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Failure of Gold, Bitcoin and Ethereum as safe havens during the Ukraine-Russia war

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Abstract

This paper studies the impact of fear, uncertainty and market volatility caused by the Ukraine-Russia war on crypto-assets returns (Bitcoin and Ethereum) and Gold returns. We use the searches on Wikipedia trends as proxies of uncertainty and fear and two volatility indices: S&P500 VIX and the Russian VIX (RVIX).
The results show that Bitcoin, Ethereum and Gold failed as safe havens during this war.

Keywords: War, Russia, Ukraine, crypto-assets, Gold, Safe haven.

JEL: H56, G32, G12, G15.

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Failure of Gold, Bitcoin and Ethereum as safe havens during the Ukraine-Russia war

Alhonita YATIE[1]

March, 2022

Abstract

This paper studies the impact of fear, uncertainty and market volatility caused by the Ukraine-Russia war on crypto-assets returns (Bitcoin and Ethereum) and Gold returns. We use the searches on Wikipedia trends as proxies of uncertainty and fear and two volatility indices: S&P500 VIX and the Russian VIX (RVIX). The results show that Bitcoin, Ethereum and Gold failed as safe havens during this war.

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1. Introduction

"A safe haven asset holds its value in 'stormy weather' or adverse market conditions. Such an asset offers investors the opportunity to protect wealth in the event of negative market conditions"

Baur and McDermott (2010).

After quite a few months of encampment near the Ukrainian border, on February 24, 2022, Russian troops attacked Ukraine. This rather "unexpected" attack, despite the ambient tensions since December 2021, will create a lot of volatility on the Russian financial market[2] and the decline of many indices[3]. The European Union will not be slow to react by inflicting financial sanctions on Russia. To avoid capital flight, the Russian Central Bank will request "the closing of the stock market", so the IMOEX index will no longer be listed from February 25.

This crisis is causing significant financial stress that the ECB will highlight on March 14, 2022 with the publication of the CISS graph, the systemic stress indicator in Europe. All these events revive the debate on the search for effective safe haven assets: assets capable of reacting positively to increased stress and volatility in the financial markets. We selected some assets that have been described several times in the literature as safe haven assets: **Cryptoassets and Gold**. Our study is therefore in line with the studies of Baur and Lucey (2010), Stensås et *al*. (2019), Urquhart and Zhang (2019), Luc Duc Huynh (2020), Ding et al (2022), Su et *al.* (2022) etc. who analyze the characteristics of these assets in times of crisis.

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[2] Russian VIX (+40.31%).
[3] IMOEX (-33.28%), CSI 1000 (2.19%), CROBEX (-6.48%), PX (-4.77%).

Our analysis shows that Bitcoin, Ethereum and Gold are not safe havens during this crisis as they react negatively to stress and volatility indicators. The remainder of the paper is organized as follows. Section 2 describes the data and the model. Section 3 presents the results. Section 4 concludes.

2. Data and Model

Our analysis is based on daily data from 1 November 2021 to 15 March 2022. The data about Bitcoin and Ethereum prices was extracted from *CoinGecko*, the data on Gold price from Banque de France, data on S&P VIX are from S&P Global website, data on Russian VIX (RVIX) are from www.investing.com and the volume of searches about Ukraine- Russia war are from Wikipedia Trends. We use a DCC-GARCH on the log-returns of our variables[4]. The aim is to capture the dynamic nature of Gold, Bitcoin and Ethereum as safe havens during this war. DCC-GARCH captures the interactions among assets by allowing the correlations to change over the time.

The model is defined as:

$$r_t = \mu_t + \varepsilon_t \quad , \varepsilon_t | E(\varepsilon_t) = 0, Cov(\varepsilon_t) = H_t \tag{1}$$

$$\varepsilon_t = \sqrt{H_t} u_t \,, \; u_t \sim N(0, I) \tag{2}$$

$$H_t = D_t R_t D_t \tag{3}$$

Where r_t, μ_t, ε_t and u_t are $N \times 1$ dimensional vectors representing respectively log returns of n assets at time t, expected value of the conditional r_t, mean-corrected returns of n assets at time t and iid errors.

H_t, R_t and D_t are $N \times N$ dimensional matrices illustrating respectively time-varying matrix of conditional variances of ε_t, time-varying conditional correlation matrix of ε_t and time-varying diagonal matrix of conditional standard deviations of ε_t.

The DCC-GARCH[5] (1,1) equation is then given by Q_t:

$$Q_t = (1 - \alpha - \beta)\bar{Q} + a\varphi_{t-1}\varphi'_{t-1} + \beta Q_{t-1} \text{ with } \varphi_t = D_t^{-1}\varepsilon_t \tag{4}$$

Where φ_t is a vector of standardized residuals from the first-step estimation of the GARCH (1,1) process, Q_t is the time-varying unconditional correlation matrix of φ_t and $\bar{Q}$ is a $N \times N$ dimensional positive-definite matrix which represents the unconditional covariance matrix of φ_t .

α and β satisfy $\alpha + \beta < 1$. As long as $\alpha + \beta < 1$ is fulfilled.

As a robustness test, we run OLS regressions with Prais-Winstern robust estimator, as presented in equations 5 and 6 :

[4] We use a Dickey-Fuller test to verify the stationarity of the variables. All the variables are stationary.

[5]The numerical results of the DCC-GARCHs are available upon request. We also confirm the presence of autocorrelation and volatility clustering in all the return series. Finally there are the presence of ARCH effect and GARCH effect.

$$Coin_t = \gamma + \beta_1 Coin_{t-1} + \beta_2 Wikipedia_t + \beta_3 Ukrainewar * Wikipedia_t + \beta_4 VIX_t + \beta_5 RVIX_t + \beta_6 Ukrainewar * VIX_t + \beta_7 Ukrainewar * RVIX_t + \varepsilon_t \quad (5)$$

$$Gold_t = \gamma + \beta_1 Gold_{t-1} + \beta_2 Wikipedia_t + \beta_3 Ukrainewar * Wikipedia_t + \beta_4 VIX_t + \beta_5 RVIX_t + \beta_6 Ukrainewar * VIX_t + \beta_7 Ukrainewar * RVIX_t + \varepsilon_t \quad (6)$$

Where $Coin_{t-1}$ is the Crypto-asset returns at day t-1, $Gold_{t-1}$ is Gold return at day t-1, $Wikipedia_t$ is the volume of searches related to Ukraine-Russia war[6] at day-t and $Ukrainewar$ is a dummy variable that equals one if day-t is on the beginning of the war or the subsequent days and 0 otherwise. **If a Crypto-asset or Gold serves as a safe haven asset during the war, then the coefficients related to Wikipedia trends and the volatility indices are expected to be positive and significant.**

3. Results

As a proxy of uncertainty and fear we use Wikipedia trends. The searches volumes on Wikipedia Trends indicate people's interest on a subject (Kristoufek, 2013, Dastgir et *al.*, 2019) and are used by Zhang et *al.* (2018b) as an "online sentiment proxy" which could have an impact on financial market for instance (Zhang et *al.*, 2018a; Ruan et *al.*, 2018).

First, Figure 1 presents the heatmap of the correlation between the series. A dark red color indicates that the respective two variables are highly negatively correlated, while dark blue indicates a highly positive correlation. As we can notice, the correlations between Gold, Bitcoin or Ethereum and our indicators of fear/uncertainty are globally negative. It is the same case for all the volatility indices. These results can give us a hint about the failure of Gold and Crypto-assets as safe havens during this crisis.

In Figure 2 the correlations between Bitcoin returns and our indicators of uncertainty or fear are negative. The correlations between Bitcoin returns and volatility indicators are also negative at the beginning of the crisis and a few weeks after, showing once again the absence of safe haven properties for Bitcoin. When we take a look to the volatility indices only, Bitcoin cannot be considered at all as a safe haven during the study period. These results are confirmed by the robustness test in Table 1, Bitcoin returns have a negative and significant relationship with: the volume of searches about the keyword "Ukraine war" (and its dummy variable) and S&P500 VIX (and its dummy variable). These results are in line with those from Su et *al.* (2022) and Choi and Shin (2021) who show that Bitcoin prices decrease significantly in response to financial uncertainty shocks measured by the VIX, suggesting that Bitcoin is not a safe haven asset.

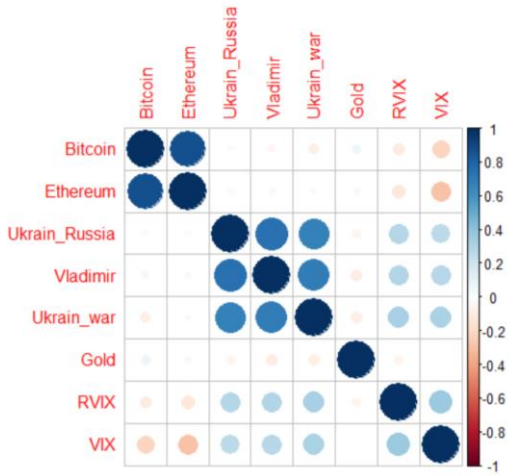
In Figure 3, we see the same results for Ethereum. The correlations between Ethereum returns and our various fear and volatility indicators are negative, showing that Ethereum could not serve as a safe haven asset during the crisis. The robustness test in Table 1 shows that Ethereum returns have a negative and significant relationship with: the dummies variables of the searches about the keyword "Ukraine war" and Vladimir Putin, and S&P500 VIX (and its dummy variable).

Figure 4 also shows that Gold is negatively correlated with fear and volatility indicators. However, we note a resumption of its status as a safe haven/hedge asset for the S&P500 VIX. The robustness test in Table 1 shows that Gold returns have a negative and significant relationship with: the dummy variable of the searches about the keyword "Vladimir Putin" and S&P500 VIX (and its dummy variable). These results are in line with those from Hood and Malick (2013) who find that Gold cannot act as a safe haven in times

[6] The words include in Wikipedia trends are: Vladimir Putin, Ukraine-Russia, Ukraine war).

of high market volatility. Ding et *al.* (2022) show also that Gold can act only as a weak-hedge during political risk.

Figure 1: Heatmap of the correlation between the series



Note: A dark red color indicates that the respective two variables are highly negatively correlated, while dark blue indicates a highly positive correlation.

Figure 2 : Correlations between Bitcoin returns and the uncertainty/volatility series

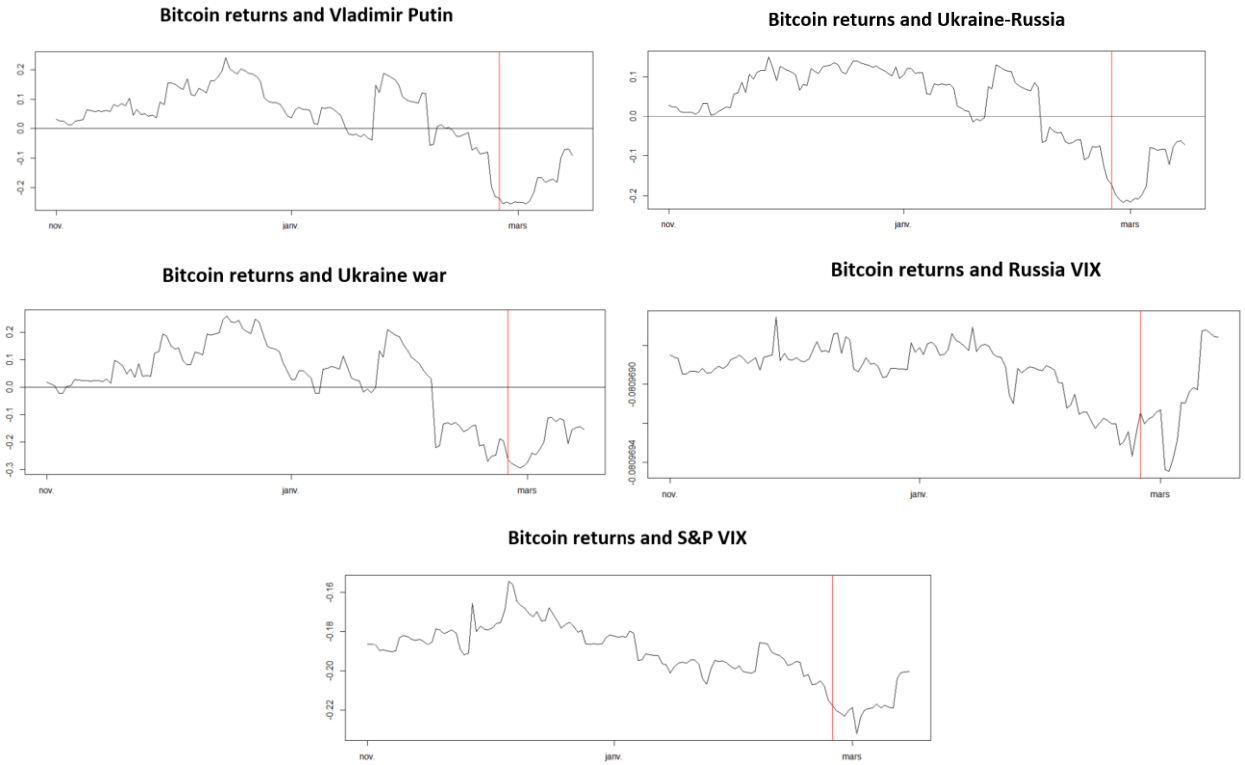


Figure 3 : Correlations between Ethereum returns and the uncertainty/volatility series

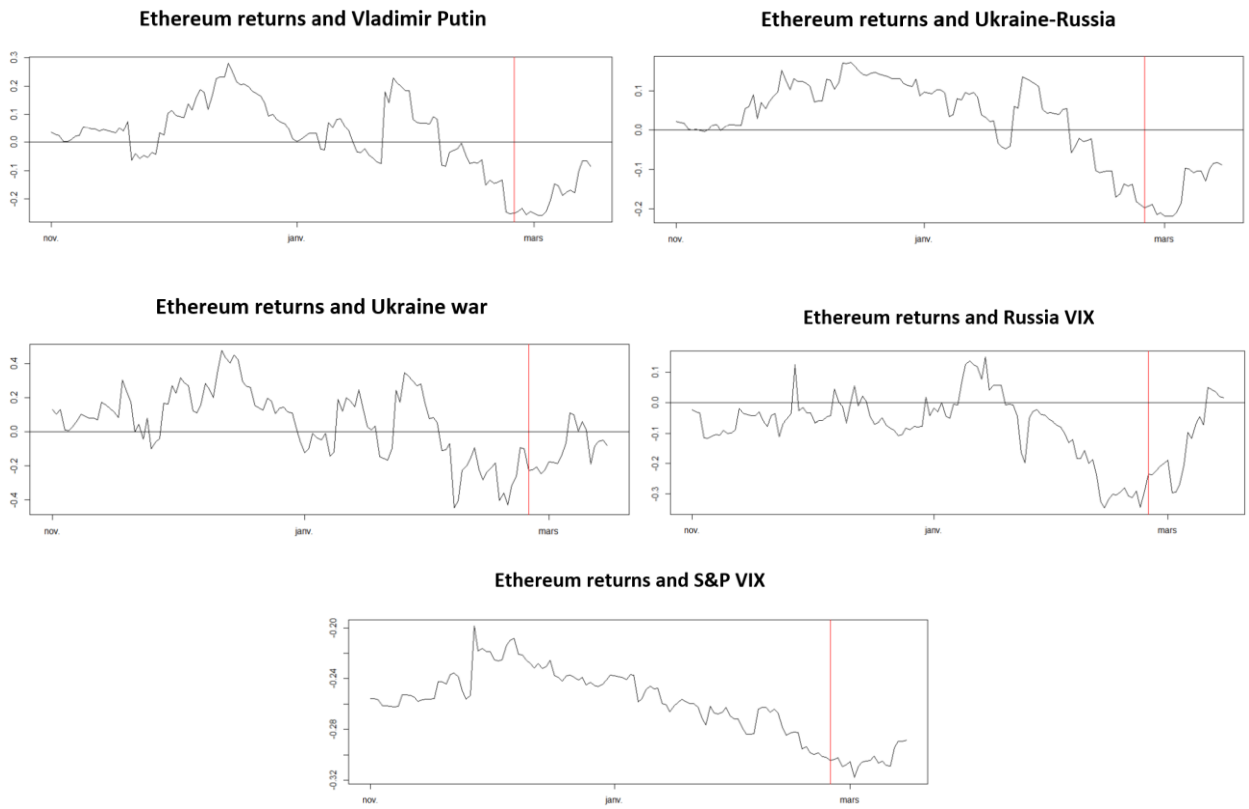


Figure 4 : Correlations between Gold returns and the uncertainty/volatility series

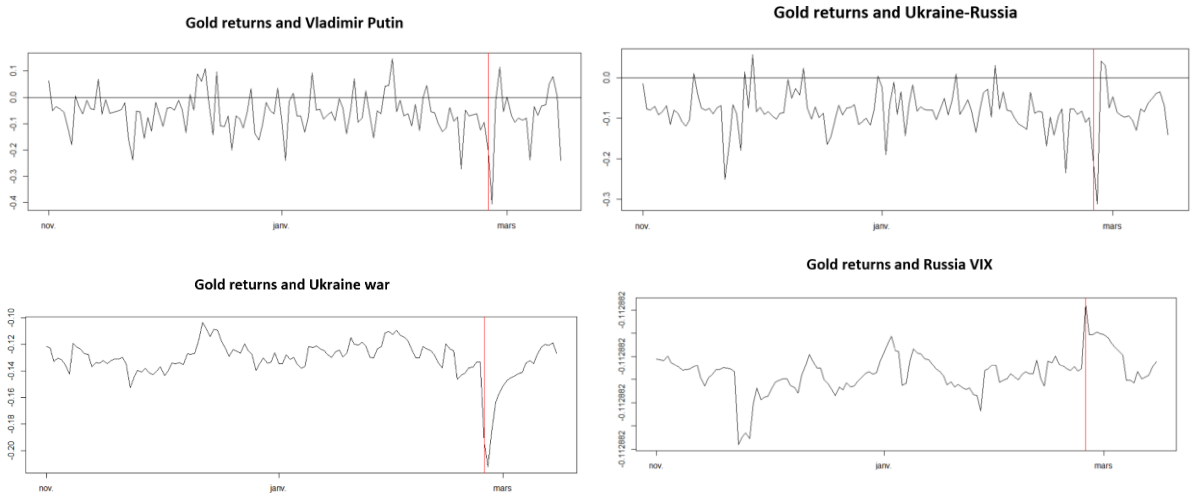


Table 1: Robustness test

Variables	*Bitcoin*	*Ethereum*	*Gold*
$Constant$	-0.232	-0.180	0.069
$Coin_{t-1}$	-0.016*	-0.014*	
$Gold_{t-1}$			0.382***
$Vladimir$	0.0101	0.014	6.9210^{-05}
$Ukraine - Russia$	0.004	-0.001	-0.001
$Ukraine - war$	-0.001**	-0.010	-0.003
VIX_t	-0.066*	-0.110***	-0.006*
$RVIX_t$	-0.021	-0.031	0.002
$Ukrainewar * Vladimir$	-0.083	-0.109*	-0.022*
$Ukrainewar * Ukraine - Russia$	0.084	0.078	0.017
$Ukrainewar * Ukraine - war$	-0.077*	-0.046*	0.004
$Ukrainewar * VIX_t$	-0.257*	-0.267**	-0.107***
$Ukrainewar * RVIX_t$	0.005	-0.009	0.028
$Adjusted\ R^2$	0.096	0.121	0.289

Note: Regression (OLS with Prais-Winstern robust estimator) results analyzing Crypto-assets and Gold as safe-havens based on Equations 5 and 6 Where $Coin_{t-1}$ is the Crypto-asset returns at day t-1, $Gold_{t-1}$ is Gold returns at day t-1, $Wikipedia_t$ is the volume of searches related to Ukraine-Russia war at day-t and $Ukrainewar$ is a dummy variable that equals one if day-t is on the beginning of the war or the subsequent days and 0 otherwise. Levels of significance: *10%, **5%, **1% .

4. Conclusion

This article has empirically shown the impact of uncertainty, fear and financial market volatility induced by the in Ukraine on Bitcoin, Ethereum and Gold. It emerged from our analysis that these assets cannot be used as safe haven assets during this crisis. They are negatively and significantly correlated with war stress. This results could be useful for investors and policymakers during this crisis.

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Appendix

Figure 1 : Wikipedia searches themes and Volatility indices

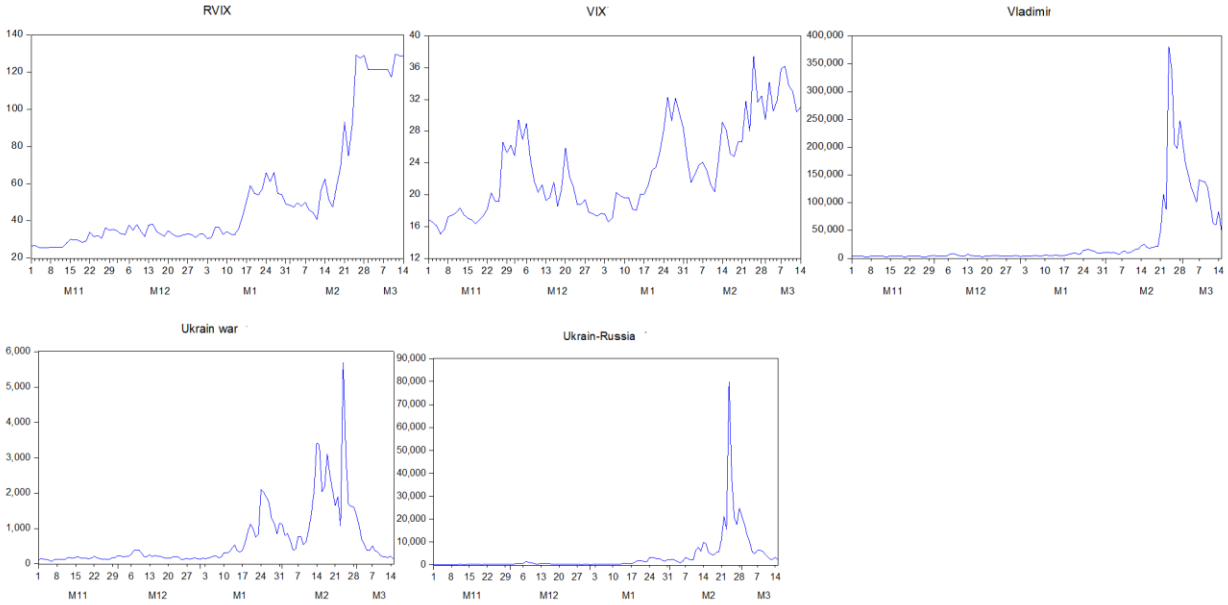

Table 1: Descriptive statistics

	BITCOIN	ETHEREUM	GOLD	UKRAIN WAR	UKRAIN-RUSSIA	VLADIMIR	Russian VIX	VIX
Mean	47284.87	3520.942	1835.820	657.298	3582.269	31046.51	52.040	23.305
Median	44421.74	3397.431	1816.950	236	581	5160	36.405	21.580
Std. Dev.	8632.891	747.3142	59.075	856.8434	8730.055	63706.91	31.842	5.722
Skewness	0.727	0.082754	1.481	2.685268	5.877740	3.142	1.537	0.596
Kurtosis	2.402	1.547726	4.503	12.39373	46.88807	13.805	3.968	2.256
Jarque-Bera	13.809	11.92876	44.146	653.7231	11525.98	872.355	41.55399	7.900
Probability	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.0192
Observations	135	135	96	135	135	135	96	96

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