

Investigating the Impact of FOMC Meetings on Stock Market Performance

By Masood Dastan



Problem Statement

This project aims to investigate the impact of Federal Open Market Committee (FOMC) meetings on stock market performance.

There is no doubt that the quantitative decisions made by FOMC have a significant impact on both the economy and the financial market.

However, whether the subject of discussion during the meetings or the prevailing sentiment of the members regarding the economy carries any potential implications for the economy and market remains uncertain.

Project Objectives

- Analyze the impact of FOMC meetings on stock market performance and fluctuations through text analysis.
- Uncover key themes, discussions, and focal points in FOMC meetings using topic modeling.
- Gauge the overall sentiment among committee members during meetings to gain insights into policymakers' expectations that shape monetary policy.
- Integrate a diverse range of economic indicators to contextualize FOMC decisions within the broader economic landscape, identifying potential interconnections between monetary policy and overall economic performance.

Project Outline

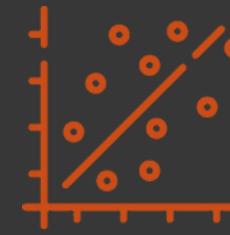


Data

FRED

FOMC

Yahoo
Stock



Modeling

Models

RNN

RF

SVC

GB

LR

Evaluation

Data - S&P 500

S&P 500 index price is collected from Yahoo Finance which provides comprehensive stock market performance information.

Feature engineering

01

Target labels -
price change

02

Percentage change
in price (lagged)

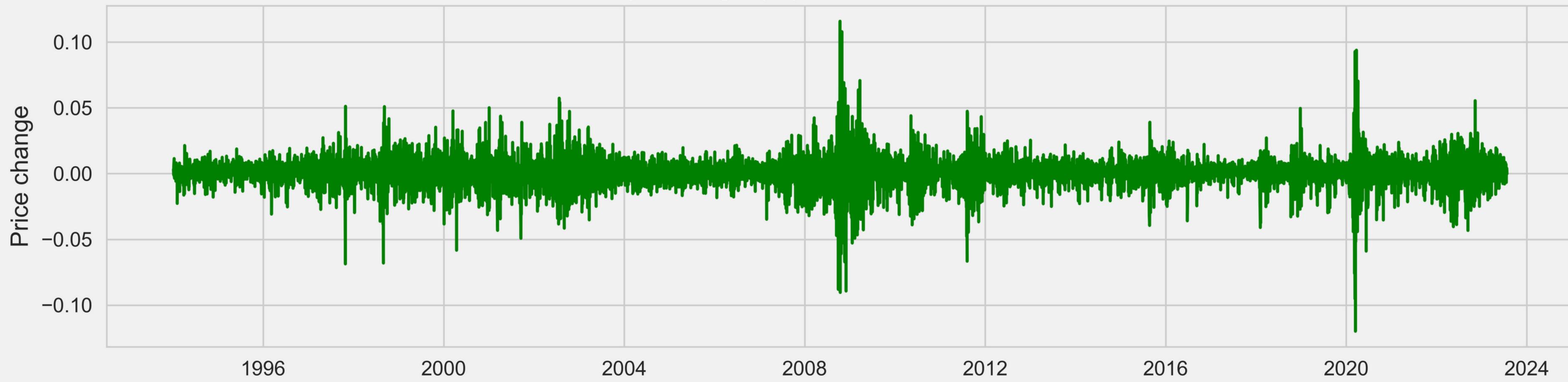
03

The 15-day rolling
average of the
percentage change
in price (lagged)

S&P 500 Stock Price



Daily Change (%) in S&P 500 Stock Price



Data - FRED

FRED (Federal Reserve Economic Data) serves as an invaluable source of economic data, offering access to a wide range of essential indicators.

The indicators are collected through the FRED API.

The indicators include:

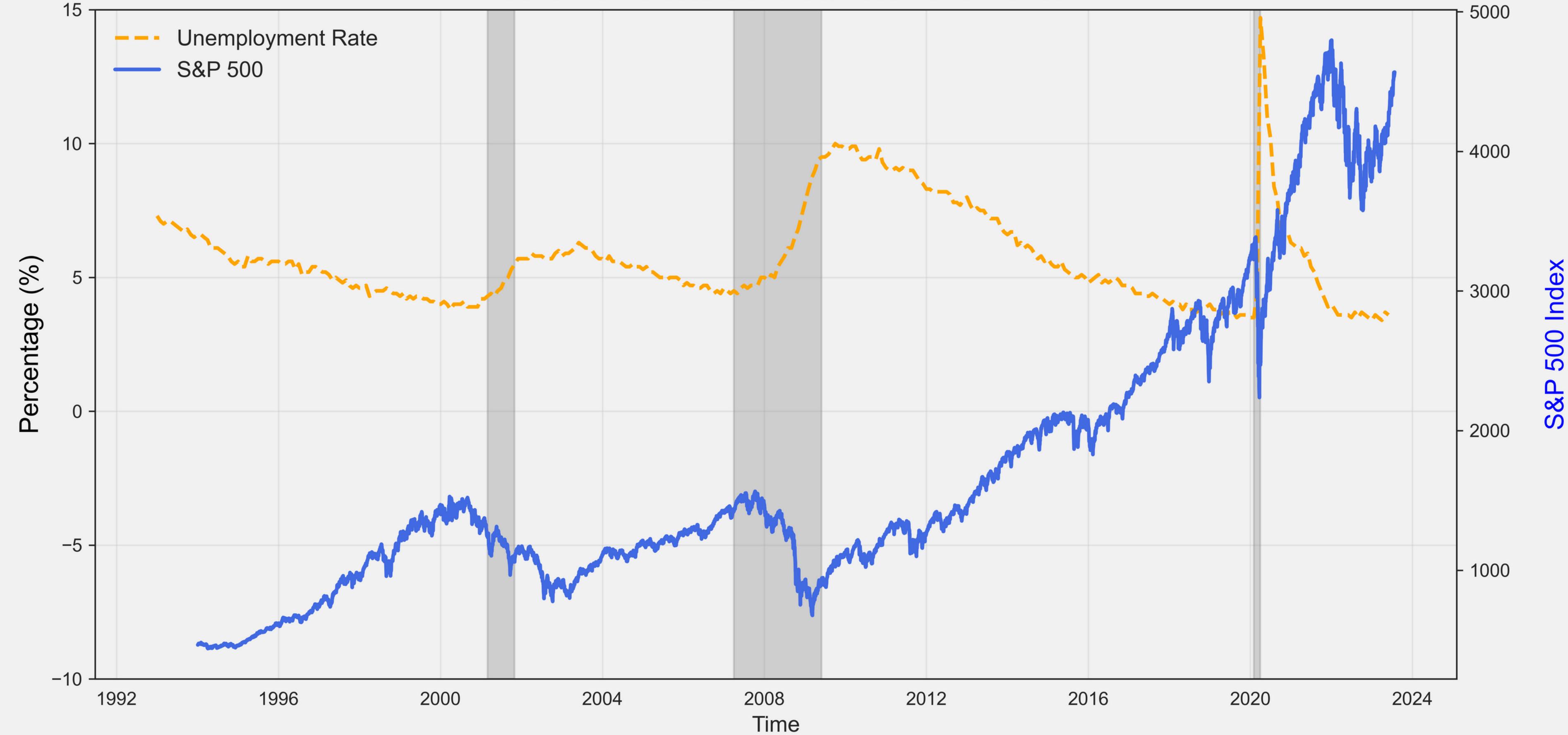
- Real GDP
- CPI (Consumer Price Index)
- Retail Sales
- Federal Fund Rate
- Treasury yield
- Treasury yield spread
- US dollar strength
-

Feature engineering

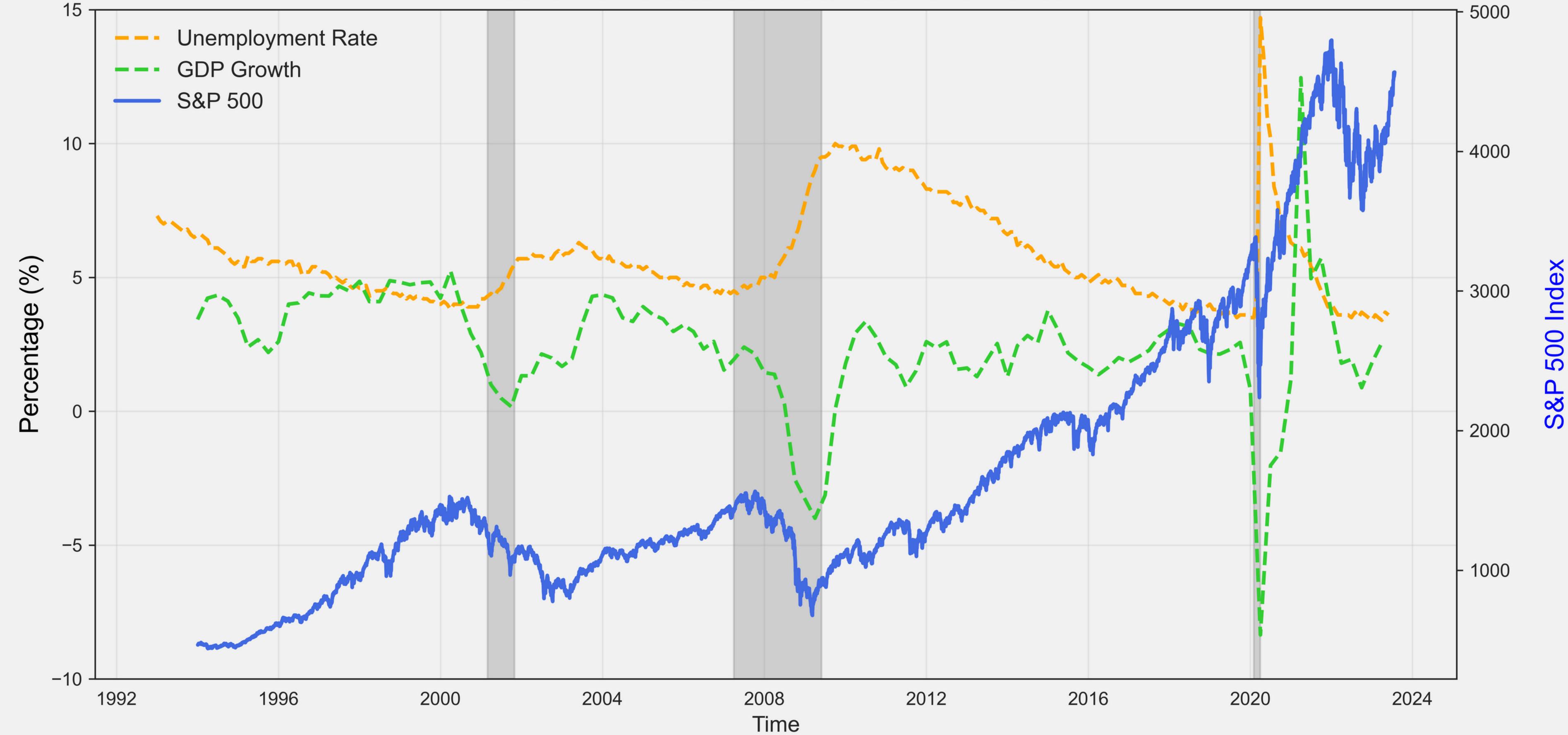
- YoY GDP growth
- YoY Inflation Rate



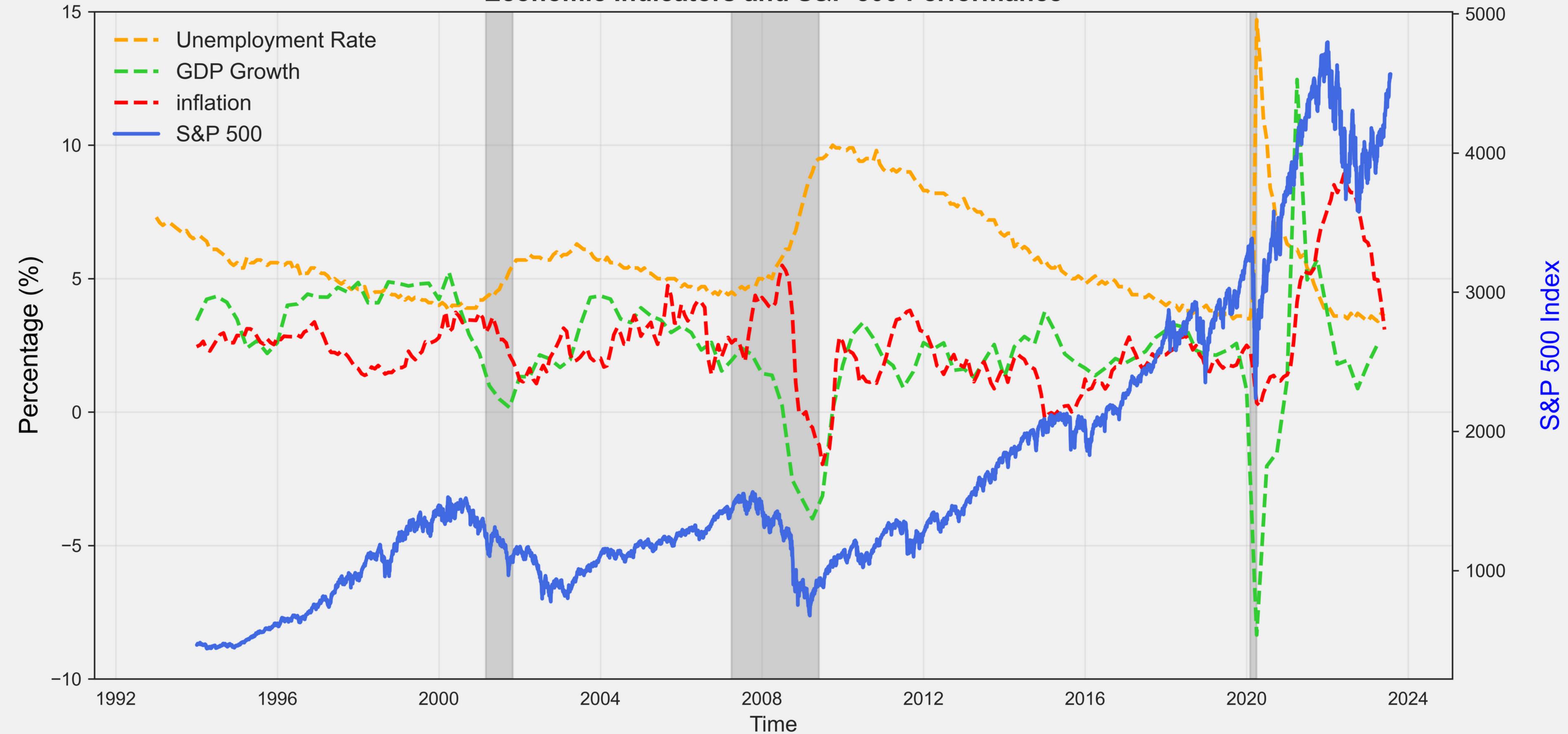
Economic Indicators and S&P 500 Performance



Economic Indicators and S&P 500 Performance



Economic Indicators and S&P 500 Performance



Data - FOMC

- The Federal Open Market Committee (FOMC) is a committee operating within the Federal Reserve System and is responsible for supervising the country's open market operations, including the buying and selling of United States Treasury securities.
- The Federal Open Market Committee (FOMC) is the monetary policymaking body of the Federal Reserve System.
- It is responsible for supervising the country's open market operations, including the buying and selling of United States Treasury securities.
- The FOMC consists of 12 members, comprising the seven members of the Board of Governors and five of the 12 Reserve Bank presidents.
- The FOMC schedules eight meetings per year, held approximately every six weeks.

Data - FOMC

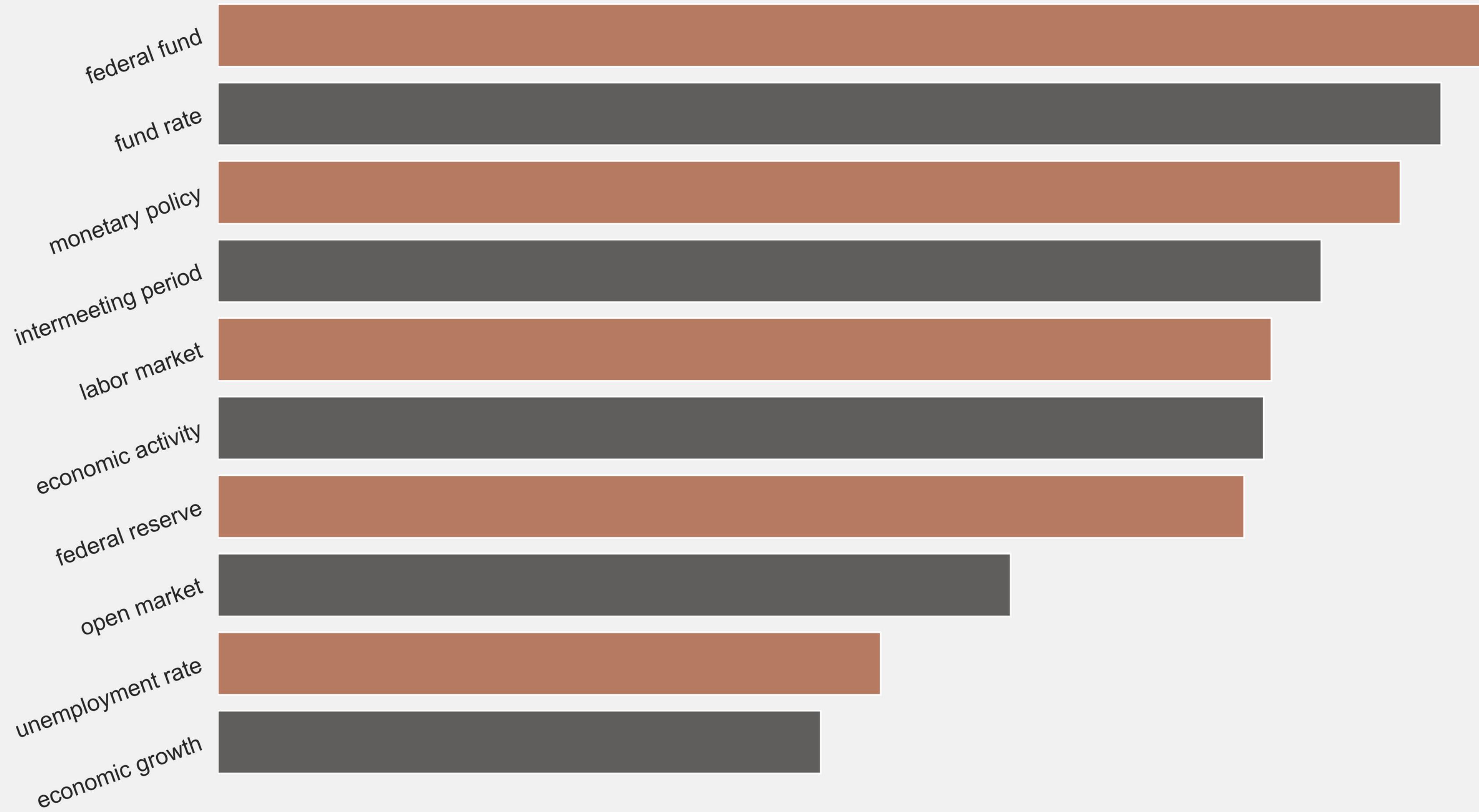
- The Federal Reserve's website regularly updates meeting minutes and statements.
- Meeting minutes spanning from January 1993 to June 2023 have been scraped from the Fed's website.

The meeting contents underwent the following main cleaning steps:

- 1 Removal of punctuations, stopwords, and all words that were not nouns, verbs, or adjectives.
- 2 Lemmatization of the remaining tokens.



Most Common Word Pairs



Data - FOMC

Feature engineering



**Topic
Modeling**



**Sentiment
Analysis**

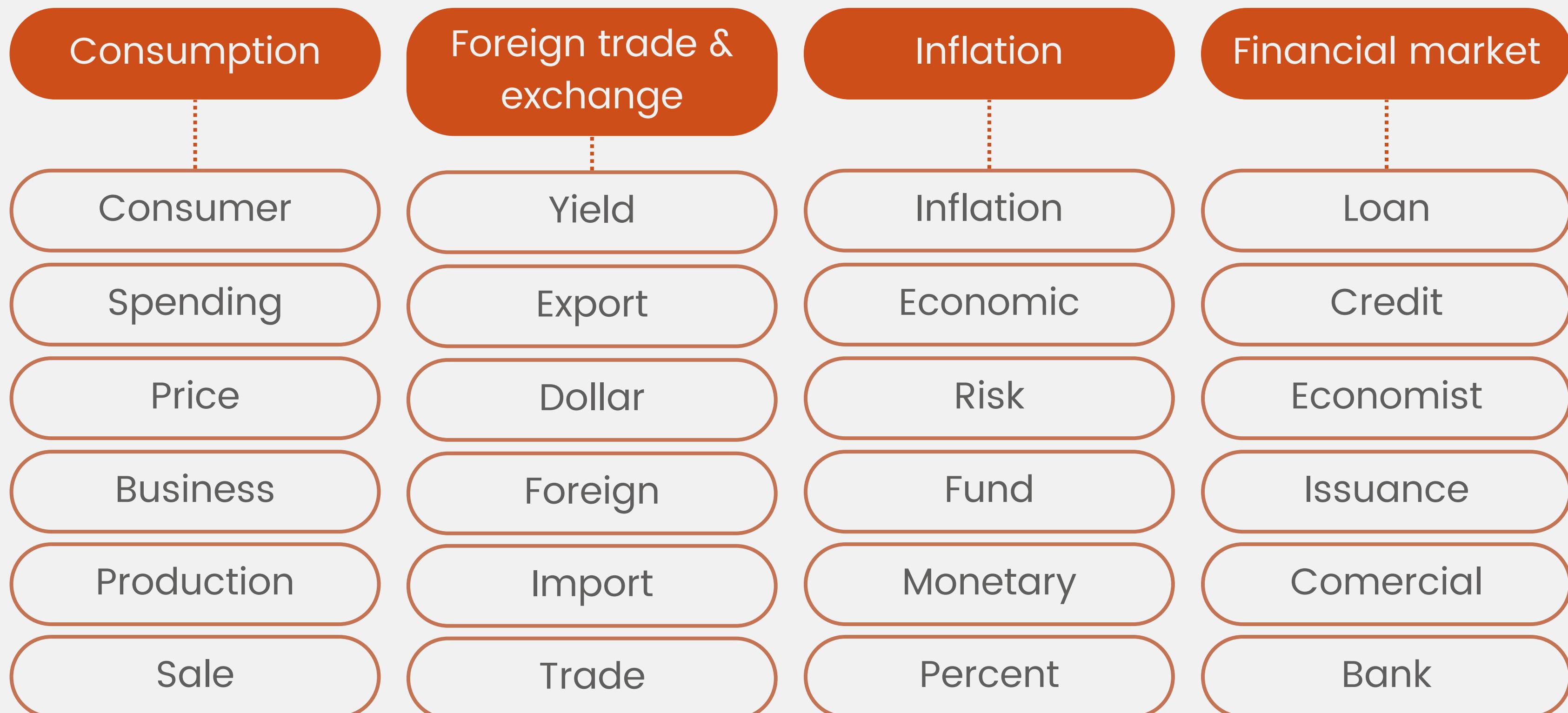
Data – FOMC

Topic Modeling

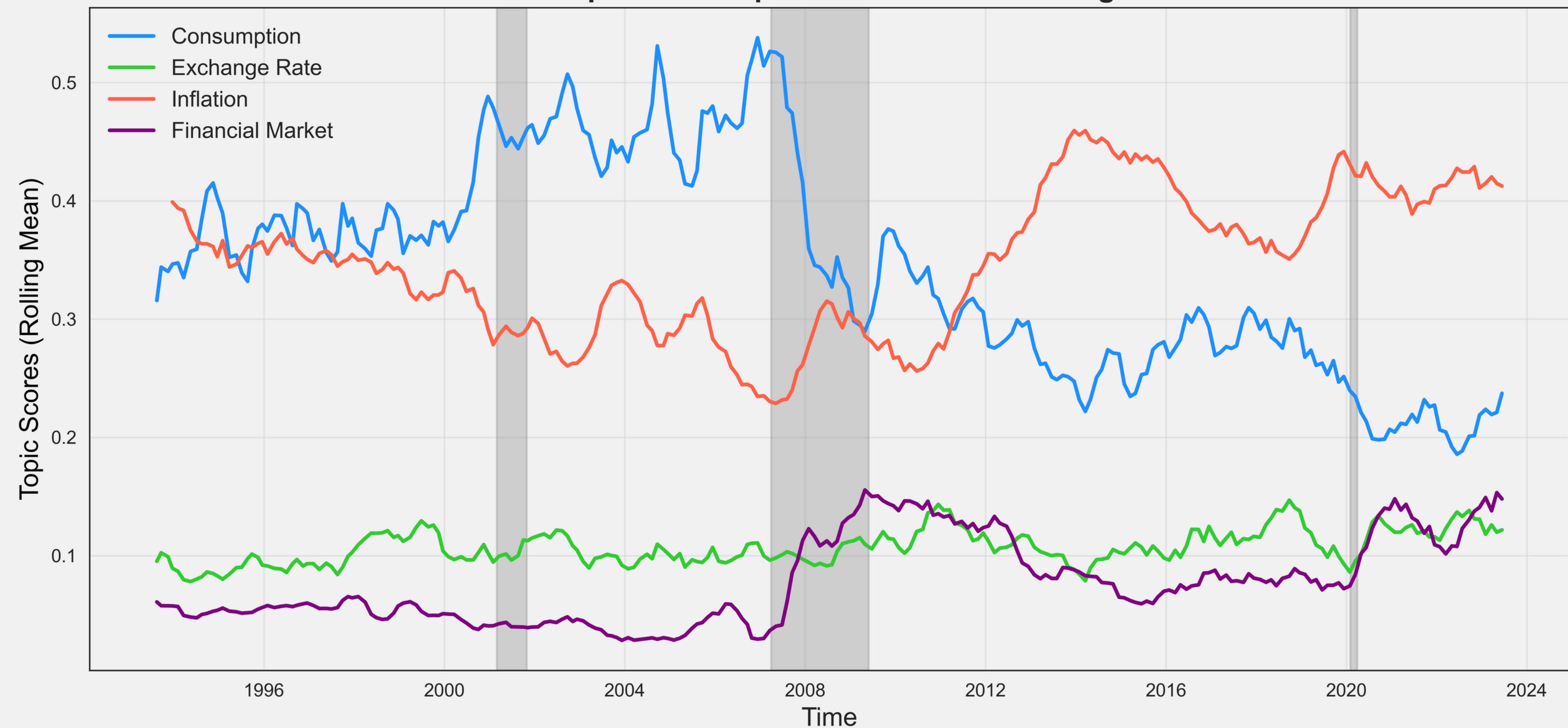
- FOMC meeting minutes provide insights into the context of discussions, focusing on significant US economic concerns.
- Topic modeling is a statistical modeling approach that employs unsupervised Machine Learning to identify clusters or groups of similar words within text data.
- The primary method for topic modeling in this project is Latent Dirichlet Allocation (LDA).
- LDA helps reveal key topics and themes discussed during the FOMC meetings.

Data - FOMC

Topic Modeling



The prevalent topics in the FOMC meetings



Data – FOMC

Sentiment Analysis

**Loughran and
McDonald Word
Dictionary**

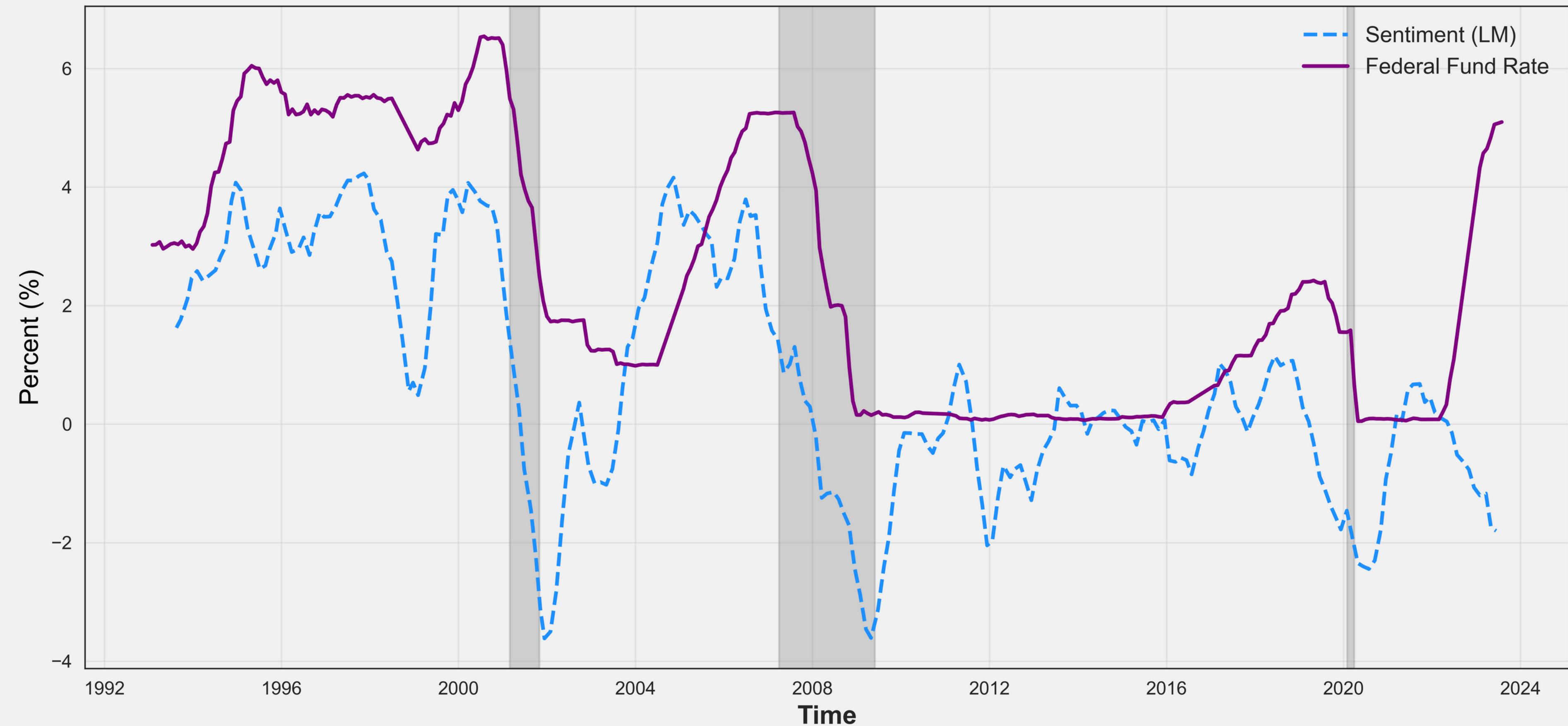
**Zero Shot text
classification**

Data – FOMC

Sentiment Analysis: Loughran and McDonald Word Dictionary

- Conventional sentiment analyzers struggle to effectively analyze vague and technical language in financial documents.
- To address this issue, Loughran and McDonald created a specialized word dictionary for analyzing 10-K statements.
- This project utilizes their custom word list to analyze the sentiment of FOMC statements.

Sentiment and Federal Fund Rate

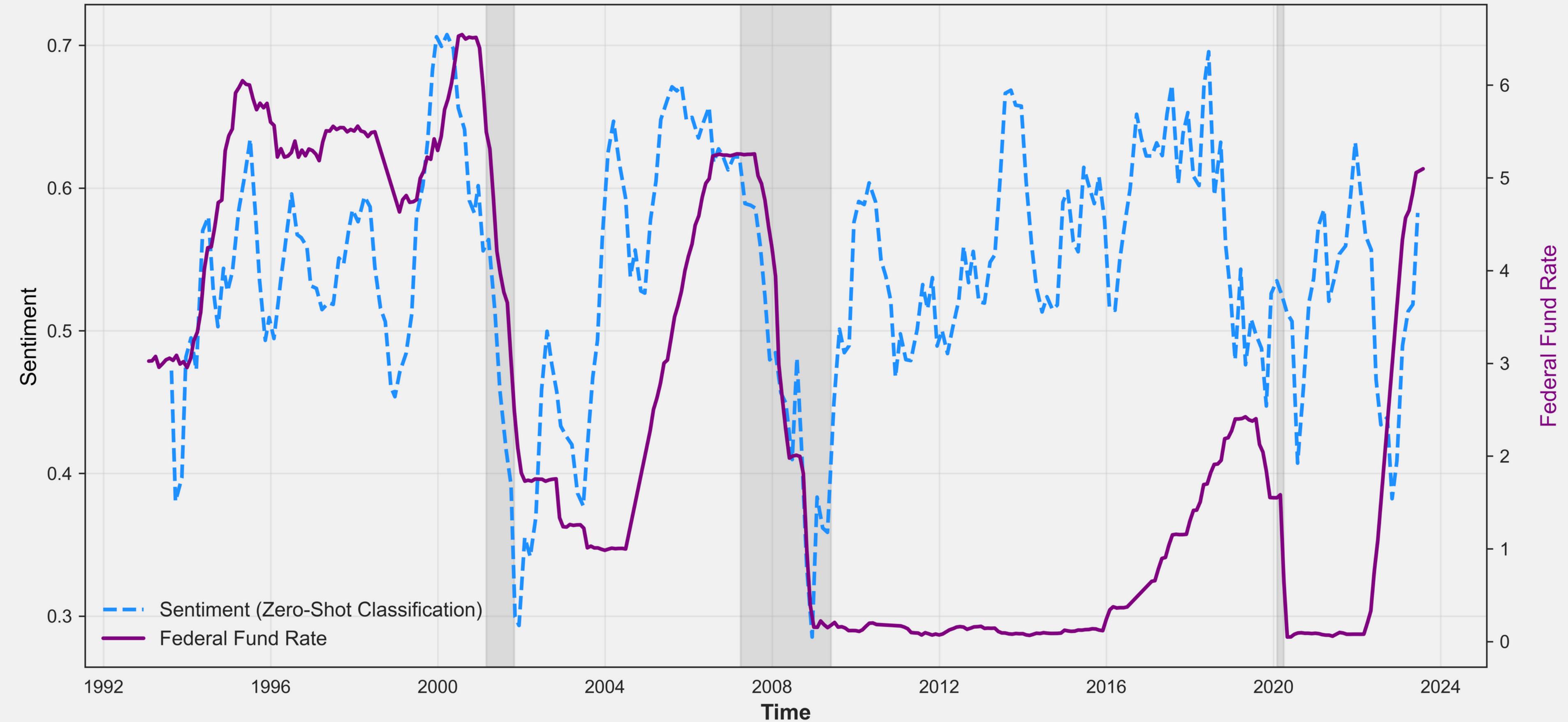


Data – FOMC

Sentiment Analysis: Zero Shot Text Classification

- Zero-shot text classification is a task in natural language processing where the model is trained on a set of labeled examples.
- However, it can classify new examples from classes it has never seen during training.
- This capability allows the model to handle previously unseen categories with meaningful predictions.
- Using a pre-trained transformer model developed by facebook (bart-large-mnli), I classify documents into two class of positive and negative.

FOMC Sentiment and Federal Fund Rate

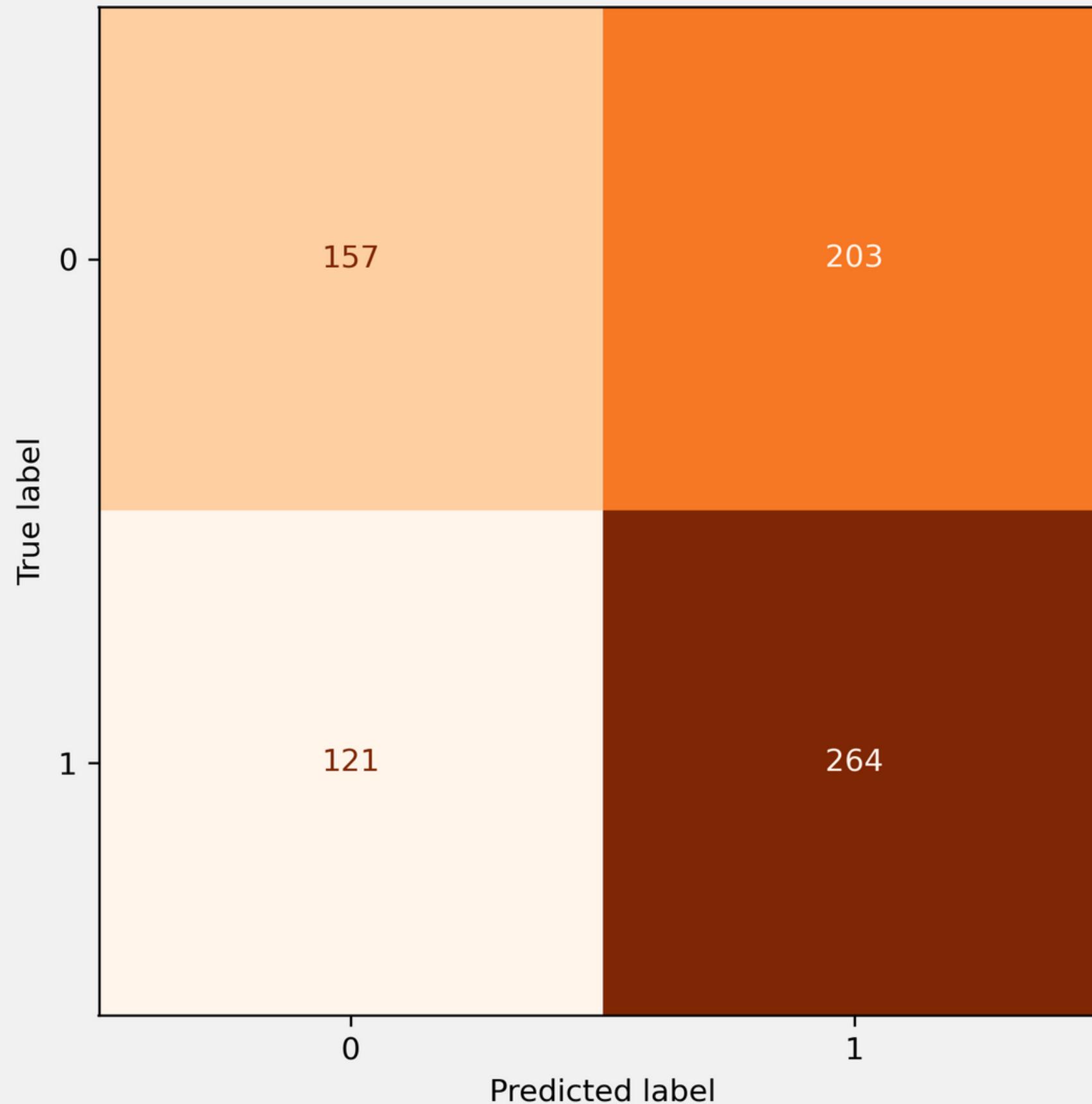


Modeling

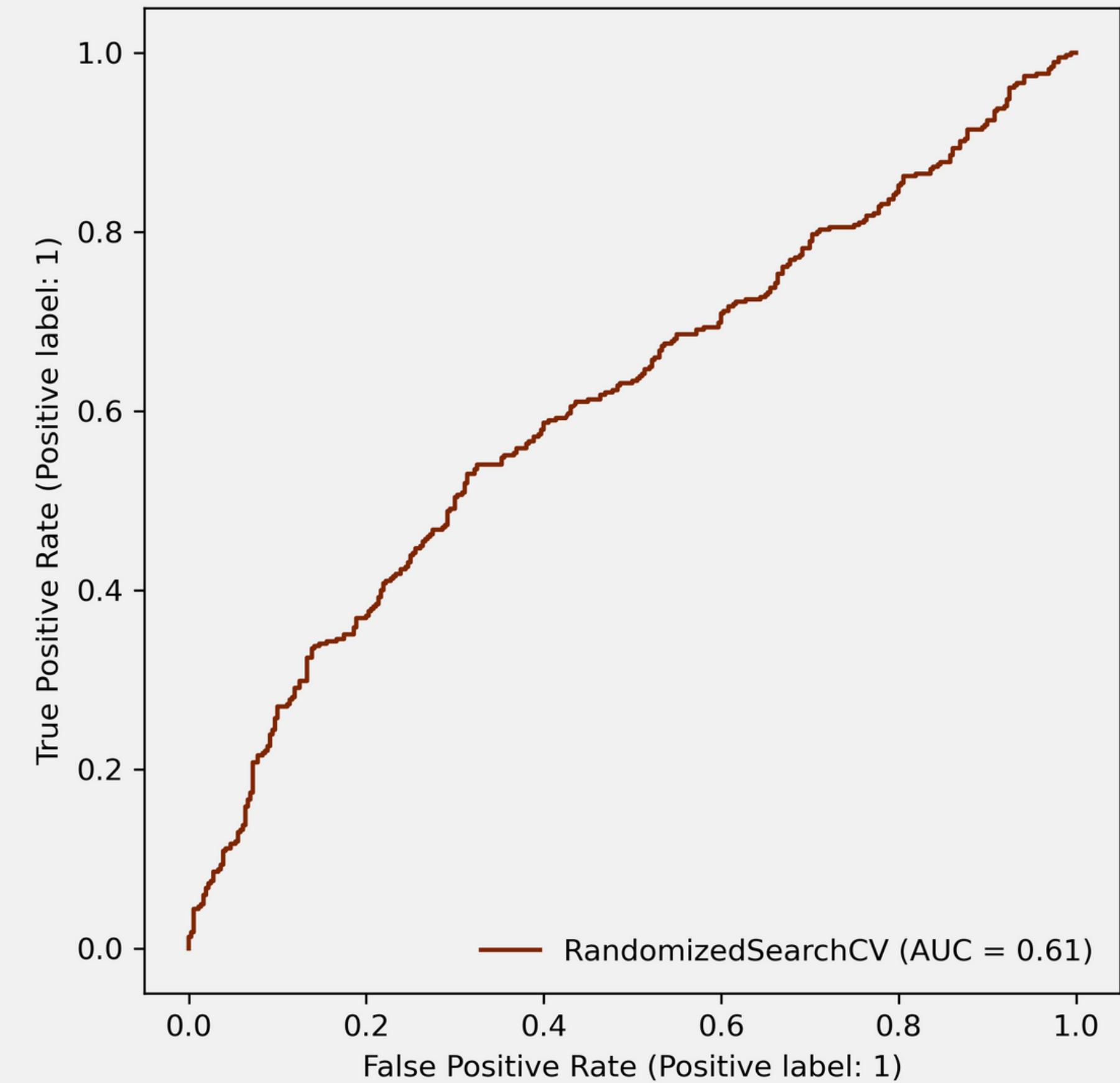
- Five classification models (Recurrent Neural Net, Logistic Regression, Random Forest, Support Vector Machine, and Gradient Boosting) were evaluated using cross-validated randomized search.
 - Models performance was measured using accuracy and AUC scores.
 - The Gradient Boosting Classifier achieved the highest accuracy (57%) and AUC score (61%).

Model Performance

Confusion Matrix



ROC Curve



Concluding Remarks

In conclusion, this project presents a comprehensive analysis of the impact of FOMC meetings on the stock market, utilizing text analysis, sentiment analysis, and economic indicators. The insights gained from this research provide valuable information for investors, policymakers, and stakeholders in making informed decisions in the financial markets.



Questions?