Available Online: 20 October 2026 DOI: 10.54254/3049-5768/2026.37834

Testing Bitcoin's deviation from gold's safe-haven effect

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Abstract. This study is based on the event study analysis method with the use of gold as safe haven asset. The observation period is from 2019 to 2026. Five representative global crisis events were chosen during this time. The primary objective is to test the hypothesis whether there was a statistically significant deviation in the return of Bitcoin on gold. The events chosen include public health emergencies, geopolitical tensions, monetary policy hike, and systemic financial risks. To this end, this paper created the daily log return difference of Bitcoin and gold. This study computed abnormal return differences and their cumulations in different event windows using this index. To provide greater robustness to the conclusions, this study performed additional robustness checks where the length of the estimation window was varied as well as the length of the event window. All five crisis events had Cumulative Abnormal Differences (CADiff) p-values > 0.05 in the preset observation window of [-15, 15] days. Therefore, the null hypothesis cannot be rejected and it can be concluded that there was no significant difference between the performance of Bitcoin and gold in crisis. However, the positive excess returns of Bitcoin were not statistically significant during geopolitical and banking risk events. The results were robust (when alternative lengths of windows were used). This study introduces a new empirical evidence for the "digital gold" hypothesis and successfully bridges the data gap on crisis periods since 2023. It is worth noting however that the price volatility of Bitcoin is approximately 5-6 times as high as that of gold and an investor should hence assess and reasonably control allocation if using it as a crisis hedge.

Keywords: Bitcoin, gold, safe-haven attribute, event study methodology, cumulative abnormal return difference

1. Introduction

Global financial crisis 2008 took place. Centralized finance were then rethought. This is where Bitcoin came into existence as a new electronic cash system. In particular, Satoshi Nakamoto's white paper describes a vision in particular. This is a "trustless electronic transaction system" that by design allows peer-to-peer transfers of value. The mechanism that validates is called cryptographic proof. Not based on the credit extended by any central authority. Based on blockchain technology, Bitcoin is characterized by a fixed total supply, decentralization, anonymity, and global circulation [1]. These characteristics have led some market participants to dub it "digital gold", believing it can serve as a store of value and a safe-haven asset during periods of heightened economic uncertainty. Wang Qian and Du Zhuoya point out that, like gold, Bitcoin

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possesses scarcity, durability, and global reach; at the same time, because it is issued on the blockchain, it offers advantages over gold that are unmatched in terms of convenience, divisibility, and traceability [2].

However, there has long been a profound divide on this issue between academia and the professional community. Smales points out that Bitcoin is more volatile, less liquid, and has higher transaction costs than traditional safe-haven assets (such as gold); therefore, "Bitcoin should not currently be included in discussions of safe-haven assets" [3]. Rashid et al. using a Markov regime-switching regression model, further found that Bitcoin behaves significantly differently from the USD/EUR exchange rate and gold; at best, it can serve as a diversification or hedging tool, but not as a true safe-haven asset [4]. Research by Gökgöz et al. also indicates that while gold, foreign exchange, and their stablecoin counterparts can all serve as risk diversification tools for Bitcoin, Bitcoin's weight in a portfolio is more stable only when combined with gold and major fiat currencies, indirectly reflecting Bitcoin's inherent volatility [5].

In recent years in particular, as major global crises have occurred with increasing frequency, Bitcoin's price behavior has exhibited a complex and contradictory pattern. Raheem's study indicates that while Bitcoin was still able to maintain its recognized safe-haven characteristics prior to the COVID-19 pandemic, its safe-haven function essentially disappeared after the outbreak [6]. Diniz-Maganini et al., using intraday data, further found that although Bitcoin's price efficiency exceeds that of the U.S. dollar and the MSCI World Index, gold's safe-haven attributes remain stronger than those of Bitcoin [7]. Regarding the response to geopolitical risks, Mo et al. point out that traditional safe-haven assets (gold, the U.S. dollar, and oil) provide a stronger and more stable hedging effect than cryptocurrencies such as Bitcoin [8].

In terms of establishing a theoretical framework, the classic study by Baur and McDermott on gold's safe-haven properties laid the groundwork for the analysis, finding that gold is a strong safe-haven asset for major European stock markets and the United States [9]. Shahzad et al. further confirmed through their study of G7 stock markets that gold is an undisputed safe-haven asset and hedging tool for multiple G7 stock indices, with its hedging effectiveness far surpassing that of Bitcoin [10]. However, although gold's safe-haven status has been widely validated, Liu Gang et al. using event study methods, found that both positive and negative news cause Bitcoin prices to fluctuate sharply before and after events, indicating that the Bitcoin market is subject to significant policy risk [11]. Selmi et al. also pointed out from a geopolitical perspective that Bitcoin's hedging properties as 'digital gold' are not stable under major geopolitical shocks, and its performance differs significantly from that of traditional gold [12].

Rodrigues et al. found that using the GARCH, EGARCH and GJR-GARCH models, the Geopolitical Activity Index (GPAs) has a significant positive impact on Bitcoin returns, while the S&P 500 index and VIX index have a negative effect, and Bitcoin returns show a stronger asymmetric reaction to negative shocks [13]. Teruel-Gutiérrez et al. further noted that market pressures can be categorised into two types: valuation-driven and uncertainty-driven. Bitcoin exhibits "pressure selectivity"—decoupling from stocks under valuation-driven pressures but showing cyclical convergence when uncertainty dominates; whereas gold consistently retains its shock-absorbing characteristics [14]. Thuy et al. compared three periods—the Global Financial Crisis, the COVID-19 pandemic, and the Russia-Ukraine conflict—and found that gold's role as a safe-haven asset varied significantly across these crises. Bitcoin failed to function as a safe-haven asset during the pandemic but became a strong safe-haven asset for some European stock markets during the Russia-Ukraine conflict [15]. Ankam and Pattanayak also confirmed that cryptocurrencies and traditional safe-haven assets (gold, the U.S. Dollar Index) exhibit heterogeneous hedging and safe-haven characteristics under different sources of uncertainty [16].

The existing literature review shows that current research still has significant room for improvement in the following areas: First, research samples mainly come from data before 2020, failing to adequately examine the

impact of major recent events such as the collapse of Silicon Valley Bank and the escalation of the Middle East conflict; second, existing studies primarily use time series models (such as GARCH, VAR-BEKK-GARCH, etc.) to analyse long-term relationships, while event studies that systematically compare the performance differences between Bitcoin and gold during short-term crises are rarely used; third, studies that directly compare gold and Bitcoin within the same event window are extremely scarce, especially those using gold as a benchmark to test whether Bitcoin deviates from its hedging function, which are almost non-existent.

This study has two points of interest. In times of great crisis, does Bitcoin exhibit safe haven characteristics like gold? Do these properties have sustainability? In order to answer this primary question, empirical strategy adopted was event study methodology. The sample includes 5 major events of crisis in the world in the period between 2019 and 2026. In this context, gold is included as the safe haven benchmark. It additionally developed a particular indicator to measure distinctions in returns for Bitcoin and gold. By systematically comparing abnormal returns during the event windows, this study aims to provide new empirical evidence for the academic debate on "digital gold".

2. Literature review

2.1. A study on gold's safe-haven characteristics

The status of gold as a traditional safe-haven asset has been widely recognised in academia. Due to its intrinsic value, physical durability, and outstanding performance during past financial crises, gold is generally regarded as an effective tool for hedging against uncertainty. Baur and McDermott found that gold is a strong safe-haven asset for major European stock markets and the United States, but does not serve this function for emerging markets such as Australia, Canada, Japan, and the BRICS countries. They also distinguished between the strength of safe-haven characteristics and noted that gold can provide stability to the financial system by mitigating losses during periods of extreme negative market shocks [9]. Shahzad et al. further proved through their study of the G7 stock markets that gold is an undisputed safe-haven asset and a hedge against various G7 stock indices, with a hedging effect far better than Bitcoin, and the diversification benefits from gold are higher and more stable [10].

However, the safe-haven function of gold does not always persist under all market conditions. Thuy et al. compared three periods—the global financial crisis, the COVID-19 pandemic, and the Russia-Ukraine conflict—and found significant differences in gold's role as a safe-haven asset across different crises: during the COVID-19 pandemic, gold lost its safe-haven status; whereas during the Russia-Ukraine conflict, gold regained its safe-haven properties in the markets of the Netherlands, the United States, and Germany [15]. Ankham and Patanayak also found that under stock market uncertainty (VIX, VXEEM, VXEFA), gold and the US dollar index outperform cryptocurrencies [16]. Teruel-Gutiérrez et al. further pointed out that when market panic intensifies, gold always shows resilience and becomes a more reliable safe-haven asset [14]. The above research indicates that the hedging function of gold varies over time and is context-dependent, yet its status as a benchmark hedging asset remains widely recognised.

2.2. A study on Bitcoin's safe-haven characteristics

Since its inception, there has been ongoing debate regarding Bitcoin's status as an asset. Supporters argue that, given its characteristics of scarcity, durability, and global reach, Bitcoin can appropriately be referred to as "digital gold". Research by Wu Tong et al. indicates that Bitcoin exhibits strong safe-haven properties in the short term with respect to the macroeconomy and financial markets; however, its safe-haven function is dynamic and time-varying, and increased speculation may weaken its safe-haven effectiveness. Bitcoin's

ability to serve as a safe haven against different sources of risk is highly similar to that of gold, and in the information age, it may serve as a substitute for gold's safe-haven properties to a certain extent [17].

However, other studies hold the opposite view. Smales points out that Bitcoin exhibits greater volatility, lower liquidity, and higher transaction costs than traditional safe-haven assets, even under normal market conditions; therefore, "Bitcoin should not currently be included in discussions of safe-haven assets" [3]. Rashid et al., using a Markov regime-switching regression model, found that Bitcoin behaves significantly differently from the USD/EUR exchange rate and gold: it is correlated with these variables in a bull market regime but is uncorrelated with any of them in a bear market regime. This contradicts the fundamental attributes of a safe-haven asset, meaning Bitcoin can serve, at most, as a diversification or hedging tool [4]. With respect to the pandemic period, Raheem's study shows that Bitcoin maintained its recognized characteristics prior to COVID-19. After the outbreak, the safe-haven function essentially disappeared. In terms of market conditions, Bitcoin serves as a safe haven only under calm and stable financial circumstances [6].

Mo et al. found that cryptocurrencies (Bitcoin, Ethereum, Litecoin) exhibit relatively weak hedging capabilities in the context of geopolitical risks, whereas traditional safe-haven assets such as gold, the U.S. dollar, and oil demonstrate more consistent and robust hedging characteristics during periods of uncertainty; moreover, the correlation between geopolitical risks and asset prices is more pronounced under extreme market conditions [8]. Rodrigues et al. decomposed geopolitical risk into three dimensions—Geopolitical Actions (GPAs), Risks (GPRs), and Threats (GPTs)—and found that only GPAs had a significant positive impact on Bitcoin returns, and that Bitcoin returns exhibited a significant asymmetric response to negative shocks [13].

2.3. A comparative study of gold and bitcoin

In recent years, there has been a gradual increase in studies directly comparing gold and Bitcoin. Diniz-Maganini et al. used intraday data to find that Bitcoin is more price-efficient than the U.S. dollar and the MSCI World Index, but gold's safe-haven properties are stronger than Bitcoin's—gold can serve as a safe-haven asset when the time horizon exceeds two months, whereas Bitcoin requires more than three months to fulfill this function [7]. Thuy et al. found that Bitcoin failed to serve as a safe-haven asset during the COVID-19 pandemic but became a strong safe-haven asset for the stock markets of the Netherlands, the United Kingdom, Germany, and Russia, as well as a weak safe-haven asset for the Chinese stock market, during the Russia-Ukraine conflict; the U.S. dollar, meanwhile, maintained its role as a stable safe-haven asset throughout the entire crisis period [15].

Wang Qian and Du Zhuoya conducted a comparative analysis using the VAR-BEKK-GARCH model and found that Bitcoin is a high-return, high-risk investment asset suitable for high-net-worth investors; Bitcoin has no mutual impact on the logarithmic returns of various assets but can hedge investment risks in the futures and foreign exchange markets; meanwhile, gold can hedge investment risks in the stock, bond, and futures markets. They pointed out that there are significant differences between the volatility spillover effects of Bitcoin and gold on traditional financial assets [2]. Ming Lei et al. identified nine price bubbles in the Bitcoin market between 2013 and 2021. They noted that prior to 2017, positive Bitcoin-related news was the primary driver of sharp price increases, whereas in the past two years, a surge in safe-haven demand caused by a deteriorating macroeconomic environment has dominated bubble formation; the implementation of regulatory policies can effectively curb abnormal price volatility [18].

Liu Gang et al. employed event study methodology to examine the impact of policy information from China and the United States on Bitcoin price volatility. They found that both positive and negative news

caused Bitcoin prices to fluctuate sharply before and after the events, indicating that the Bitcoin market is subject to significant policy risk and that speculative behavior follows in the wake of policy information [11]. Gökgöz et al. adopting a counterintuitive perspective, examined the safe-haven functions of gold, foreign exchange, and stablecoins relative to Bitcoin. They found that stablecoins pegged to the Japanese yen, British pound, and Swiss franc are the most effective risk-diversification tools, while Bitcoin exhibits more stable weightings when combined with gold, the euro, the British pound, the Swiss franc, and the Japanese yen, making it suitable for long-term investment strategies [5].

Research by Teruel-Gutiérrez et al. revealed Bitcoin's "stress-selective" behavior: under valuation-driven market pressures, Bitcoin exhibits limited correlation with the stock market; however, when uncertainty dominates market pressures, the correlation between Bitcoin and stocks rises sharply, reaching its peak during systemic events. Rolling beta analysis shows that Bitcoin exhibits significant right-tail risk exposure under uncertainty-driven conditions, whereas gold remains relatively insulated [14]. Ankam and Pattanayak further point out that neither cryptocurrencies nor traditional safe-haven assets (gold, the U.S. Dollar Index) exhibit consistent hedging and safe-haven properties across different uncertainty indices, and that these properties depend on market conditions and investment scale [16].

In summary, the existing literature still has room for improvement in the following areas: First, research samples are mostly drawn from before 2020, failing to fully examine the impact of major recent events such as the collapse of Silicon Valley Bank and the escalation of conflicts in the Middle East; second, existing studies primarily use time-series models to analyze long-term relationships, with few employing event studies to compare the performance differences between gold and Bitcoin during short-term crisis events; third, studies directly comparing gold and Bitcoin within the same event window are extremely scarce. This paper aims to address these gaps by employing event studies to systematically compare the abnormal returns of gold and Bitcoin during five major crisis events, thereby providing new empirical evidence for the "digital gold" debate.

3. Methodology and data

3.1. Event-study model design

This paper employs the event study method to analyze the impact of major crisis events on the price behavior of Bitcoin relative to gold. The basic logic of the event study method is as follows: if the market is efficient, the impact of an event will be quickly reflected in asset prices, and the extent of that impact can be measured by calculating abnormal returns within the event window.

Unlike previous studies, this paper uses gold as a safe-haven benchmark and constructs an indicator of the yield spread between Bitcoin and gold (Equation (1)):

$$Diff_t = R_{BTC,t} - R_{Gold,t} \tag{1}$$

In this context, $R_{BTC,t}$ and $R_{Gold,t}$ represent the logarithmic returns of Bitcoin and gold, respectively, on day t.

Drawing on the research by Liu Gang et al., this paper uses a mean-adjusted model to estimate the normal difference [11]. The normal difference is the mean of the differences within the estimation window (Equation (2)), and the abnormal difference within the event window is calculated as the actual difference minus the normal difference (Equation (3)). Cumulative Abnormal Differences (Equation (4)) are then computed accordingly:

Normal Differences (Equation (2)):

$$E(Diff) = \frac{1}{k} \sum_{t=T_0+1}^{t_1} Diff_t \tag{2}$$

Anomaly Differences (Equation (3)).:

$$ADiff_t = Diff_t - E(Diff) \tag{3}$$

Cumulative Abnormal Differences (Equation (4)):

$$CADiff(t_1, t_2) = \sum_{t=t_1}^{t_2} ADiff_t \tag{4}$$

To test whether the difference is significantly different from zero, this paper employs a t-test, with the null hypothesis being $ADiff = 0$. If $p < 0.05$, the null hypothesis is rejected, indicating a significant difference between Bitcoin and gold; if $p \geq 0.05$, the null hypothesis is not rejected, indicating no significant difference between Bitcoin and gold.

3.2. Event selection and window definition

This article provides a clear and well-structured analysis of five significant global crises that occurred between 2019 and 2026, categorising them into three types: health crises, geopolitical crises, and financial risks. The health crisis was the outbreak of the COVID-19 pandemic (on March 11, 2020, the World Health Organization officially declared it a global pandemic). Geopolitical events included the escalation of the Russia-Ukraine conflict (February 24, 2022, when Russia launched a "special military operation" against Ukraine) and the escalation of the Middle East conflict (October 9, 2023, when the Israel-Palestine conflict escalated; since October 7 was a weekend and not a trading day, the date was counted as the next trading day). The monetary policy event was the Federal Reserve's first interest rate hike (March 17, 2022, when the Fed began its rate-hiking cycle). The financial risk event was the collapse of Silicon Valley Bank (March 13, 2023; since March 10 fell on a Friday, the date was adjusted to the next trading day).

Following the parameter settings in Liu Gang et al., this paper defines the estimation window as the 100 trading days prior to the event date through the 6 trading days prior ([-100,-6]), and the event window as the 5 trading days prior to the event date through the 5 trading days following it ([-5,5]) [11]. Additionally, to test the robustness of the results, this paper conducts robustness tests by varying the event window lengths to [-3,3] and [-10,10], and the estimation window lengths to [-120,-11] and [-80,-6].

3.3. Data source and descriptive statistics

This paper uses daily price data for Bitcoin and gold, covering the period from January 1, 2019, to March 15, 2026. Both Bitcoin and gold price data are sourced from the Investing.com website; the gold price data is based on the London spot gold price (USD/oz).

Figure 1 shows the price trends of gold (left axis) and Bitcoin (right axis) during the sample period (upper half) and the fluctuations in their daily returns (lower half). As can be seen, Bitcoin's price volatility is significantly greater than that of gold, exhibiting the typical characteristics of a high-risk asset.

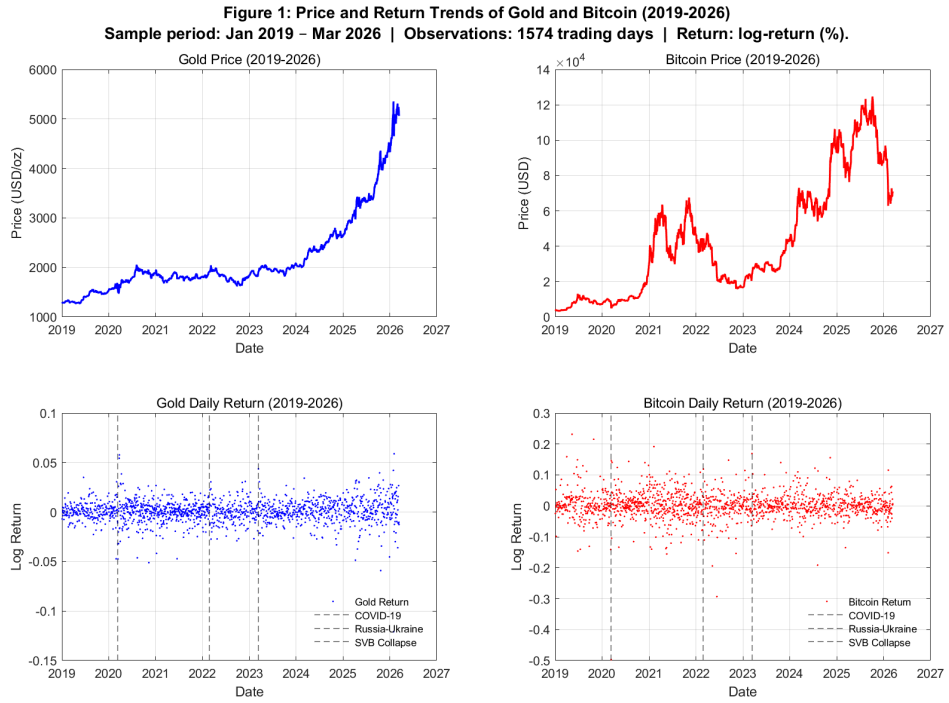


Figure 1. Price and yield trend chart (A) Price trends of gold and Bitcoin from January 2019 to March 2026. (B) Daily log returns of gold and Bitcoin over the same period

Note: Picture credit: Original

3.4. Empirical results

Table 1. Results of significance tests for cumulative anomaly differences (CADiff) across events

Event	CADiff	*t*-value	*p*-value	Is it significant
The Outbreak of the COVID-19 Pandemic	-0.3510	-0.6162	0.5424	Not significant
Escalation of the Russia-Ukraine Conflict	0.1038	0.3277	0.7454	Not significant
The Federal Reserve Raises Interest Rates for the First Time	0.0195	0.0627	0.9504	Not significant
The Collapse of Silicon Valley Bank	0.2349	0.9768	0.3365	Not significant
Escalation of the Conflict in the Middle East	0.2689	1.6617	0.1070	Not significant

Note: $CADiff$ represents the cumulative abnormal difference within the event window [-15, 15]. The null hypothesis is that ADiff = 0 (i.e., Bitcoin and gold move in tandem).

As shown in Table 1, the *p*-values for all five crisis events are greater than 0.05. At the 95% confidence level, there is insufficient evidence to reject the null hypothesis that "Bitcoin's price movements are consistent with those of gold". Bitcoin's performance during the chosen timeframe has not been so much different from well-established safer haven patterns in the case of gold. The *p*-value for the Middle East conflict event is

0.1070. This is fairly close to the traditional 10% significance level. The CADiff has a value of 0.2689. In these specific conditions, Bitcoin displays a very small positive excess return during geopolitical conflicts as compared to gold. However, this observed outperformance remains statistically insignificant. Furthermore, considering the sustained increase following the Silicon Valley Bank incident, Bitcoin's relative performance during financial risk events is also very favourable.

Overall, the results in Table 1 indicate that, within the [-15, 15] window surrounding the five crisis events, the difference between Bitcoin and gold was not statistically significant in any case, supporting the conclusion that Bitcoin and gold move in tandem.

4. Conclusion

This paper uses gold as a safe-haven benchmark and applies the event study method to check whether the return differences of Bitcoin relative to gold significantly deviate from zero during five major global crises from 2019 to 2026.

The study reached the following main conclusions. Firstly, within the [-15, 15] event window for all five crisis events, the Cumulative Abnormal Difference ($CADiff$) of Bitcoin relative to gold did not pass the 5% significance test in any case. The $CADiff$ resulting from the COVID-19 pandemic was -0.3510, with a *p*-value of 0.5424; the $CADiff$ due to the Russia-Ukraine conflict was 0.1038, with a *p*-value of 0.7454; the $CADiff$ following the Federal Reserve's first interest rate hike was 0.0195, with a *p*-value of 0.9504; the $CADiff$ caused by the collapse of Silicon Valley Bank was 0.2349, with a *p*-value of 0.3365; the $CADiff$ from the Middle East conflict was 0.2689, with a *p*-value of 0.1070. These results indicate that, within the selected event window, there is insufficient statistical evidence to reject the null hypothesis that the price movements of Bitcoin are consistent with those of gold.

Robustness tests were conducted by systematically adjusting the event window lengths to [-3, 3] and [-10, 10], while also adjusting the estimation windows to [-120, -11] and [-80, -6]. The results obtained from these adjustments were fully consistent with the main findings. The difference is not yet statistically significant. This is true for all the settings tested. Irrespective of the event window chosen, the stability of the empirical conclusions is supported. Random selection does not affect the influence.Bitcoin's reactions to different types of crises are heterogeneous. This can be seen by the Cumulative Abnormal Difference ($CADiff$) trajectory. Take into account financial risk events such as Silicon Valley Bank or Middle Eastern geopolitical conflicts. In these cases the $CADiff$ curve is upward trending following the event day. This thus has a positive cumulative impact on the relative performance of Bitcoin. There is a significant drop at the beginning of the COVID-19 pandemic. This is followed by a gradual recovery. $CADiff$ trades near the zero line in as far as the Russia-Ukraine conflict situation and the Fed's first rate hike. The relative strength of Bitcoin will be determined by the type of shock. Its overall trend is still in line with the safe haven trend exhibited by gold. The present research has several points to add to the literature. A relative return difference indicator is built, using gold as a benchmark. That is a direct test of the digital gold hypothesis. A new analytical framework is thus presented for analysing Bitcoin's asset attributes. Empirical scopewise, the sample period is till 2025. The recent big events are of course covered: Silicon Valley bank collapse, escalating Middle Eastern conflicts, and so on. The analysis consequently has a much improved timeliness. Theoretically speaking, they offer positive empirical evidence for the digital gold argument. The evidence indicates that Bitcoin did not display any significant outperformance compared to gold during major crises at least within the sample period. The conclusions have implications for investors. In times of general crisis, Bitcoin shows a risk-hedging behavior like gold. This attribute helps to justify the rationale for a moderate allocation. Bitcoin could be considered as a secondary

risk management asset in an investors' portfolio. However, the volatility differential has to be taken into consideration. The volatility of bitcoin's daily return is about five to six times that of gold. So there is a different investment weight, depending on risk tolerance of the individual. That weight is to be adjusted wisely accordingly. In practice of asset allocation, a dynamic approach is desired. The relative performance is indeed different for the various types of crisis. Experience indicates that the higher the percentage of Bitcoin in the geopolitical conflict/banking risk event, the better the outcomes. On the other hand, in times of public health emergencies, relative performance is rather poor. However, that performance returns over a period of time. Such situations require a more conservative approach to investing, considering these volatility trends.Some methodological limitations need to be noted. Only a small time frame around each crisis is used for an event study. This does not take account of long-term effects. This impacts upon the Bitcoin-gold hedging relationship. Sample includes only 5 crisis events. With the events selected, not all topics may be covered. Investors might experience a wider variety of disruptions in the market. There is no decomposition of the abnormal differences in this analysis. Here expected and unexpected are still mixed up! A more sophisticated econometric model is thus needed. A policy expectation framework is the only way to separate policy expectation responses from those to purely unanticipated shocks.Based on these restrictions, the crisis sample can be extended in future research. There are other events that should be included. This encompasses geopolitical, financial and health crises. Other periods of history should also be explored. Short term event study approaches can be applied with time varying approaches. This can be seen in the case of rolling window GARCH or time-varying parameter VAR. This combination is able to capture the dynamic evolution of the hedging relationship. In the long term this Bitcoin-gold relationship is dynamic. Another avenue for future research lies with structural models. An alternative to this is the use of high frequency identification strategies. Both methods can be used to break out the abnormal returns. This is a decomposition of expected and unexpected parts. Knowing this, a better understanding is possible. The main question is around Bitcoin's hedging properties. Predictable crisis factors may be its drivers. Or perhaps, unexpected factors are to blame. This distinction can have practical significance. It offers more subtle advice to both investors and policy makers

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