

The Impact of Federal Reserve Interest Rate on Spot Gold Prices: An Event Study

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Abstract. Gold has become increasingly important as a safe-haven asset since the outbreak of COVID-19, and it is also an important reserve fund for countries. This study uses Excel to process the data of XAUUSD prices from Yahoo Finance from 2015 to 2025 and the events of the Federal Reserve's interest rate decisions. This study analyzes this data to observe the short-term price changes before and after the event day. The study finds that the Federal Reserve interest rate decisions have a significant short-term impact on gold prices. Furthermore, both market expectations and exogenous factors can cause abnormal fluctuations in gold prices. This research indicates investors that they should not adjust their gold allocation merely based on the direction of interest rate hikes or cuts. It is a better choice to decide after comprehensively considering factors such as the trend of the US dollar, inflation data, and market sentiment, and in combination with information on the Federal Reserve's interest rate adjustments.

Keywords: Gold prices, Federal Reserve, Interest Rates, Event Study

1. Introduction

In the international financial market, gold has always been an important asset allocation choice for countries and investors due to its value storage and crisis avoidance functions. As the US dollar is a core international currency, the Federal Reserve can influence the strength of the dollar and the attractiveness of dollar assets by adjusting interest rates. Interest rate adjustments will affect the flow and cost of global capital among different countries and asset classes, exerting a profound impact on the economies and markets of countries around the world.

The question of this study is: will the event of the Federal Reserve raising interest rates depress the price of gold, and will the event of the Federal Reserve cutting interest rates push up the price of gold? This study collected data on gold prices from public sources and events of the Federal Reserve's interest rate decisions and used Excel to process these data to observe the short-term changes in gold prices before and after the events. This is to achieve the research purpose of this thesis.

The theoretical significance of this study lies in that by focusing on the key event day of the Federal Reserve's interest rate meeting, it can more clearly capture the impact of interest rate policy changes on the gold price, providing high-quality evidence for understanding the "interest rate - gold price" relationship. In practical applications, the results of this study can provide precise decision-

making references for investors and risk managers. The results can help them grasp the short-term fluctuation patterns of gold prices after the Federal Reserve announces its interest rate policy, thereby optimizing the selection of trading timing and adjusting the gold asset allocation strategy.

2. Literature review

The interest rate policy of the Federal Reserve is the core of its monetary policy. The mechanism of its influence on the gold price has been the focus of academic research. Most current research generally holds that there is a negative correlation between gold prices and interest rates, and the mechanism is mainly generated through three theories [1].

The first theory is opportunity cost effect; as a special entity, gold is different from ordinary money, and its holding cost is relatively high, which is closely related to the market interest rate [2]. When the Federal Reserve raises interest rates, the yield of US dollar assets rises accordingly, and the opportunity cost for investors to hold gold increases significantly [3]. This will cause funds to flow from the gold market to other more liquid assets, thereby exerting downward pressure on the gold price. Conversely, cutting interest rates reduces the opportunity cost of holding gold and enhances its appeal.

Second, transmission channels of the US dollar exchange rate can also impact the relationship. Due to the Bretton Woods system, the US dollar is currently the pricing currency of gold, and its exchange rate fluctuations show a stable negative correlation with the gold price [4]. The Federal Reserve's interest rate hikes usually attract international capital inflows through the different advantages of interest rates, promoting the appreciation of the US dollar [5]. When the US dollar performs well, it increases the cost for investors using other currencies to purchase gold, thereby suppressing demand and causing the gold price to fall. Therefore, the US dollar exchange rate is a key mediating variable that affects the gold price through current interest rate policies.

Last, risk-averse demand and Inflation expectations can influence the value [6]. Gold is generally regarded as an important safe-haven asset and a store of value in the market. When the Federal Reserve cuts interest rates, it often indicates that there are uncertainties in the current economic landscape or that growth lacks certain momentum. Usually currently, the appeal of risky assets declines. Due to concerns over economic uncertainty and the possibility of market deterioration, investors' risk appetite has declined [7]. To avoid uncertainty, this is bound to drive funds into the gold market currently [8]. In addition, an environment of interest rate cuts is often accompanied by loose monetary conditions and the possibility of rising inflation. Gold can hedge against the decline in the purchasing power of money, so this will also stimulate investment demand for gold [9].

Although existing literature has expounded on the relationship between interest rates and gold prices from different perspectives, most studies have focused on using econometric models (such as VAR and GARCH) to analyze long-term trends and volatility [10]. There is still a lack of systematic observation on the price response within 1-2 or 3-5 days before and after the interest rate decision is announced, especially the impact of the "event day" and its adjacent trading days.

Therefore, this study aims to fill the above gap by adopting the event study method, focusing on the short-term market reactions on the day of the Federal Reserve's interest rate decision announcement and within a total of three trading days before and after it, with the expectation of more clearly and directly revealing the immediate impact of interest rate policy adjustments on the spot gold price.

3. Data and method

This study adopts the event research method, taking the spot gold price (XAU/USD) over 10 years (2015-2025) as the sample to explore the short-term impact of the Federal Reserve's interest rate decision on the gold price. This study defines the announcement date of each interest rate meeting as the event day ($t=0$) and select a window period of two trading days: $[-1, +1]$ and $[-3, +3]$. Firstly, a market model is established based on the estimated period data to calculate the normal yield of gold. Then, the excess return within the event window and the cumulative excess return are calculated. Finally, this study observed and statistically analyzed the direction of changes in the returns of gold prices (upward, downward or stable) during these two event Windows. This study further assesses the extent to which the Federal Reserve's interest rate adjustment activities affect the gold price based on the observation results.

4. Results

This study uses the spot gold price (XAU/USD) from 2015/1/1 to 2025/9/23 as a sample data set and combines the specific content of each Federal Reserve interest rate decision during this period to explore the impact of interest rate policy on the short-term price reaction of the gold market. The sample covers several rounds of interest rate hikes and cuts and experienced complex backgrounds such as the impact of the pandemic and high inflation, making the fluctuations in the gold market better reflect the policy effects. To analyze this relationship, this paper uses the event study method, setting each Federal Reserve policy decision date as the event date ($t = 0$) and calculating the gold price return and cumulative return (CAR) around the event date. In data processing, the yield rate is based on the closing price of the previous trading day, and the change is expressed in percentage form.

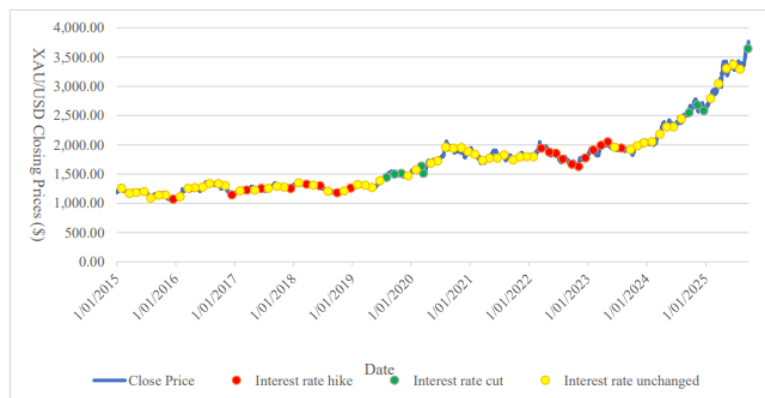


Figure 1. XAU/USD closing prices federal reserve interest rate event (2015/1/1 -2025/9/23)

Data Source: Yahoo Finance

Figure 1 collects the daily closing prices of gold from January 1, 2015, to September 23, 2025, and plots a line chart with time as the X-axis and closing prices as the Y-axis. The three cases of interest rate hike/cut and interest rate unchanged on the event date are marked in red/green and yellow on the line. In general, gold prices exhibited a fluctuating upward trend from 2020 to 2025. During the 2020 pandemic, rising global risk aversion drove gold prices rapidly upward. After 2021, due to the interplay of rising inflation expectations and the Fed's interest rate hike expectations, gold prices experienced a period of correction. During the period of consecutive rate hikes from 2022 to

2023, gold prices declined somewhat but overall remained at a relatively high level. Overall, gold's long-term performance reflects its value as a haven during times of economic uncertainty.

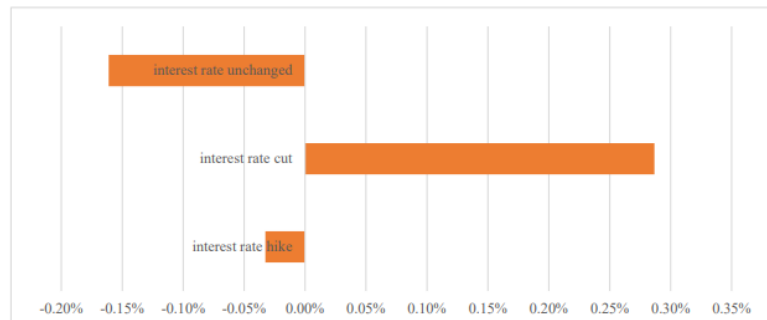


Figure 2. The average changes in gold price fluctuations of three federal reserve events

Data Source: Yahoo Finance

Figure 2 shows the average returns for the three types of events: interest rate hike, interest rate cut and unchanged interest rate on the event day ($t = 0$). The results show that, for all interest rate hike events, the gold price fell an average of 0.03% on the decision day, with a standard deviation of 0.010166. When the Federal Reserve cut interest rate, the gold price rose an average of 0.29%. When the Federal Reserve maintained interest rate unchanged, the gold price change was smaller, averaging -0.16%. Looking at the situation on each event day, gold price movements exhibit a negative correlation with interest rate decisions. It is consistent with economic expectations. Gold prices generally fell during interest rate hikes. For example, the gold prices decrease 0.57% on the same day when the Federal Reserve raised interest rates by 0.25 percentage points on June 15, 2017. When the Federal Reserve raised interest rates again in June 2018, the gold price decrease about 0.6%. During the 2022-2023 interest rate hike cycle, the gold prices have short-term pullbacks after several Fed's meetings. These phenomena suggest that the attractiveness of non-yielding assets will decrease when interest rates rise and the demand for gold will be suppressed accordingly. In contrast, gold prices often rise during the periods of rate cut. For instance, the gold prices increased 2.23% when the Federal Reserve cut 0.25% interest rate on August 1, 2019. Subsequently, the gold prices continued to increase after another 0.25% rate cut.

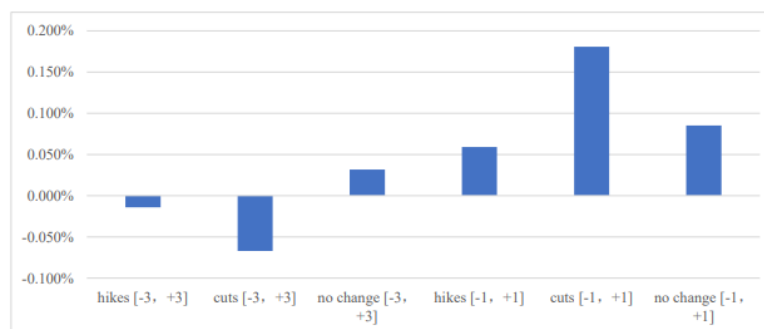


Figure 3. The average Cumulative Rate of Return (CAR) for short and long-term event analysis

Data Source: Yahoo Finance

To further analyze the sustainability of the impact of monetary policy, this research calculates the cumulative rate of return (CAR) over multiple time windows before and after the event date. The results are shown in Figure 3. The average CAR for the short-term window $[-1, +1]$ shows that gold

prices average increase 0.059% during rate hikes and increase 0.181% during rate cuts. The average CAR for the long-term window [-3, +3] shows that gold prices average decrease 0.014% during rate hikes and decrease 0.067% during rate cuts. This phenomenon suggests that the market reaction to the Fed's decision is not limited to the day itself but is gradually digested by investors over the days surrounding it. Figure 3 shows a bar chart comparison of the average CAR for the three events, which clearly shows that the short-term window effect is strong while the long-term window effect is weakened. This is caused by the effectiveness of the market and the rapid digestion of information. Financial markets are highly efficient, especially in their responses to major and clear events such as central bank policies. Prices will discount new information at an extremely fast speed. The short-term window [-1, +1] will be subject to the pure impact of the event. The long-term window [-3, +3] has the introduction of noise and the reconstruction of expectations, which digests part of the impact brought by the event, so the impact brought by the event will also be quickly corrected.

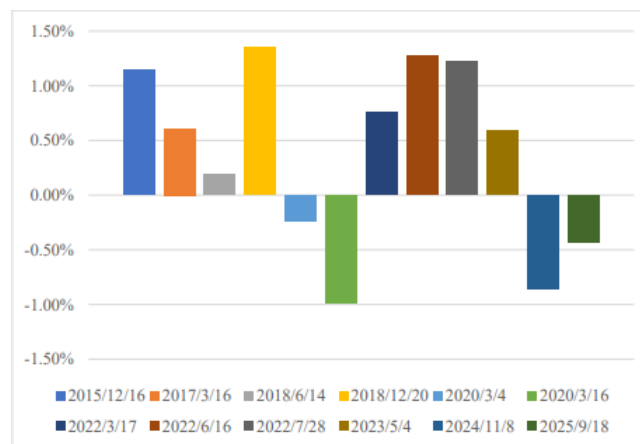


Figure 4. Abnormal phenomenon in gold prices on the federal reserve event day

Data Source: Yahoo Finance

In addition to the overall trend, this article also analyzes several representative anomalies separately. However, some of these results contradict conventional theory. In Figure 4, this study lists the abnormal phenomenon event days where the gold price on the event day is positively correlated with the Federal Reserve interest rate in chronological order. For example, on May 4, 2023, the Federal Reserve announced a 0.25 percentage point interest rate hike, but gold prices rose by 0.59%. Similarly, on November 8, 2023, despite the Fed's small 0.25 percentage point rate cut, gold prices fell by 0.86%. These inverse reactions suggest that short-term fluctuations in the gold market are not entirely driven by interest rate changes but are more likely influenced by market expectations and external sentiment.

On the one hand, the market often reacts before policy announcements. If investors widely anticipate an interest rate hike, a "buy the expectation, sell the reality" effect may occur when the hike is officially announced. On the other hand, the single effect of monetary policy may be altered or covered in the short term by exogenous factors such as geopolitical risk, inflation risk, or stock market fluctuations. These exogenous factors can directly affect capital flows in the short term.

It is particularly noting that gold prices sometimes still experienced significant fluctuations when interest rates remained unchanged. For example, the Fed remained interest rates unchanged on November 3, 2022. According to the negative correlation between gold prices and interest rates, the gold price should increase, but it decreased about 0.19% on that day. These phenomena suggest that

investors' interpretation of future policy trends is more influential to market behavior than the single interest rate adjustment itself. Although the interest rates remain unchanged, the Federal Reserve's wording and forward guidance will still alter market sentiment and indirectly change the gold prices.

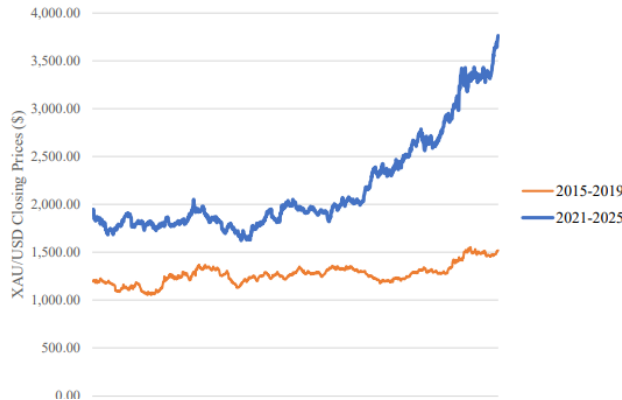


Figure 5. XAU/USD closing price comparison (pre-pandemic vs post-pandemic)

Data Source: Yahoo Finance

To validate the effectiveness of the obtained results, this research also conducted a robustness test, and the comparison results are shown in Figure 5. This robustness test plots two line on the same vertical axis based on the XAU/USD closing prices between the pre-pandemic (2015-2019) and the post-pandemic (2021-2025). According to Figure 5, the market reaction after the pandemic period is more obvious, possibly related to increased uncertainty about global inflationary pressures and monetary policy expectations. In conclusion, the results of this study are generally robust and can support a significant negative correlation between interest rate changes and gold prices.

Although most events results are consistent with the theory that interest rates are negatively correlated with gold prices, but there are still some deviations. The existence of these deviations suggests that the impact of monetary policy on gold prices depends not only on the direction and magnitude of interest rates themselves, but also on the combined effects of market expectations, economic sentiment, and external uncertainty. The overall results provide an empirical basis for the subsequent discussion and show that the event study approach can reveal the short-term dynamics characteristics of policy impacts.

5. Discussion

Interest rate hikes tend to depress gold prices, while rate cuts drive them up. This phenomenon aligns with the economy theory of opportunity cost: When interest rates rise, the opportunity cost of holding gold increases, prompting investors to choose income-generating assets such as bonds. In other words, rate hikes will reduce the demand for gold, which will lead to a fall in gold prices. Conversely, rates cut will reduce the yields of other assets, making gold more attractive.

In addition to the opportunity cost effect, changes in the US dollar exchange rate are also an important transmission conduit. The Fed's rate hikes typically lead to a stronger dollar, and since gold is priced in dollars, a stronger dollar tends to depress gold prices. The regression analysis of this study after controlling for the US dollar index further confirms this point. This research indicates that the dollar is a key intermediary factor between Federal Reserve's interest rate policy and gold prices. At the same time, market expectations and risk sentiment also influence the gold prices. If the market expects an interest rate hike to occur, the actual reaction to the announcement

may be small. However, the market will react more negatively if the policy exceeds expectations or the wording is hawkish. In addition, purchasing gold will be chosen as a haven for investors in situations of geopolitical risk, financial stress and weaker dollar. It explains the existence of the unusual phenomenon that rising interest rate cause an increase in gold prices.

The comparison with existing literature also supports the validity of the results. Most scholars believe that gold prices and interest rates are negatively correlated, and this paper reaches a similar conclusion within the framework of short-term event analysis. This paper also finds that the positive effects of interest rate cuts are slightly stronger than the negative effect of interest rate hikes. It suggests that the market is more sensitive to monetary policy, which may be related to the gold's safe-haven properties. Compared with previous studies on long-term volatility, this paper pays more attention to the immediate reactions within the 1 to 3-day event window.

6. Conclusion

This research clearly demonstrates that the Fed's interest rate decisions have a significant impact on short-term fluctuations in gold prices. The market expectations and exogenous factors can also cause abnormal fluctuations in gold prices. This study provides intuitive evidence for understanding the short-term spillover effects of monetary policy. The results indicate that as market concerns about inflation and economic risks intensify, the demand for gold as a safe-haven asset will be further strengthen amid monetary easing. This aligns with the theoretical foundation of the traditional monetary policy transmission mechanism. Of course, this research has certain limitations: 1) The sample size is limited, and it fails to precisely distinguish between expected and unexpected decisions. 2) This research does not further examine the role of long-term effects and inflation expectations. About future research, market expectations can be quantified by incorporating data from interest rate futures or overnight index swaps (OIS). Using high-frequency data to observe the market's immediate reaction on the day of the Fed's rate decision should also be an effective analytical method. In theory, these ways can reveal the mechanism of interest rate policy on the gold market more comprehensively.

From a practical standpoint, this study indicates that the gold market will experience significant short-term fluctuations before and after the Fed's interest rate decisions. Investors should conduct comprehensive analysis by considering factors such as the performance of dollar, inflation data and market sentiment, rather than making simplistic decisions based on the direction of interest rate hikes or cuts. For policymakers, changes in gold prices are an important market signal, which can reflect the market reactions to policy expectations, while also reminds that monetary policy has a cross-market transmission effect.

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