

## The safe haven feature of gold in the recent crisis: Rolling regression approach

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### SUMMARY

The global repercussions of the COVID–19 pandemic had a substantial adverse impact on the overall economy, resulting in equity markets decline worldwide. Amidst this turbulent environment, plagued with uncertainty, investors have redirected their attention towards secure assets to protect their capital. In that context the main objective is to reevaluate whether gold still demonstrates the qualities of a safe haven investment during unprecedented events like the COVID–19 pandemic and the Ukrainian war, events distinct from past crisis we have experienced for example 2008 and 1987. For the same reason, a rolling regression between gold and the S&P500 index was employed, taking into account the time–varying properties of daily returns and opting for an optimal window size. The findings indicate that significant negative slope coefficients coincide with the COVID–19 pandemic and the initiation of the Ukrainian war. These results offer empirical evidence that gold continues to maintain a robust position as a safe haven in the perception of investors. Nevertheless, it is essential to emphasize that there is no universally applicable safe haven; the safety features of different assets fluctuate over time, depending on the specific market conditions and the nature of financial turmoil.

### KEYWORDS

*crisis, gold, rolling regression, safe haven, S&P500 index*

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## 1. Introduction

The COVID–19 pandemic resulted in the most severe recession since the Great Depression in the 1930s, businesses were forced to shut down, unemployment grew, leading to reduced consumer spending. The pandemic also caused disruptions in global supply chains which led to shortages and price increases in essential goods ([World Economic Forum, 2021](#)). Such a sharp downturn in business operations and financial performance naturally caused global stock markets to decline. From February 2020 to March 2020 the equity index Dow Jones Industrial Average (DJIA) declined by 32%, and in the same period S&P500index, which represents 500 largest and most liquid companies listed on the US stock exchange, experienced a drop by 34% ([Nasdaq, 2020](#)). In such turmoil surroundings at the stock market, plagued

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with uncertainty, investors have focused on so-called safe haven assets in order to preserve their investment. Several research have shown that gold, specific currencies such as Swiss Franc and numerous other commodities are efficient in protecting investors capital in volatile market conditions. Cryptocurrencies, for example, have been considered as an alternative for traditional forms of investment since the creation of Bitcoin due to its decentralized nature and lack of authority over it by the government. Research studies have examined the hedging capabilities of cryptocurrencies like Bitcoin and Ethereum (Huynh et al., 2022) and found evidence that they can indeed act as a hedge against market volatility. Leutert (2018) found that Swiss franc and US dollar appreciated in episodes of crisis demonstrating safe haven properties. Similarly, in a study of the 2008 financial crisis, Brunnermeier et al. (2009) found that the Swiss franc appreciated against other major currencies and served as a safe haven currency during the financial crisis. Park (2023) observed US dollar, Swiss franc and Japanese yen and found that they acted as a safe haven assets.

Gold has a long history of acting as a safe haven for capital in times of financial turmoil. History dates back centuries ago when gold was used as a form of currency, tradition has not changed much as investors would commonly turn to gold as it has, historically speaking, exhibited increase in prices while stock and bonds would perform poorly. In the research of 2008 financial crisis, Baur and Lucey (2010) found that gold acted as a safe haven, providing investors with a safe and liquid store of value during the crisis. Additionally, Baur and McDermott (2010) found that gold is a safe haven asset during times of high uncertainty, as it tends to exhibit a negative dependence with stocks and provides portfolio diversification benefits.

Current study contributes to the existing literature by further examining the time-varying dependence between gold and S&P500. Stock index S&P500 is used as a benchmark of American capital market, i.e. it is commonly used by investors as a measurement of performance of the US economy, and gold, traditionally used as a safe haven investment to protect the capital from the ongoing turbulence's in the stock markets. The COVID-19 crisis is different than the previous crisis's we have seen in for example 2008 and 1987, as the government measures prevented businesses from operating, which had even deeper effect on the economy than the previously mentioned crisis. Therefore, it is important to reevaluate whether gold could still serve as a safe haven asset in such an unprecedented times like COVID-19 pandemic is. For the purpose of this research, daily data from December 2017 to December 2022 are obtained from Yahoo finance platform. This time frame allows us to capture the behavior of observed variables before and during crisis of COVID-19 and including war in Ukrain. Obtained data consists of daily returns on log price of one ounce of gold and daily returns on price of S&P 500 market index expressed in USD. Data are analyzed using method of rolling regression due to time-varying properties of daily returns.

Continuing sections of the paper are systematized as follows. Section 2 explains the theoretical concept of safe haven property with respect to different assets including previous studies review. Section 3 deals with empirical findings and offers comprehensive interpretation of the results and finally, Section 4 concludes.

## 2. Safe haven assets during COVID crisis

The term safe haven asset, generally, describes a low-risk asset which can provide investors a "place" to protect their wealth in periods of economic uncertainty. However, while discussing the concept of a safe haven, it is necessary to be more precise. This paper will follow the definition that safe haven assets are defined empirically, against other assets during specific periods of turmoil on financial markets and that safe haven assets display negative or no correlation in price movements against other assets which follow economic downturn (Baur and McDermott, 2010). There is an abundance of financial literature concluding that various assets indeed possess safe haven properties, most notably gold, Swiss Franc and US government bonds. Moreover, it is important to differentiate safe haven from concepts like diversifier and hedge, as it is often mistaken to represent the same idea. A diversifier is an asset, investment, or strategy that has a low or negative correlation with other portfolio assets. Its purpose is to minimize overall risk by spreading investments across different asset classes or securities that behave differently under various market conditions. Diversifiers help to smooth out the portfolio's performance and potentially enhance risk-adjusted returns. Although both diversifiers and safe haven assets contribute to risk reduction in a portfolio, they serve different purposes. Diversifiers are used to spread risk by investing in assets with low or negative correlations to one another. The goal is to reduce the overall volatility of the portfolio and potentially enhance returns by combining assets that perform differently under various market conditions. Safe havens, on the other hand, are assets or investments sought after during times of market uncertainty or crises. They are intended to provide stability and act as a store of value when other investments may be experiencing significant declines. Similarly, hedges are also a risk management strategy which works on the principle of taking certain position in order to mitigate or offset potential risks or losses associated with another investment. It involves taking an opposite position to the original investment, aiming to reduce the impact of adverse price movements or unexpected events. For example, if an investor holds a large number of shares of a certain stock, the investor can create a hedge by purchasing put options, which basically means that investor is betting on the price of that very same stock to decline, now if the prices of that stock were to significantly decline, the value of that put option will increase which will offset the losses from the decline of the price and possibly create profit for the investor. On first glance, it may seem like safe haven assets and hedge represent the same idea, they differ in their purpose and execution. As opposed to hedge, which focuses on risk management and minimizing losses, a safe haven serves as a refuge to protect against market turmoil and provide stability in a portfolio.

The crisis of COVID-19 has brought massive uncertainty on financial market and once again forced investors to preserve their capital. Given the unprecedented nature of this crisis and the thorough effect it had on both demand and supply side of the economy, it was necessary to once again examine can some assets still serve as a safe place for investor's capital. Before the COVID-19 crisis, cryptocurrencies experienced growth in popularity and became increasingly popular in investment portfolios. Cryptocurrencies are digital or virtual currencies that employ cryptographic techniques to secure transactions, operating independently of central banks or governments. Bitcoin, the most well known cryptocurrency, was joined by a number of others such as Ethereum, Ripple, and Litecoin. These digital assets garnered attention due to their decentralized nature, which offered transparency, security, and privacy. Investors were drawn to cryptocurrencies due to the potential for high returns

and their perceived ability to hedge against traditional financial systems (Chiu and Koepl, 2017). Inclusion of the cryptocurrencies in investment portfolios provided diversification, as they exhibited low correlation with traditional assets, like stocks and bonds (Dyhrberg, 2016; Bouri et al., 2017). This allowed investors to participate in the expanding digital economy and decentralized finance ecosystem (Bonneau et al., 2015).

As the crisis of COVID-19 struck, this is the first major test for cryptocurrencies to determine whether they can serve as safe haven assets or even potentially outperform gold, as Bitcoin, cryptocurrency representative, is often referred to as "digital gold". Several studies have yielded different results. Cocco et al. (2022) documented that during period of COVID-19 crisis, Bitcoin and Ether showed safe haven properties as it was negatively correlated with major world financial indexes. Wijaya and Ulpah (2022) concluded on the example of Indonesian markets that Bitcoin and Ethereum serve as both hedge and safe haven assets. Chemkha et al. (2021) observed Bitcoin and gold safe haven and hedge properties against four world stock indices and found that gold served as a safe haven asset in COVID crisis, whereas Bitcoin displayed variability and was therefore not a safe shelter for capital. Moreover, Conlon and McGee (2020) demonstrated that Bitcoin moves in line with S&P 500 which discredits Bitcoin as a safe haven asset. Dutta et al. (2020) concluded that Bitcoin acted as a diversifier not as a safe haven asset. Varying results from studies show that consensus has not been reached on whether cryptocurrencies indeed served as safe haven assets during COVID crisis. It can be concluded that cryptocurrencies require more examination as this was their first true test as a safe haven asset.

Unlike cryptocurrencies, gold has already been tested and confirmed by various studies to hold safe haven property and numerous studies have emerged during COVID-19 to analyse whether gold still holds those properties during this unprecedented surroundings. Akhtaruzzaman et al. (2021) analyzed high-frequency data for gold and most important financial market indexes using Dynamic Conditional Correlation (DCC) from Multivariate Generalized Autoregressive Conditional Heteroskedasticity (MGARCH) class models to examine time-varying correlation in different phases of COVID-19 crisis and concluded that gold exhibits safe haven attribute and negative correlation with S&P500 and Nikkei250 during phase one of COVID crisis (before government intervention), but lost its safe haven property after government intervention. Similarly, Živanović et al. (2018) examined DCC between gold and major world market indices and concluded gold can be used as a safe haven used both in crisis and in other non-crisis periods and a diversifier of the investment portfolio of individual and institutional investors. The same methodology was used by Arnerić and Mateljan (2019), but their study examines safe haven property of Bitcoin and not the gold. Wen et al. (2022) applied the time-varying vector autoregression (TVP-VAR) model to test the safe haven property of gold and Bitcoin against oil and stock market during period of COVID-19 crisis. They found that gold indeed could serve as a safe haven asset during COVID crisis against both oil and stock market. Using cross-quantilogram approach, Ji et al. (2020) concluded that gold and soybean commodity futures acted as a safe haven during period of COVID-19. However, Sun et al. (2022) examined gold, bitcoin and US dollar as safe haven assets during COVID-19 market in south-east Asia and found that gold and bitcoin did not display safe haven properties whereas US dollar showed safe haven properties in several Asian countries. Following the definition of a safe have asset set in previous section, gold has historically been considered a safe haven given its lasting role as a store of value Bouri et al. (2017). Previous studies have extensively explored the role of gold as a safe haven asset, providing valuable

insights into its behaviour and characteristics during periods of market turbulence and economic uncertainty, but also during market stability. [Baur and McDermott \(2010\)](#) conducted a comprehensive analysis over a 30-year period from 1979 to 2009. Their findings indicated that gold acted as a safe haven for most developed stock markets, including the United States and Europe, during significant financial crises such as the 2008 financial crisis and the 1987 stock market crash. However, they noted that gold's safe haven characteristics were not consistently observed in emerging markets like Japan, Canada, and Australia. [Baur and Lucey \(2010\)](#) focused on investigating the relationship between gold, stocks and bonds in the United States, the United Kingdom, and Germany. They discovered that gold served as a safe haven asset for stocks, but for a limited duration of approximately 15 days. Beyond this period, investors experienced diminishing returns on their gold investments, suggesting that gold's safe haven effect may be time-constrained. [Baur and McDermott \(2012\)](#) studied behavioural bias of why investors would buy riskier asset which is gold as compared to US government bonds during financial distress which are far less volatile and risky. The empirical study confirmed that gold was a strong safe haven asset during aftermath of 9/11 attack and during bankruptcy of Lehman brothers in 2008. The behavioural bias was contributed to the fact that positive past performance of gold and its tradition as a store of value outweighs the negative connotations such as potential risk or volatility.

In a study by [Reboredo \(2013\)](#), weekly data from 2000 to 2012 was analyzed to examine the relationship between gold prices and the US dollar. The results indicated that as the US dollar depreciated against other currencies, gold demonstrated the potential to function as both a hedge and a safe haven asset, providing protection against currency devaluation and economic uncertainty. Expanding the scope to include multiple markets, [Beckmann et al. \(2015\)](#) analyzed 18 individual markets and 5 regional indices over a period from 1970 to 2012 on a monthly frequency. Their research revealed that gold exhibited characteristics of both a hedge and a safe haven asset, but the effectiveness of these properties depended on the prevailing economic circumstances. The ability of gold to act as a hedge or a safe haven varied across different market conditions. [Lucey and Li \(2015\)](#) examined safe haven properties of four precious metals, namely gold, silver, platinum, and palladium. They found that in the United States, different precious metals served as safe haven assets during specific periods when gold was not the strongest or safest haven. This suggests that investors may diversify their safe haven assets based on the prevailing market dynamics and the relative strengths of different precious metals.

[Peng \(2020\)](#) applied the GARCH–DCC model to analyse the hedge and safe haven properties of China's precious metals in the domestic financial market. The study revealed that precious metals, including gold, acted as strong hedges against the bond market, mitigating risks associated with bond investments. Furthermore, during times of financial turmoil, precious metals generally served as safe haven assets, providing investors with a measure of protection and stability. Similar study has been conducted by [Chen et al. \(2023\)](#) that employ a quantile-on-quantile regression to explore the asymmetric effects of financial stress on China's precious metals market. It concludes that financial stress has distinct impacts at different quantiles, revealing nuanced relationships between financial stress and precious metals returns. The use of sophisticated methodology, although innovative, may lead to overfitting or spurious results if not carefully validated. [Cheema et al. \(2022\)](#) suggest that traditional safe havens, such as gold and government bonds, retained their status during both crises (2008 financial crisis and the COVID-19 pandemic), emphasizing those investors may find

reassurance in these assets. However, establishing a clear causal links between safe haven assets and crisis events is challenging, and thus conclusions of the study may be influenced by various market dynamics and external factors that are hard to isolate.

The study of [Dyhrberg \(2016\)](#), which uses GARCH methodology to examine the volatility dynamics of Bitcoin, gold, and the dollar, suggests that Bitcoin exhibits higher volatility than gold and the dollar, potentially influencing its role as a safe haven or a hedging instrument. However, changes in market regulatory developments since 2016 may impact the relevance of the conclusions. [Gallagher \(2021\)](#) provides a year-long review of how precious metals performed during the initial stages of the COVID-19 pandemic. He suggests that precious metals, particularly gold and silver, exhibited resilience and acted as safe haven assets during the economic uncertainties of the pandemic. The main drawback of his research is limited time frame of analysis which might restrict the ability to make conclusions about the long-term performance of precious metals. Additionally, external factors, such as government interventions, are ignored in the paper. [Xiaofan \(2020\)](#) concludes that gold exhibits characteristics of both, acting as a hedge against inflation and a safe haven during financial turmoil in the Chinese context. The study's applicability to other global markets may be limited, and the findings might be specific to China's economic conditions only. Also, potential endogeneity issues in the methodology should be considered for a more robust interpretation.

The COVID-19 crisis has put various assets to the test as safe haven investments, and while cryptocurrencies have shown mixed results, gold has proven to be a more appropriate safe haven. Cryptocurrencies, such as Bitcoin and Ethereum, were initially seen as potential safe havens due to their decentralized nature and low correlation with traditional assets. However, studies conducted during the COVID-19 crisis have yielded conflicting findings regarding their safe haven properties. On the other hand, gold, a well-established safe haven asset, has been extensively analysed during this unprecedented situation. Studies have consistently demonstrated that gold possesses safe haven characteristics, exhibiting negative correlation with major financial market indexes and acting as a diversifier in investment portfolios. These findings reinforce the notion that gold has stood the test of time as a reliable safe haven investment, making it a more suitable choice in times of uncertainty and economic crisis. From the previous studies, we can notice that the conclusions of the research follow the definition of a safe haven asset set in the previous chapters. There is not a universal safe haven asset, the safe haven property of some asset varies over time and it is dependent on the characteristics of a financial turmoil and the market in which the crisis is occurring. That means that if an asset displayed safe haven properties during 2008 financial crisis, it may not display the same properties during COVID crisis or some future financial turmoil that is yet to occur.

This research will focus on observing behavior of gold and S&P500 market index in periods spanning from before and during COVID crisis to get a better understanding of features of gold and S&P500 market index during and before the crisis and how they correlated in different periods.

### 3. Empirical findings

This section deals with empirical analysis of daily time-series over five year's period (from January 2, 2018 to December 30, 2022) with respect to gold closing prices per ounce and S&P500 index closing prices. As a result of distinctive scales both assets are presented on



the single figure with dual axis for comparison purposes, although expressed in the same measurement units of USD (Figure 1).

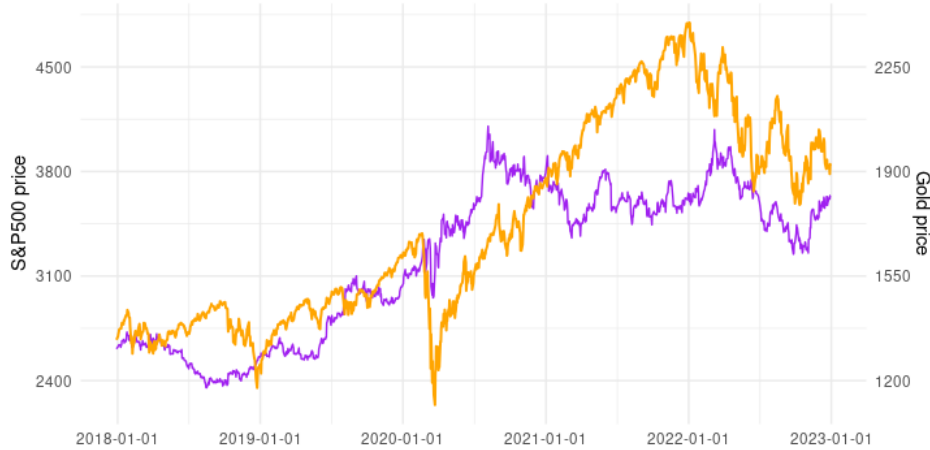


Figure 1. Daily closing prices of S&P500 index and gold from January 2018 to December 2022

From the beginning of 2018 to the second half of 2019 closing prices of gold were demonstrating downward trend as prices of S&P500 were, in the same period, experiencing upward trend. At the beginning of 2020, S&P500 exhibited severe drops in prices due to COVID recession, whereas gold experienced a slight drop, showing resilience on the market during high financial uncertainty. Following US government stimulus in March of 2020, S&P500 prices began to recover and showed upward trend as investors were now encouraged to make riskier investments, whereas prices were stagnating, which suggests similar conclusion to [Akhtaruzzaman et al. \(2021\)](#), that gold served as a safe haven asset before the government stimulus. In general, [Figure 1](#) exhibits substantial opposite direction of price movements and thus supports safe haven property of the gold, which will be empirically demonstrated by using daily returns, i.e. closing prices are transformed into first differences of the logs. Using returns instead of prices is more appropriate due to simpler interpretation and stationarity condition. By comparing both return time-series on the left panel of [Figure 2](#), it is evident that S&P500 is more volatile, with the lowest return in the beginning of 2020, right before the US government stimulus, after which S&P500 returns started recovering, as opposed to gold which was experiencing negative returns. More clear impression of dependence between two assets returns can be obtained from the scatter diagram (the right panel of [Figure 2](#)).

Despite the scatter diagram, which indicates no correlation between returns of S&P500 and gold when entire period of data is observed, we cannot ignore the fact that in some periods those returns had opposite signs. Periods of negative S&P500 returns accompanied with positive gold returns are particularly important in safe haven property determination. For the same reason we cannot assume that linear dependence between two assets returns is constant, rather it is more adequate to consider time-varying linear dependence. In that context rolling regression approach is considered. Before applying rolling regression, descriptive statistics of returns and unit root tests are conducted ([Table 1](#)) as well as residual diagnostics of simple regression model ([Table 2](#)).

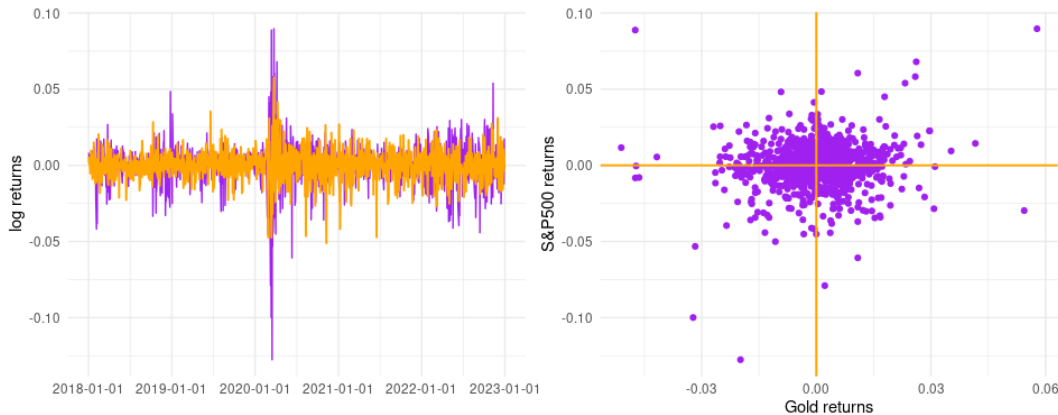


Figure 2. Daily returns of S&P500 index and gold: time-series plot (left) and scatter diagram (right)

Descriptive statistics in Table 1 demonstrates S&P500 index as riskier investment with standard deviation greater than that of gold and considerably broad range, i.e. minimum and maximum return on S&P500 have been higher and lower than gold, showing higher spikes and variations throughout the observed period. Along with descriptive statistics, Table 1 also reports Augmented Dickey–Fuller (ADF) unit root test results, indicating stationarity of return series (null hypothesis in both cases is rejected at p-value less than 0.001). ADF is performed without trend and without drift as returns have zero mean and no linear trend present in the data. Stationarity of both return series give us no information about time-varying linear dependence between two assets, but it is required to conduct non-spurious simple regression in preliminary analysis. By regressing gold returns on S&P500 returns, which are both stationary, we can obtain residuals from non-spurious regression. Diagnostic checking of those residuals may indicate the necessity of employing rolling regression.

Table 1. Descriptive statistics and unit root tests of gold and S&P500 returns

Returns	Mean	SD	Min	Median	Max	ADF
S&P500	3e-04	0.0138	-0.1277	9e-04	0.0897	-24.8484***
Gold	3e-04	0.0096	-0.0511	5e-04	0.0578	-25.1756***

Note: \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

A linear regression between two stationary variables is estimated using Ordinary Least Squares method (OLS). Estimation results and diagnostic test of residuals are reported in Table 2. Diagnostic test of residuals (such as Breusch–Godfrey test, Breusch–Pagan test and Jarque–Bera test) are not performed to validate common assumptions of the regression model, but primarily to gain further insight into ignored properties of the data and consequently to adopt more adequate approach in determination if gold can still serve as a safe haven in the recent crisis.

Foremost, the slope coefficient with respect to S&P500 return is statistically significant at 5% significance level but positive (1% increase in S&P500 return would increase gold return on average for 0.06%). However, this coefficient holds for entire observed period and cannot be considered as evidence of safe haven property approval or disapproval.



Table 2. OLS regression results between gold and S&amp;P returns

	Gold return
Intercept	0.0002 (0.0003)
S&P500 return	0.0624** (0.0196)
Num.Obs.	1259
R2	0.008
AIC	−8123.9
BIC	−8108.5
Log.Lik.	4064.962
F	10.195***
BG(1)	1.0112
BG(2)	1.0786
BP	25.647***
JB	122.71***

Note: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; standard errors in parentheses

Furthermore, R2 indicates no explanatory power of S&P500 towards gold which is contradictory to slope interpretation. This conclusion is supported by residuals diagnostic indicating the presence of heteroscedasticity. Null hypothesis for Breusch–Godfrey test (BG) for both order 1 and order 2 is not rejected at significance levels of 10%, 5% and 1% showing that residuals do not display autocorrelation. However, the null hypothesis of Breusch–Pagan test (BP) is rejected at all significance levels indicating that model suffers from heteroscedasticity meaning that variance of residuals is not constant, i.e. it changes over time. Lastly, the null hypothesis of Jarque–Bera test is rejected at all significance levels, providing evidence that residuals do not follow normal distribution. Given that variance of residuals displays variability over time it is to be expected that slope coefficient will have different sign and/or magnitude in different periods. Therefore, it is appropriate to apply rolling window regression to determine in which periods gold demonstrated negative dependence with S&P500. Based on 1259 daily observations 1225 rolling regressions are conducted with optimal window size of 35. Every rolling regression (including intercept and slope) is estimated by usage of 35 precedent observations, which approximately covers one month period.

Optimal window size of 35 is determined by the rule of thumb as the square root of the sample size. Furthermore, to ensure valid significance testing of the slope coefficients White robust standard errors are employed. Figure 3 shows the results obtained using rolling regression in RStudio. Purple points on the plot represent slope coefficients which are statistically significant at 1% or 5% significance level, while highlighted periods correspond with periods of COVID-19 pandemic and onset of Ukrainian war. Figure 3 indicates that S&P500 and gold were negatively related during period of COVID pandemic before the US government stimulus with many of the slope coefficients being statistically significant, giving us sufficient evidence that gold indeed served as a safe haven in the period of COVID-19 pandemic. Moreover, gold experienced short decline in mid-March but followed with a steady increase caused by factors such as trade tensions between US and China and global supply chain disruptions (Gallagher, 2021), meaning that after the stimulus which encouraged investors to engage in riskier investments and gold switching its role from a safe haven to a hedge. The

similar finding holds for the period of Ukrainian war, which strengthens the preposition that gold does serve as a safe haven in the time of financial distress.

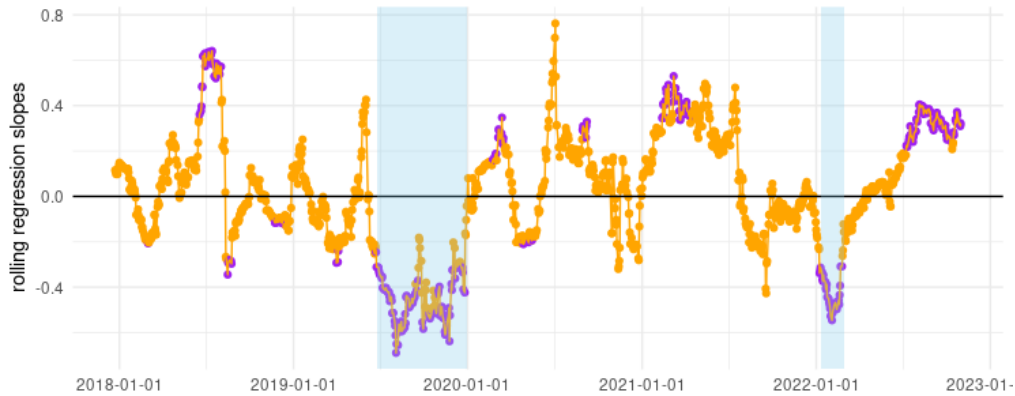


Figure 3. The slope coefficients of rolling regressions

This result supports the conclusion of Velip et al. (2023). Gold surpassed 2000 USD in the first quarter, reaching new all-time highs, following the beginning of the war, whereas S&P500 declined by 5% in that time period (Spence, 2022). Table 3 reports dates with the largest negative slopes, accompanied with intercepts and slopes p-values based on White's robust standard errors.

Table 3. Rolling regression estimates with significant and the largest negative slopes

Date	Intercept	Slope	p-value	Date	Intercept	Slope	p-value
2019-10-02	-0.0003	-0.6125	0.0000	2020-01-03	0.0025	-0.5248	0.0068
2019-10-03	0.0003	-0.6897	0.0000	2020-01-08	0.0023	-0.5170	0.0135
2019-10-04	0.0004	-0.6505	0.0001	2020-01-09	0.0023	-0.5343	0.0098
2019-10-07	0.0000	-0.6556	0.0001	2020-01-10	0.0023	-0.5363	0.0090
2019-10-08	-0.0002	-0.5954	0.0004	2020-01-13	0.0024	-0.5964	0.0040
2019-10-09	0.0001	-0.5635	0.0009	2020-01-14	0.0025	-0.6098	0.0026
2019-10-10	-0.0001	-0.5859	0.0006	2020-01-15	0.0027	-0.6072	0.0030
2019-10-11	0.0000	-0.5936	0.0004	2020-01-16	0.0027	-0.5847	0.0037
2019-10-14	0.0000	-0.5512	0.0036	2020-01-17	0.0028	-0.5690	0.0052
2019-10-15	-0.0002	-0.5948	0.0018	2020-01-21	0.0027	-0.5226	0.0094
2019-10-16	-0.0003	-0.5875	0.0020	2020-01-23	0.0031	-0.6384	0.0029
2019-10-17	-0.0002	-0.5890	0.0021	2020-01-24	0.0027	-0.5245	0.0099
2019-10-18	-0.0004	-0.5796	0.0033	2022-04-01	0.0014	-0.5274	0.0001
2019-10-21	-0.0003	-0.5785	0.0030	2022-04-04	0.0019	-0.5460	0.0001
2019-10-22	-0.0008	-0.5188	0.0053	2022-04-05	0.0012	-0.5152	0.0002
2019-10-23	-0.0008	-0.5596	0.0033	2022-04-06	0.0010	-0.5020	0.0003

Out of 1225 slope coefficients 567 were negative, from which 157 were statistically significant at 1% or 5% significance level. More importantly, out of 157 negative and significant slopes 85% of them fall in crisis periods, which corresponds, to COVID-19 pandemic and Ukrainian war.

Empirical findings indicate that investors turn to gold as a safe haven right at the beginning or at peak of the crisis, in the case of COVID this was in the end of 2019. and beginning of 2020., when the first COVID cases were reported and not long after that the Government issued guidelines in preventing the spread of COVID-19 which included closing various business and stopping production, globally, similar measures could be seen around the world and inevitably this caused major uncertainties in financial markets causing major stock indices such as S&P 500 to drop to, at that time, record lows, and gold being used as a safe haven for investors capital. War in Ukraine had instant effects on various global markets as Russia and Ukraine are major exporters of wheat making over 75% of global world exports, moreover, EU is heavily reliant on Russian energy supply with 45% of total gas imports coming from Russia making Europe face the problem of finding a new gas supply. More expensive gas prices and overall inflation have also caused investors to turn to gold as not only a safe haven, but also a hedge against inflation.

#### **4. Conclusion**

The purpose of this paper was to contribute to the literature by analysing performance of gold as a safe haven asset during COVID crisis in comparison to S&P 500 market index, which served as a representation of American capital. Empirical findings demonstrated that gold showed safe haven properties as movements in its returns were negatively correlated in periods of two financial crisis in the observed period. Findings suggest that gold served as a safe haven asset during period of COVID crisis before government stimulus which encouraged investors to return to their previous, more risky investments, similarly to the conclusion made by [Akhtaruzzaman et al. \(2021\)](#) and [Velip et al. \(2023\)](#). Findings also showed negative correlation between the two variables during war in Ukraine. The research shows that gold still holds a strong position in investors' minds as a safe haven for their capital in times of financial distress and has contributed to the previously mentioned literature by providing enough evidence to conclude that gold demonstrates safe haven properties in times of crisis.

Further research should include other assets that are commonly considered as safe haven assets such as government bonds, currencies or other commodities to capture potential dynamics between other safe haven assets and gain deeper knowledge on dynamics of safe haven assets in financial markets. As previously mentioned, there is no universal safe haven asset, safe haven property is observed empirically, for each period of crisis and therefore it is important to have more research regarding unprecedented crisis such as COVID pandemic, with many different variables examined to be able to predict and properly react to potential similar crisis in the future.

#### **Attribution**

This article originated from the undergraduate thesis of the BDiB study program at University of Zagreb, Faculty of Economics and Business.

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## Značajka zlata kao sigurnog utočišta u recentnim krizama: pristup pomične regresije

### SAŽETAK

Globalne posljedice COVID-19 pandemije imale su značajan negativan utjecaj na cjelokupno svjetsko gospodarstvo, što je rezultiralo padom dioničkih tržišta diljem svijeta. Usred tog turbulentnog okruženja, opterećenog neizvjesnošću, investitori su svoju pozornost preusmjerili na sigurnu imovinu kako bi zaštitili svoj kapital. U tom je kontekstu glavni cilj rad provjeriti pokazuje li zlato i dalje kvalitete ulaganja kao sigurnog utočišta tijekom događaja bez presedana poput COVID-19 pandemije i ukrajinskog rata, koji se pak razlikuju od prošlih kriza koje smo doživjeli, primjerice 2008. i 1987. godine. Iz istog razloga korištena je pomična regresija između zlata i S&P500 indeksa, uzimajući u obzir vremenski promjenjiva svojstva dnevnih prinosa te odabirući optimalnu širinu prozora. Rezultati pokazuju da se značajni negativni koeficijenti nagiba podudaraju s COVID-19 pandemijom i početkom ukrajinskog rata. Ovi rezultati nude empirijski dokaz da zlato i dalje zadržava čvrstu poziciju sigurnog utočišta u percepciji ulagača. Ipak, važno je naglasiti da ne postoji univerzalno primjenjivo sigurno utočište; sigurnosne značajke različite imovine fluktuiraju tijekom vremena ovisno o specifičnim tržišnim uvjetima i prirodi financijskih previranja.

### KLJUČNE RIJEČI

*kriza, zlato, pomična regresija, S&P500 indeks*

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