**Key drivers that affect the evolution of Central Banks rate**

**Introduction**

Central banks, including the Federal Reserve in the United States, play a crucial role in maintaining financial stability within their regions. Their monetary policies are specifically designed to sustain healthy employment levels while keeping inflation in check. Over the past year, interest rate policies have dominated financial markets, particularly following the Fed's announcement of an easing cycle a year ago. However, the first rate cut was only implemented recently, leaving market participants in a prolonged state of anticipation regarding the timing of further cuts.

This study aims to identify the factors that most significantly influence central bank interest rates. Our analysis will cover the period from 1960 to the present day.

A graph showing the rate of the federal funds rate

Description automatically generated

1. **Unemployment rate**

The Federal Funds Rate and the unemployment rate tend to exhibit an inverse relationship (as shown on the next graph), driven largely by the Federal Reserve’s mandate to manage inflation and maximize employment. When the economy shows signs of slowing or entering a recession, the Federal Reserve may lower the Fed Funds Rate, which is the interest rate at which banks lend to each other overnight. A lower rate encourages borrowing and spending by businesses and consumers, stimulating economic growth and, in turn, helping reduce unemployment. This is because increased spending leads to higher demand for goods and services, which typically requires businesses to hire more workers, thereby reducing the unemployment rate.

A graph showing a graph

Description automatically generated with medium confidence

I computed the 6 month rolling percentage change for both unemployment rate and Fed funds rate:

A graph of a graph showing the amount of unemployment rate

Description automatically generated

This scatter plot clearly shows that the Fed Funds Rate tends to increase as the unemployment rate declines, indicating a heating up economy.

Conversely, we can observe a strong density of points clustering in the lower right corner of the scatter plot, indicating that rates tend to decrease when the unemployment rate increases.

1. **Inflation**

To measure the impact of inflation on Fed Funds rates, I chose to pick the ‘*Consumer Price Index for All Urban Consumers: All Items’* from the FRED database.

A graph showing the price of a stock market

Description automatically generated with medium confidence

We can see on the chart above that CPI seems to be also a factor that drives Fed Funds rates.

A graph of different colored dots

Description automatically generated

The scatter plot above is insightful for several reasons. Firstly, in the lower left corner, we can observe a significant drop in the Fed funds rate corresponding to a decrease in inflation. Additionally, the plot indicates that a low-level increase in inflation does not consistently lead to a rise in the Fed funds rate. However, when inflation increases substantially, the Fed funds rate tends to rise as well.

I performed a linear regression analysis of the Federal Funds Rate with respect to the Consumer Price Index (CPI),

**Mean Squared Error: 0.006632681606596519**

**R-squared: 0.09880472210283309**

Here is the representation on my test dataset:

A graph of a graph showing a line and a line

Description automatically generated with medium confidence

1. **Linear Regression combining both inflation and unemployment rate**

In this section, my goal is to perform a multiple linear regression to predict Fed funds rates based on the combination of unemployment rate and inflation levels.

Mean Squared Error: 6.047288274249201

R-squared: 0.5315048039702643

The linear regression that combines both the six-month rolling unemployment rate and the percentage change in the inflation rate demonstrates stronger predictive power. This indicates that it is essential to consider the evolution of both parameters in order to forecast Federal Funds rate levels; relying on only one of them is insufficient.

**A graph with a line and dots

Description automatically generated**

1. **Conclusion and Areas for Improvement**

The study clearly shows that there is a very strong relationship between the Fed funds rates, the unemployment rate, and the level of inflation. To refine the prediction model of the Fed funds rates, it would have been necessary to gather more macroeconomic data that central bankers consider when establishing their monetary policy.

If I had to add variables, I would choose to include for example the GDP growth rate, the Consumer and Business Confidence Indices such as the one from MIT University, exchange rates, and oil prices.

I will perform PCA to reduce the dimensionality of my dataset, which is likely to enhance the predictive power of the model significantly