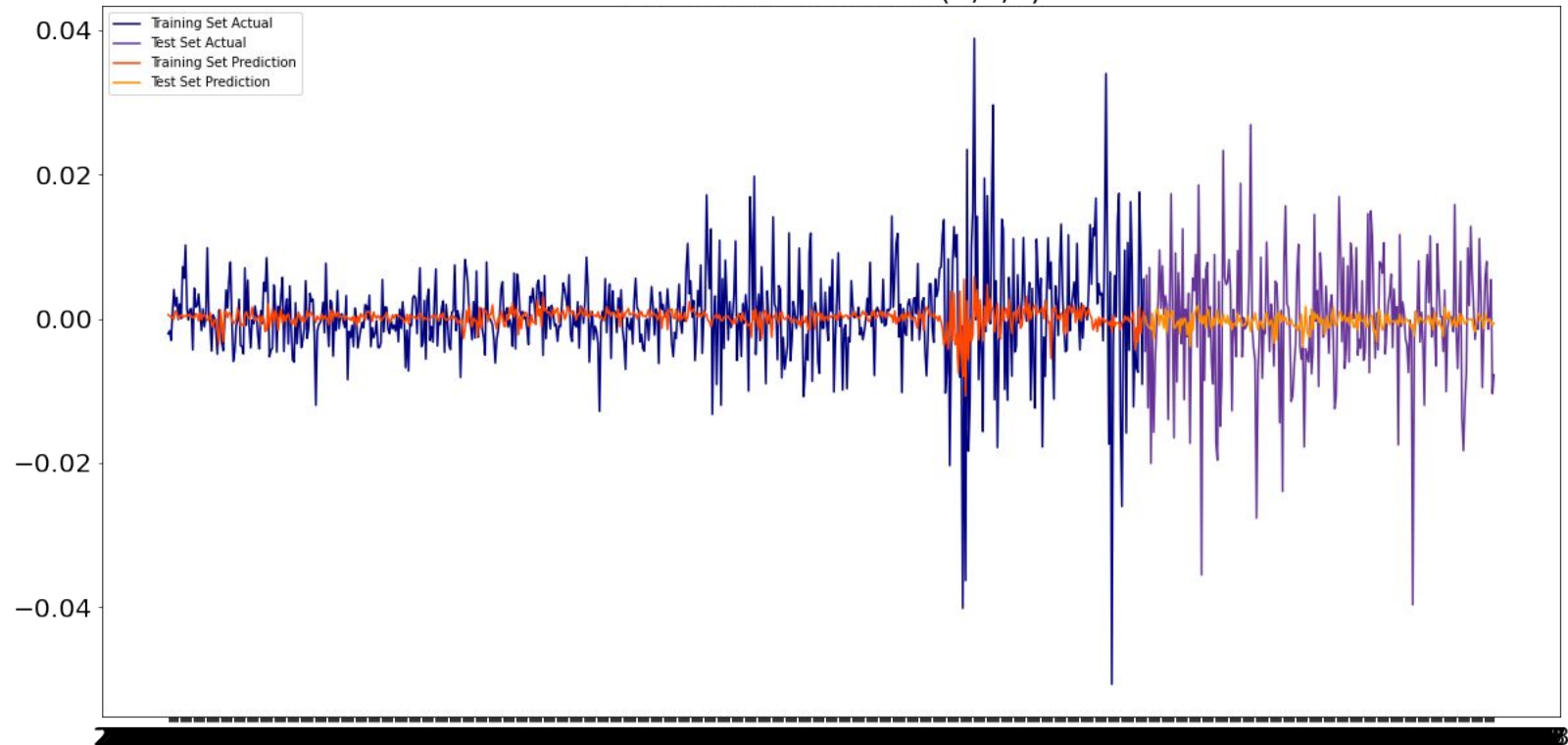Seasonality was not found.

Findings

The most effective model (by AIC) was shown to have a PDQ of (0, 0, 0)

This is not good because models with a PDQ of (0, 0, 0) are referred to as 'white noise' or a 'random walk'

RMSE for this model's test was 0.008781

Baseline RMSE was 0.008861
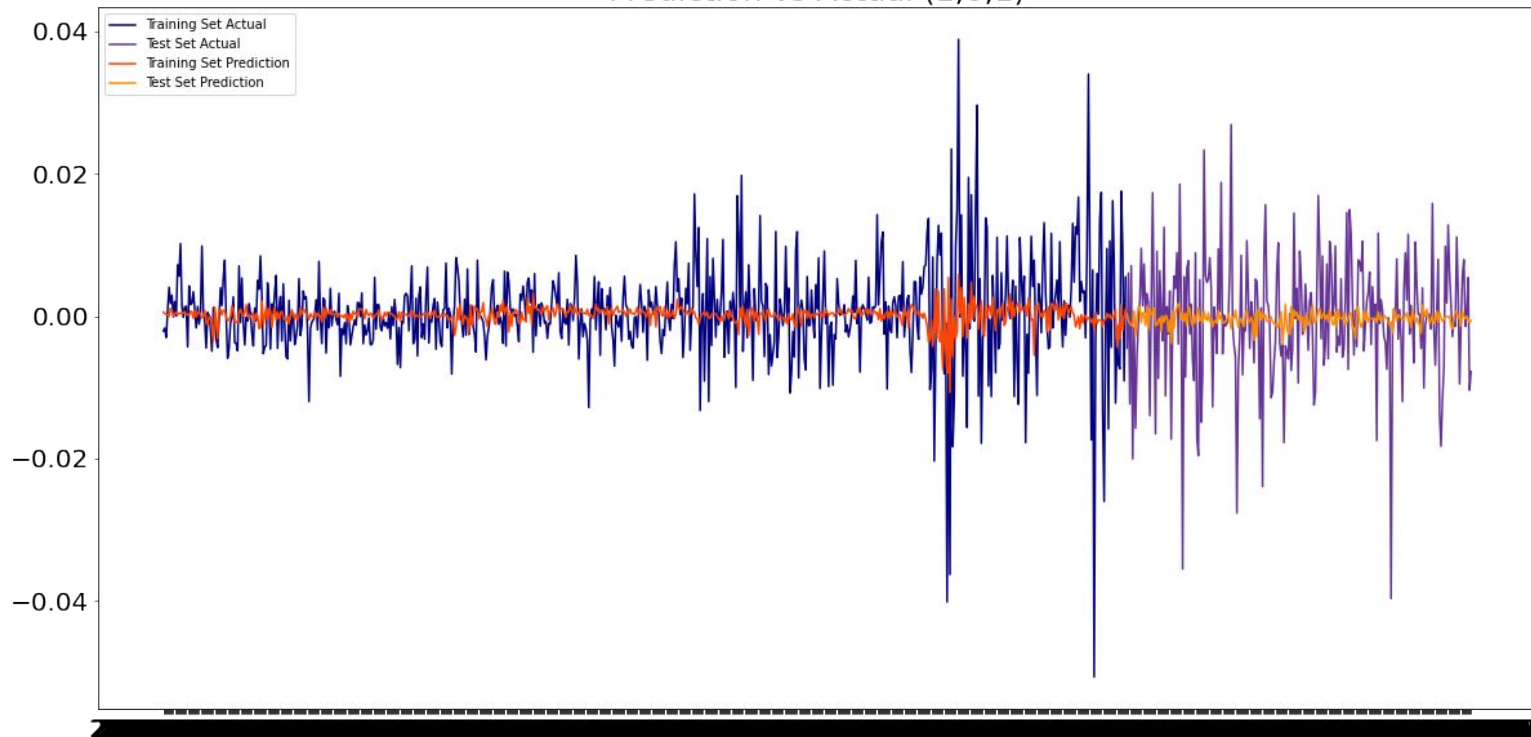
Prediction vs Actual (0,0,0)

I attempted a (1, 0, 1) as well to show its RMSE

RMSE for (1, 0, 1) was 0.008782

RMSE for (0, 0, 0) was 0.008781

Baseline RMSE was 0.008861

Prediction vs Actual (1,0,1)

Next Steps

- Simplify, bianarize outcome.
- Sentiment Analysis