Federal Funds Rate Analysis

Quisitive Corp.

Executive Summary

Welcome Open Data Science Conference 2022 Attendees!

- Financial institutions such as leading G-SIB's and emerging Fintech companies such as Paypal, Square, Affirm
- Utilize Time Series Models such as AR, MA, ARIMA, and SARIMA
- Forecast Federal Funds Rate
    - Minimize credit and interest rate risk

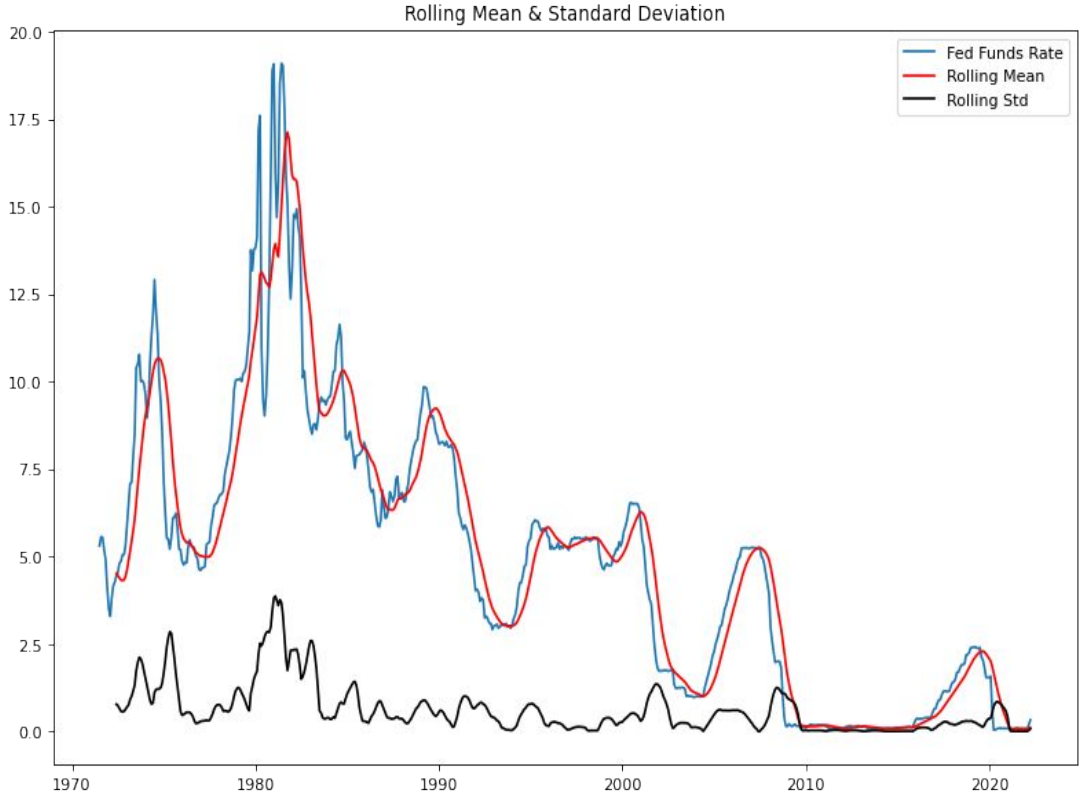
Background

What is the Federal Reserve?

- U.S. Central Bank
- Sets short term interest rates (overnight bank to bank lending rate)
- Manages U.S. dollar money supply
- Regulates financial markets

Data Review

- Analyzed the Federal Funds Rate from 7/1/1971 to 4/1/2022
- Source: St.Louis FRED Economic Data Website



Business Problem

- Lenders have sought ways to reduce credit & interest rate risk
- Delinquency rates averaged 1.66% since 2020 (Federal Reserve est.)
- High inflation (8.5% Y/Y) has increased interest rate risk

Solution: SARIMA Time Series Model

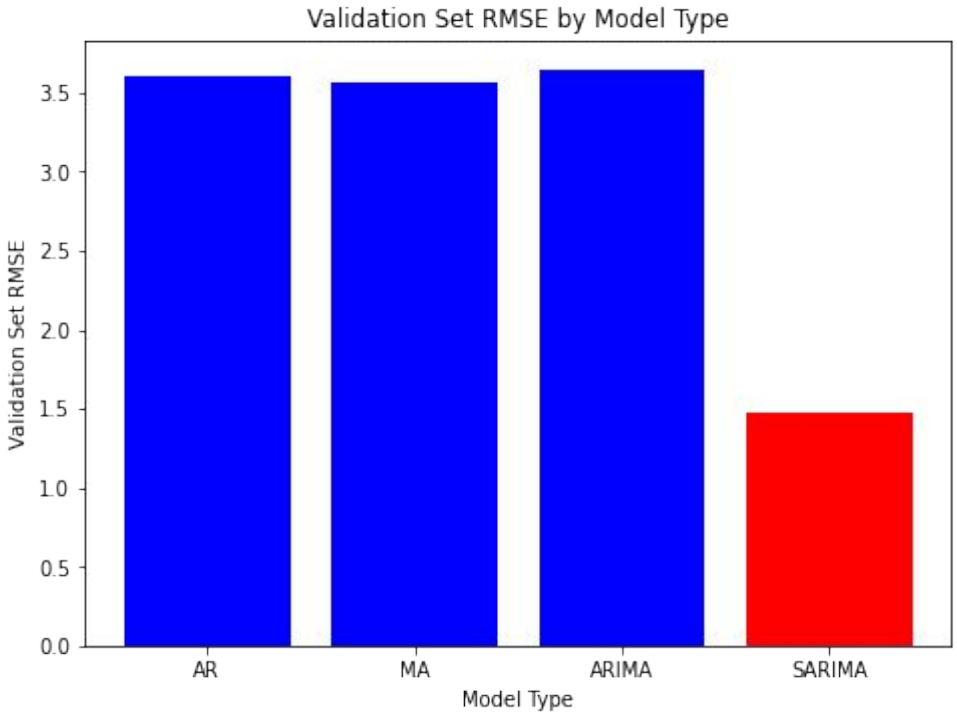
Seasonal AutoRegressive Integrated Moving Average Model

- Combines AR & MA Models with seasonal orders and differencing
- Forecast Federal Funds Rate
- Identify high risk credit/debt

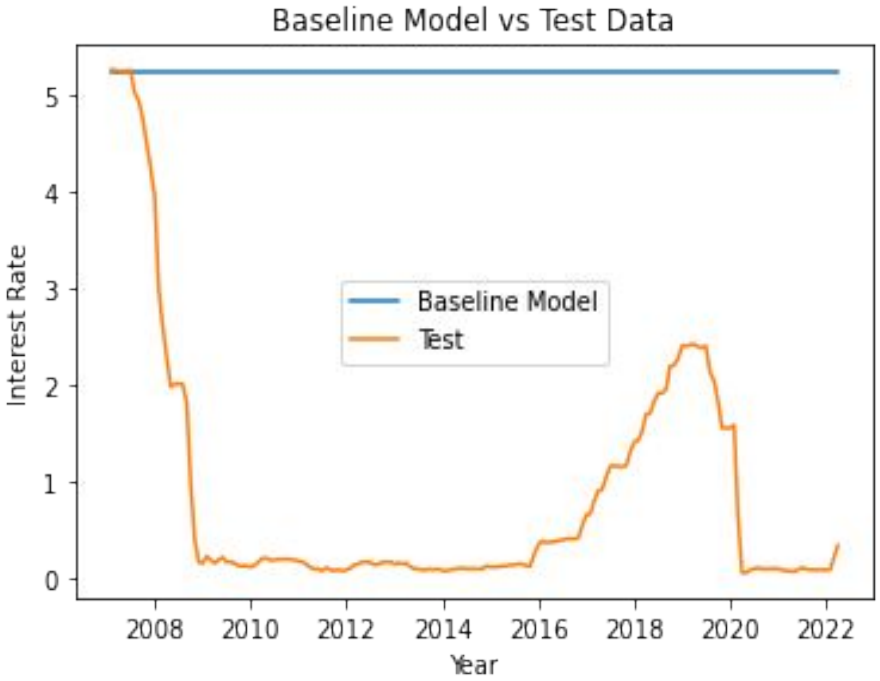
Model Performance

Validation Set RMSE by Model

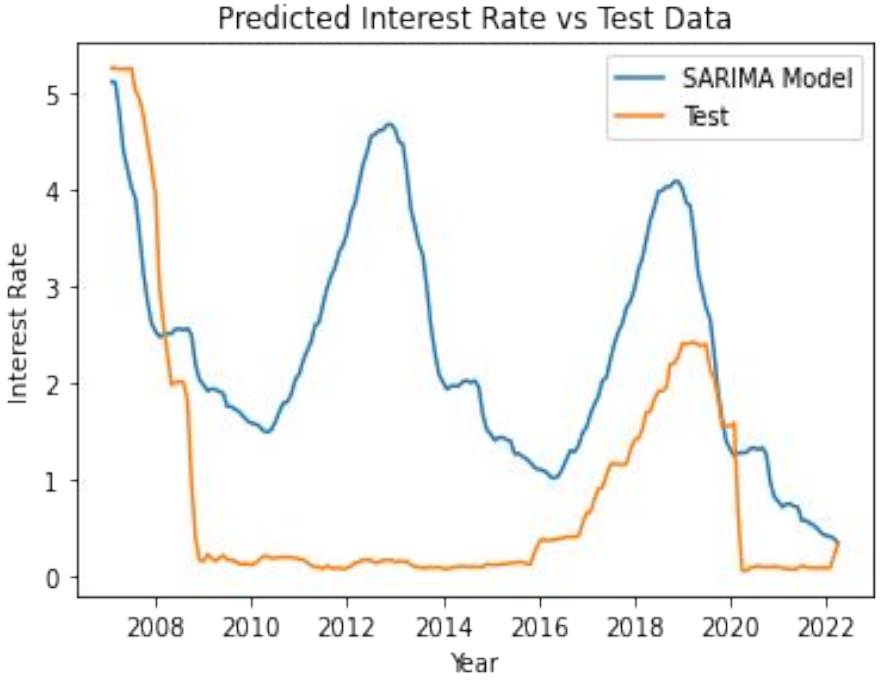
- AR Model: 3.60
- MA Model: 3.57
- ARIMA Model: 3.66
- SARIMA Model: 1.47



Model Performance

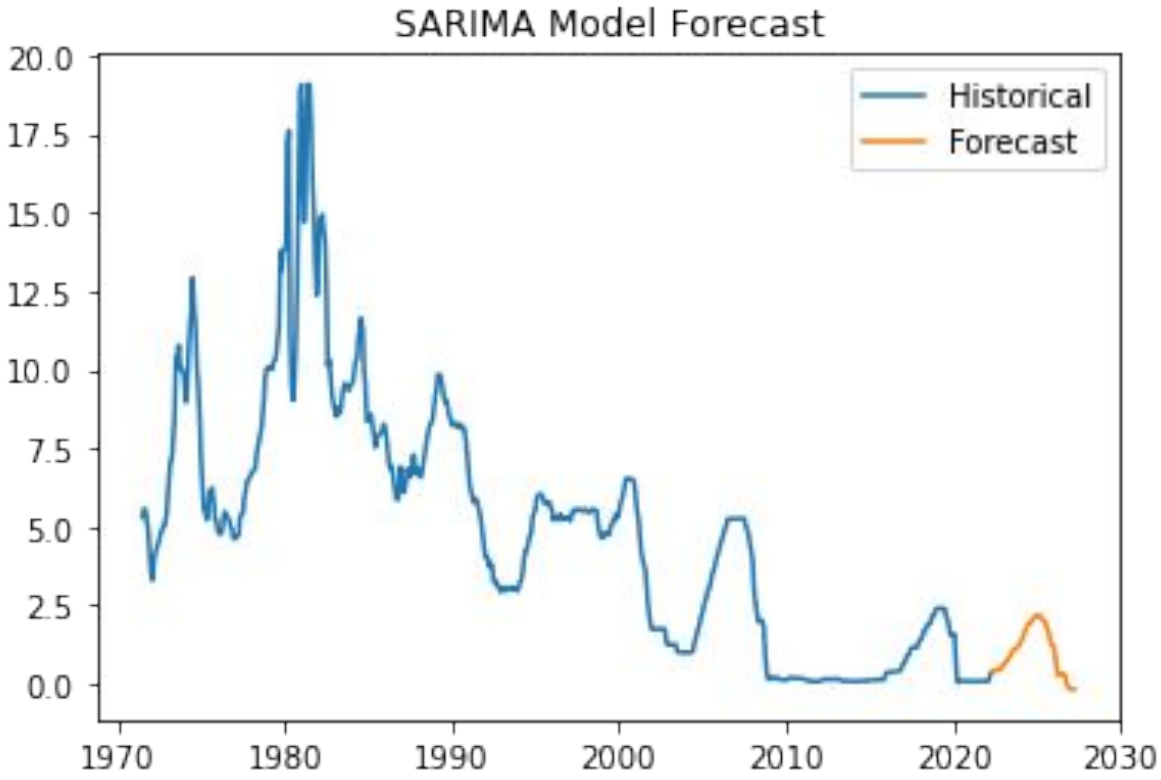


- Validation Set RMSE of 3.49
- AIC score 822



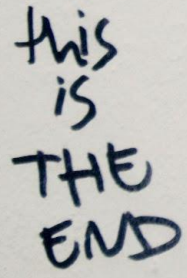
- Validation Set RMSE of 1.47
- AIC score 38.8
- Test Set RMSE of 1.92

SARIMA Model 5 Year Forecast



Conclusion

- Prediction on unseen test data off by 1.92 percentage points vs. actual Federal Funds Rate on average (vs. 3.49 percentage points on baseline validation set)
- Model forecast used to identify high risk credit/debt
- Minimize credit losses



Next Steps

- Increase the size of our dataset to take in more years and take in real-time data
- Acquire more computational power to run models with higher order terms
- Utilize the SARIMAX model with exogenous variables

Thank you! Any questions?

By Mychal Dubyk, Quisitive Corp.