Historical study of the relationship between the federal funds rate and the inflation rate

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Abstract
It is believed that in order to control high inflation rates, the Federal Reserve Bank (“the Fed”) increases the federal funds rate and when the inflation rate gets low, the Fed takes the opposite approach. (The federal funds rate is a rate of interest that banks charge each other to lend funds and stay above the reserve requirement, set by the government.) This project examines the relationship between the federal funds rate and the inflation rate. Sixty-five years of historical inflation rates and federal funds rates were used as the basis for this exploration. Because a time lag between the setting of the federal funds rate and its impact on the economy may exist, recurrence quantification analysis was used in the time series analysis. The results provide insight into the relationship between the federal funds rate and inflation and test the impact of using the federal funds rate as an anti-inflationary tool.

Disciplines
Mathematics | Statistics and Probability

Comments
Historical Study Between the Federal Funds Rate and Inflation
Aaron Wilkins, St. John Fisher College

Introduction / Abstract
It is believed that in order to control high inflation rates, the Federal Reserve Bank ("the Fed") increases the federal funds rate and when the inflation rate gets low, the Fed takes the opposite approach. (The federal funds rate is a rate of interest that banks charge each other to lend funds and stay above the reserve requirement, set by the government.) This project examines the relationship between the federal funds rate and the inflation rate. 65 years of historical inflation rates and federal funds rates were used as the basis for this exploration. Because a time lag between the setting of federal funds rate and its impact on the economy may exist, recurrence quantification analysis was used in the time series analysis. The results provide insight into the relationship between the federal funds rate and inflation and test the impact of using the federal funds rate as an anti-inflationary tool.

Economic Theory and Background
In economics the theory is that the Federal Reserve uses the federal reserve rate as a tool to impact inflation [4]. Inflation is bad when it gets too high and the federal government has different tactics to attempt to control inflation to a level that is sustainable. One such way the federal reserve attempts to control inflation is by purchasing or selling securities to banks to impact the amount that banks are holding. The more money the banks have over the reserve requirement (the minimum amount of cash that banks have to always hold to avoid bankruptcy), the more money they can lend out. If more money is lent this has an impact of encouraging spending and increases the inflation rate. On the other hand, the Federal Reserve can buy back securities from the banks which leads the banks to hold fewer assets than before which in turn raises the federal funds rate. This increase in the federal funds rate restricts the available money supply which discourages giving out loans and decreases inflation.

Data Sources
These data come published from two websites that had the historical information for inflation and the federal funds rate available and are listed in the reference section. [1] [2]

Main points
Time Lag Between Inflation and The Federal Funds Rate

Discussion
• The two graphs below seem to indicate the federal funds rate and the inflation rate have some sort of relationship but the recurrence quantification analysis (RQA) shows the correlation is weaker than it appears visually. The RQA does not seem to show either of the two variables having a significant impact with regards to the other. There are small segments in the RQA plot that show one variable driving the other but those instances are limited and not abundant.
• Could other open market operations (Federal Reserves tools used to impact the amount of assets a bank holds) be the link to inflation?
• Since the direct impact of the Federal Reserve is to increase or decrease the amount of assets in the banks, is the ripple effect on the inflation rate so small that it is not impactful?
• Research could be completed to look at the Federal Reserve and a time lag with the stock market to inquire about impact on one another using RQA

References
1. Federal Funds Rate - 62 Year Historical Chart. https://www.macrotrends.net/2015/fed-funds-rate-historical-chart