RESEARCH INTO SOFR AND IT'S RELATIONSHIP TO MACRO-ECONOMIC FIGURES FOR TRADING ARBITRAGE

The global economy within recent years has been some of the most turbulent in recent history. One of the most important macroeconomic indicators is SOFR (Secured Overnight Financing Rate). SOFR is the benchmark for lending interest between financial institutions. Higher SOFR indicated decreased liquidity or tighter macroeconomic policy. There are many other macroeconomic indicators that have some positive/negative correlation to SOFR such as the 10Y Treasury Yield, Fed Funds Rate and the Inflation Rate. Being able to understand these correlations can allow investors and traders to profit from inefficiencies in the financial markets. Essentially, through a proper understanding of SOFR and its relationship to other macro indicators, individuals and institutions can drive profits from their respective trading desks. Thus, the problem can be framed as helping solve the disconnect between hard-to-understand economic features and their relation to SOFR. Some guiding questions include: "What macroeconomic statistics have the closest correlation to SOFR", "To what extent are certain macroeconomic features correlated to one another, "How has the correlation between different macroeconomic figures and SOFR changed in the recent turbulent times, etc.

The recent macro-economic indicator that has gotten a lot of attention recently has been the 10-Year Treasury Rate. The 10-Year treasury rate is the return that investors can expect through the ownership of government debt for 10 years. This is an important metric used in banking, equity research, trading, etc. From the initial Pearson correlation coefficient of 0.89 present within table I-1, the 10Y treasury yield is highly correlated to SOFR.

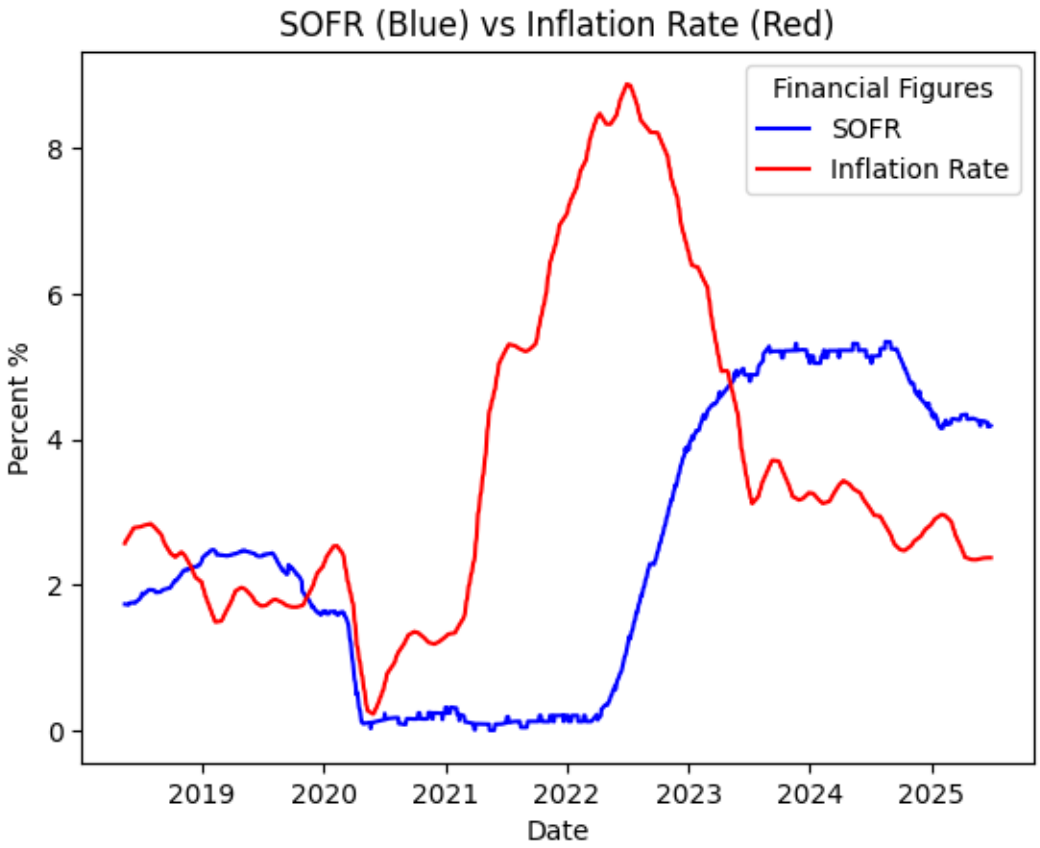
The Fed Funds Rate is another important metric that is the interest rate set by the Federal Reserve. This rate represents the overnight lending between banks (very similar to SOFR). The Fed Funds Rate is important as when it is higher than borrowing it is more expensive, and it slows economic growth and vice versa is true. Based on table I-1, the Pearson correlation coefficient between SOFR and the Fed Funds Rate stands at 0.98. The fed funds rate is obviously highly correlated, but there is a slight gap which leaves room for arbitrage and possible profit!

Inflation rate is one of the most widely known macroeconomic indicators which measure the percentage increase of average goods and services over time. This figure is important as high inflation reduces purchasing power and low/negative inflation shows a possible recession. From the Pearson correlation coefficient in table I-1, SOFR and inflation rate are correlated at a value of -0.07. This correlation between the inflation rate and SOFR shows very little negative correlation. Again, with this information, financial professionals could gain further conviction in their financial analysis. We will analyze how these macroeconomic indicators have shifted and changed their relationships through graphs later in this paper.

Figure: I-1 Heatmap Between Macro-Economic Indicators

As mentioned before, inflation rate measures the percentage increase of goods and services over time. From a simple conceptual standpoint, if SOFR is reaching higher and money is harder to loan out, inflation rate should always inverse SOFR, right? As is seen within Figure I-2, SOFR and inflation rate have shared spreads as small as 0.01 of a percent but have also shared periods like the ones in 2022 with a spread of 7%+. The relatively easy to understand relationship between SOFR and inflation rate appeared to go through small changes/shifts until early 2020. The extremely low SOFR and high inflation rate from 2020 to 2022 can be attributed to the Covid-19 pandemic. The Covid-19 pandemic led to a more dovish fed policy that wanted to stop an economic crash by any means necessary, and this means extremely low interest rates to motivate consumer spending, but inflation takes a hard hit when such policies are implemented. As Early 2023 was approach, SOFR and the inflation rate hit an inverse and SOFR became higher as inflation started to decline below it. This change between SOFR and inflation rate can be attributed to Jerome Powell and the Federal Reserve's recent policies that include not or barely reducing interest rates to reduce inflation.

Figure: I-2 Line plot Between Inflation Rate and SOFR



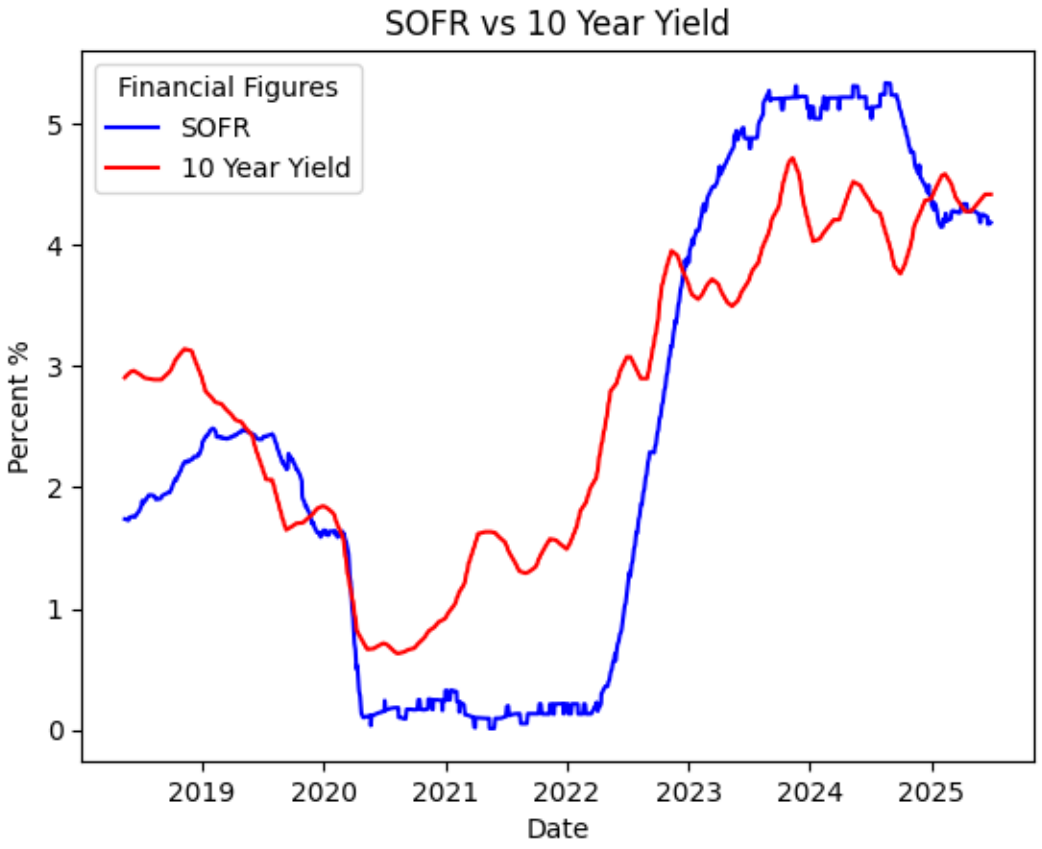
While the line plot between SOFR and Inflation Rate is interesting to analyze, what are some good trading ideas that would have taken advantage of this macro-economic scenario and its inefficiency?

- Early 2020 to Early 2022:
    - Inflation Rose greatly in this period while SOFR remained flat, these would be the best traded to have entered to take advantage of this scenario:
        - Commodities like gold, silver and oil: commodities are often known as “safe assets”, but in this scenario if a individual wanted to preserve their wealth, they could have bought commodities that would have rose in value as the buying power of the dollar decreased.
        - Real Estate Rentals: With record low SOFR, debt was extremely cheap. With extremely cheap debt comes a greater opportunity to leverage your capital and get mortgages at a lower interest rate and rent out the property to both gain value through a increasing market price for the home, and the increased rent you could charge.
- Early 2022 Onwards:
    - Inflation declined steeply while SOFR increased and remained stable. The best trade idea in this scenario would be:

- Variable interest credit lending: A giant pool of individuals was lining up debt in early 2022 due to how cheap debt was. If variable interest was agreed to, the sharp spike in SOFR would lead to at least a 5% additional interest rate increate Year over Year (YoY).

As mentioned before, the 10-Year treasury rate is the return that investors can expect through the ownership of government debt for 10 years. The 10Y yield has gone through multiple changes in inverse relationship relative to SOFR. The gap between these two values shows a much tighter spread than SOFR versus Inflation Rate. The most interesting periods are between 2020 and 2022, then 2022 onwards. From the beginning of 2020, SOFR remained low, (as was explained in SOFR versus Inflation Rate), but the 10Y continued to increase, and this relationship flipped in 2023. In the middle of 2024, the 10Y also caught ahead of SOFR, and this can be attributed to the current U.S administration and the riskier decisions made that have made holding U.S debt seem more riskier to most investors. Overall, this relationship is very interesting as it changes more often and allows for more rapid trade ideas which could be described below.

Figure: I-3 Line plot Between 10Y Yield and SOFR

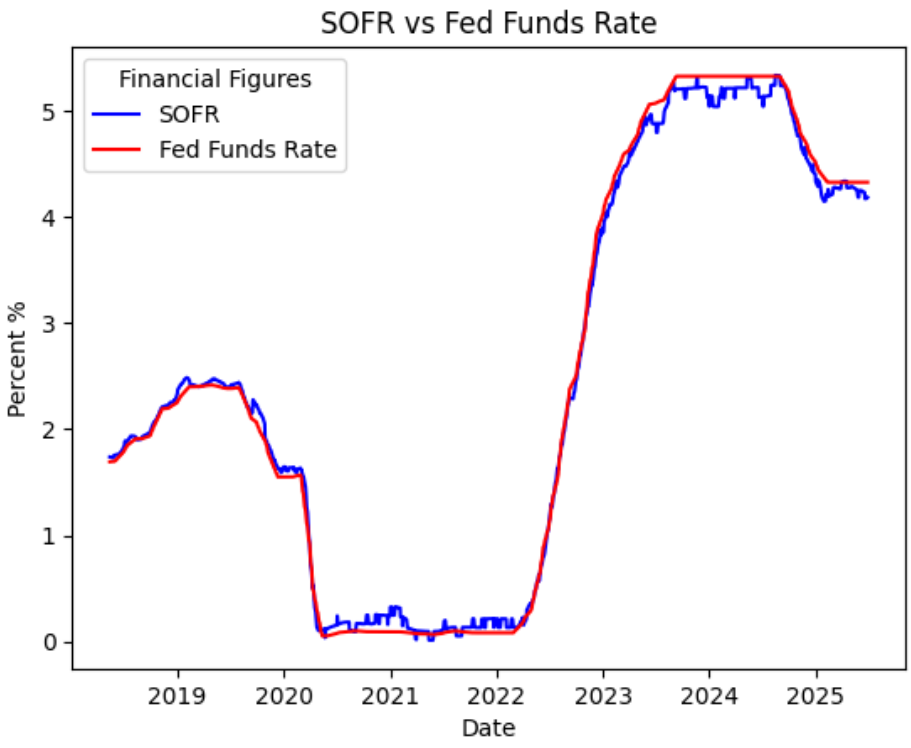


While the line plot between SOFR and 10Y is interesting to analyze, what are some good trading ideas that would have taken advantage of this macro-economic scenario and its inefficiency?

- Early 2020 to Early 2022:
    - SOFR remained low due to Federal Reserve policy during the Covid-19 pandemic and the 10Y yield slowly increased. The best trade in this scenario would be:
        - Taking out debt and purchasing the 10Y yield. If interest rate on debt is based on SOFR and the rate is close to 0, anyone can go out and buy the treasury debt can get a 1-3% return, it is essentially free money, but this does not consider the skyrocketing inflation we have seen before so this yield would have been eaten into. Nevertheless, positive trade could have been performed based on this percentage gap.

As previously stated, the Fed Funds Rate represents the overnight lending between banks (very similar to SOFR). The Fed Funds Rate is important as when it is higher than borrowing it is more expensive, and it slows economic growth and vice versa is true. In the chart below we almost see no deviation between the SOFR and the Fed Funds Rate. The fact that the macroeconomic indicators are so tightly bound together is important, confirming the similarity initially described before. The main deviations between Fed Funds Rate is between the 2020 to 2022 timeframe and 2023 onward timeframe as the Fed Funds Rate goes from struggling SOFR to leading it. Since the Fed Funds Rate is so tightly bound to SOFR, any arbitrage would yield profit that is not worth the effort for investors. Nevertheless, it is important to confirm our hypothesis and gain insight into how the economy truly works.

Figure: I-4 Line plot Between Fed Funds Rate and SOFR



Who Will Benefit from This and What Is The Purpose?

From the research analysis that was presented in this paper, there are many profitable strategies that can be developed from arbitrage between macro-economic figures. Such trade ideas could range from buying commodities like silver to buying real estate in your local area. All these trading ideas are important as it allows individual investors, pension managers and many other people interested in the financial market to gain an edge within the currently turbulent economy. This not only helps individuals who want to make a gain from the financial markets but also educates students and economists on expected versus real differentiations between economic figures. All in all, understanding the economics behind the news report we see every day is important, and with this, more and more individuals can learn about our complex economy (and maybe even make some money).