

Are gold and cryptocurrency a safe haven for stocks and bonds? Conventional vs Islamic markets during the COVID-19 pandemic

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Abstract

Purpose – This study aims to identify the ability of gold and cryptocurrency (Cryptocurrency Uncertainty Index (UCRY) Price) as safe haven assets (SHA) for stocks and bonds in both conventional (i.e. stock indices and government bonds) and Islamic markets (i.e. Islamic stock indices and Islamic bonds (IB)).

Design/methodology/approach – The authors employed the nonadditive panel quantile regression model by Powell (2016). It measured the safe haven characteristics of gold and UCRY Price for stock indices, government bonds, Islamic stocks, and IB under gold circumstances and level of cryptocurrency uncertainty, respectively. The period spanned from 11 March 2020 to 31 December 2021.

Findings – This study discovered three findings, including: (1) gold is a strong safe haven for stocks and bonds in conventional and Islamic markets under bearish conditions; (2) UCRY Price is a strong safe haven for conventional stocks and bonds but only a weak safe haven for Islamic stocks under high crypto uncertainty; and (3) gold offers a safe haven in both emerging and developed countries, while UCRY Price provides a better safe haven in developed than in emerging countries.

Practical implications – Gold always wins big for safe haven properties during unstable economy. It can also win over investors who consider shariah compliant products. Therefore, it should be included in an investor's portfolio. Meanwhile, cryptocurrencies are more common for developed countries. Thus, the governments and regulators of emerging countries need to provide more guidance around cryptocurrency so that the societies have better literacy. On top of that, the investors can consider crypto to mitigate risks but with limited safe haven functions.

Originality/value – The originality aspects of this study include: (1) four chosen assets from conventional and Islamic markets altogether (i.e. stock indices, government bonds, Islamic stock indices and IB); (2) indicator countries selected based on the most used and owned cryptocurrencies for the SHA study; and (3) the utilization of UCRY Price as a crypto indicator and a further examination of the SHA study toward four financial assets.

Keywords Conventional assets, Cryptocurrency, Gold, Islamic assets, Safe haven, UCRY price

Paper type Research paper

1. Introduction

The beginning of the COVID-19 pandemic in 2020 was reported as the highest recorded instance of global uncertainty based on the world uncertainty index (WUI) (Ahir *et al.*, 2022). Hence, risk aversion continues to have a significant influence on investors in seeking safe haven assets (SHA) (Aharon *et al.*, 2021) due to infectious diseases (Ali *et al.*, 2022). SHAs move in the opposite direction of other assets in times of a market crisis (Shahzad *et al.*, 2019a).

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In that case, investors take a long position on SHAs when uncertainty increases to preserve their wealth (Kaul and Sapp, 2006).

Gold is still the most popular and most used SHA. It is proven by the average annual prices for gold worldwide from 2015 to 2021, which increased from United States (US)\$ 1,161 to 1,795 (per troy ounce) [1]. Even before the COVID-19 pandemic, gold was found to be a SHA against conventional stocks and/or bonds (Baur and Lucey, 2010; Baur and McDermott, 2010; Lucey and Li, 2015; Li and Lucey, 2017; Shahzad *et al.*, 2019a, 2020). Yet a very limited study of gold as a SHA against Islamic stock markets (Tirosh and Barkai, 2007; Chkili, 2017). Meanwhile, during the COVID-19 pandemic, most of the literature examined and confirmed gold as a SHA against conventional stock indices (Akhtaruzzaman *et al.*, 2021; AlAli, 2020; Kristoufek, 2020; Chemkha *et al.*, 2021; Lahiani *et al.*, 2021; Esparcia *et al.*, 2022).

Based on the above studies, gold has clearly been a favorable SHA throughout history. However, attention from gold has shifted to cryptocurrency. Bitcoin, the most popular digital cryptocurrency, is claimed to be “digital gold” (Disli *et al.*, 2021; Koutmos *et al.*, 2021). Cryptocurrencies have similar hedging and safe haven characteristics to gold (Antonakakis *et al.*, 2019; Shahzad *et al.*, 2019a). Before the COVID-19 pandemic, the studies only focused on Bitcoin which served as a safe haven against conventional stock indices (Kang *et al.*, 2020; Shahzad *et al.*, 2019a; Stensås *et al.*, 2019). It was further studied during the COVID-19 pandemic by investigating more cryptocurrencies (i.e. Bitcoin and Ethereum) and revealed SHA properties against conventional stock indices (Mariana *et al.*, 2021). Będowska-Sójka and Kliber (2021) conducted a comprehensive study and the results revealed that gold serves as a strong SHA, while Bitcoin and Ether have weak SHA properties against conventional stock indices. Disli *et al.* (2021) also investigated both gold and Bitcoin, but against Islamic equity indices, it was revealed that gold and Bitcoin do not possess safe-haven properties.

Notably, we identified that studies on investments which rely on Islamic faith are scarce, while this study has attracted scholars during a subprime crisis (Umar and Gubareva, 2021). It interests more investors’ attention because of the ethical and social responsible features and can be highly considered by both conventional and faith-based investors (Umar *et al.*, 2022a). Regarding the prior works above, we discovered several research gaps, including: (1) there is a dearth of SHA studies on conventional and Islamic bonds (IB) during the COVID-19 pandemic for both gold and cryptocurrency; (2) there are no SHA studies of cryptocurrency against Islamic stock indices during the COVID-19 pandemic; (3) most of the prior works were benchmarking to big stock markets and world-wide indices; and (4) the studies utilized price or return as the cryptocurrency indicator and only focused on the top two cryptocurrencies (i.e. Bitcoin and Ethereum).

Recently introduced by Lucey *et al.* (2021), the Cryptocurrency Uncertainty Index (UCRY) (UCRY Price) measured the size of unpredictable moves in the price of cryptocurrency. Bitcoin – the leading cryptocurrency – experienced an approximate 500% price hike since COVID-19 was declared as a pandemic [2]. However, it also could broadly decline by 30% in an hour [3]. Therefore, we conjecture that the UCRY price is an effective indicator of cryptocurrency volatility in determining SHAs when markets were in turmoil due to the COVID-19 pandemic. To our knowledge, there were only two recent studies discussing SHA by utilizing UCRY Price (Hassan *et al.*, 2021; Karim *et al.*, 2022).

Therefore, our study fills the research gap by contributing to the literature in threefold: (1) it covers four financial assets at once from both conventional and Islamic markets (i.e. stock indices, government bonds, Islamic stocks and IB); it provides better and more comprehensive portfolio investment strategies for investors, especially during market turbulence; (2) it takes a panel setting (i.e. countries’ level over a period); of a SHA study for gold and cryptocurrency which are categorized as the highest cryptocurrency owners and users based on a Statista Global Consumer Survey [4]; hence, it represents a more reliable

depiction of the cryptocurrency market; and (3) it uses UCRY price as the crypto indicator and further examines the SHA properties of those four financial assets.

The rest of the paper is structured as follows. [Section 2](#) provides the literature review. [Section 3](#) describes the data and explains the research methodology. [Section 4](#) presents and discusses the results. [Section 5](#) presents the conclusion and recommendations.

2. Literature review

2.1 Conventional and Islamic markets

The conventional market disregards the “halal-haram” aspects [\[5\]](#) and does not align with the principles of *Shariah* or Islamic law. It uses the concept of interest containing usury, and speculative/manipulative transactions ([Nurhayadi and Rito, 2019](#)). Contrarily, the Islamic market follows the principles of *Shariah* or Islamic law, prohibiting the “halal-haram” aspects. It also applies asset-backed security and equity participation and limitations of investments on assets that are in accordance with Islamic law ([Jawadi et al., 2014](#)).

2.2 The theory of safe haven assets

[Markowitz \(1952\)](#) pioneered the modern portfolio theory with the aim to create the most efficient portfolio possible reducing volatility and the risk of losses by choosing assets that are negatively correlated. Conceptually, a SHA is negatively correlated with another asset under extreme market pressure ([Baur and Lucey, 2010](#)). Therefore, investors tend to seek SHAs to minimize losses during critical periods such as the COVID-19 pandemic ([Akhtaruzzaman et al., 2021](#); [AlAli, 2020](#); [Haddad and Trabelsi, 2021](#)). As a safe haven, an asset must hold its value during market turbulence to limit its exposure to extreme losses ([Disli et al., 2021](#)). Apart from being a safe haven, an asset also can be a hedge if it is negatively correlated with another asset on average and a diversifier if it shows a positively correlation to another asset ([Kliber et al., 2019](#)).

2.3 Gold as a safe haven asset

Gold has been considered as the most dependable SHA throughout history. For example, before the COVID-19 pandemic, gold was a SHA for the US, the United Kingdom (UK) and German stock indices but not a SHA for bonds in any market based on the GARCH (Generalized AutoRegressive Conditional Heteroskedasticity) model ([Baur and Lucey, 2010](#)). Using the cross-quantilogram, this depicted gold as a weak SHA in developed and emerging stock markets ([Shahzad et al., 2019a](#)). Based on the MGARCH DCC (Multivariate GARCH Dynamic Conditional Correlation) model, gold performs as a SHA against the US stocks and bonds during most economic crisis events ([Lucey and Li, 2015](#)). Using an OLS (Ordinary Least Square) regression resulted in gold acting as a SHA for stocks (the US, the UK, Germany, Italy, Japan and India) and bonds (the UK, France, Italy and Canada) ([Li and Lucey, 2017](#)). The Islamic market was examined using the Markov switching approach and suggested gold as a SHA against the Islamic stock market at high volatility ([Chkili, 2017](#)). Another study also using the MGARCH DCC model found that gold is a SHA for Shariah-compliant equities ([Tirosh and Barkai, 2007](#)). Contrarily, a revisited study using the novel VAR (vector autoregressive) for the value at risk (VaR) approach and the cross-quantilogram method revealed that gold does not act as a SHA for the G7 stock and bond markets ([Shahzad et al., 2019b](#)).

Gold has always been a superior SHA during periods of economic uncertainty and crisis ([Hasan et al., 2021](#); [Huang and Chang, 2021](#); [Ji et al., 2020](#); [Liu, 2020](#)). The existing studies have scrutinized the role of gold as a SHA using the DCC GARCH model during two distinct phases of the COVID-19 pandemic. It was found that gold was a SHA for stock indices (i.e. S&P500, equity indices of the Eurozone (EURO) STOXX50, Nikkei225 and China FTSE450) in Phase I (31 December 2019 to 16 March 2020), but it lost its SHA potential in Phase

II (17 March to 24 April 2020) (Akhtaruzzaman *et al.*, 2021). Moreover, using an OLS regression, gold was a SHA for the S&P 500, Shanghai SE, Nikkei 225, Germany stock index (DAX), Australia stock index (ASX) and UK stock exchange (FTSE) 100 over the period of 12 February to 9 April 2020 (AlAli, 2020). Another result applied an A-DCC model and found that gold served as a weak SHA for the S&P 500, EURO STOXX 50 and FTSE 100, except for the Nikkei 225 (Chemkha *et al.*, 2021). Another finding by applying an nonlinear ARDL (autoregressive distributed lag) (NARDL) model has confirmed gold as a SHA against the S&P 500 during the COVID-19 pandemic period (31 December 2019 to 25 June 2021) (Lahiani *et al.*, 2021). By scrutinizing several methodologies (i.e. VaR, wavelet methods and performance assessment), indeed, gold was remarkable as a safe haven property during a recession (Esparcia *et al.*, 2022). An opposite finding using a wavelet coherence analysis found that gold did not exhibit safe haven characteristics against Islamic equity indices during the COVID-19 crisis (Disli *et al.*, 2021). Additionally, new findings using the DCC-Multivariate Stochastic Volatility (MSV) model revealed that gold did not act as a SHA against several indices (i.e. S&P 500, DAX, STOXX 600 and FTSE 250) during the COVID-19 outbreak (Będowska-Sójka and Kliber, 2021).

2.4 Cryptocurrency as a safe haven asset

The emergence of Bitcoin, as the first and largest cryptocurrency, has shifted investors' attention (Bouri *et al.*, 2020; Shahzad *et al.*, 2020). Recently, researchers have started to question whether cryptocurrency (i.e. Bitcoin and Ethereum) is a better SHA than gold (AlAli, 2020; Kristoufek, 2020; Będowska-Sójka and Kliber, 2021; Chemkha *et al.*, 2021; Disli *et al.*, 2021). Before the COVID-19 pandemic, by using a Dynamic Equicorrelation Fractionally Integrated GARCH (DECO-FIGARCH) model, Bitcoin was an effective SHA for the case of the stock market (S&P 500) (Kang *et al.*, 2020). Moreover, by addressing a cross-quantilogram approach from 19 July 2010 to 22 February 2018, Bitcoin was a weak SHA for China stock indices (Shahzad *et al.*, 2019a).

Meanwhile, during the COVID-19 pandemic, cryptocurrency was claimed to be a SHA against several stock indices (i.e. S&P 500, DAX, FTSE 250 and STOXX 600). Using the DCC-MSV model, cryptocurrencies can be considered as SHAs occasionally; (1) Ether SHA against DAX, and S&P 500, and (2) Bitcoin SHA against FTSE 250, STOXX 600, and S&P 500 (Będowska-Sójka and Kliber, 2021). Another finding using the DCC model showed that Ethereum was a SHA against the S&P 500 from 1 July 2019 to 6 April 2020 (Mariana *et al.*, 2021). In contrast, during the COVID-19 pandemic, opposite findings using wavelet coherence revealed that Bitcoin was not a SHA against Islamic equity indices (Disli *et al.*, 2021). Apart from this, similar findings using a DCC model claimed that Bitcoin was not a safe haven property (Lavelle *et al.*, 2022). In addition, Bitcoin did not act as a SHA against the S&P 500 (Conlon and McGee, 2020). Also, a study focused on VaR, conditional value at risk (CVaR), modified value-at-risk (MVaR) and modified CVaR (MCVaR) showed that Bitcoin and Ethereum did not act as a SHA for international equity markets (Conlon *et al.*, 2020).

3. Data and methodology

3.1 Data and sources

This study selected 10 out of 56 countries who owned and used the most cryptocurrencies for the independent variables (i.e. Stock Indices (SI), Government Bonds (GB) and Islamic Stock (IS)) as there was an unavailability of data as detailed in Table 1. Meanwhile, we employed

No	Criteria	Countries
1	Countries with the most used and owned cryptocurrencies	56
2	Countries with unavailable data of Islamic stocks	46
	Countries selected as the sample of this research	10

Table 1.
Selection countries

global data for IB (i.e. Dow Jones Sukuk World) (see [Table A1](#)). The conventional stock indices and government bond variables were proxied as the most common financial assets. For the Islamic stocks and bonds variables, they were also chosen as they were suggested to be invested along with cryptocurrency ([Rehman et al., 2020](#)) in addition to functioning well during the COVID-19 pandemic ([Nomran and Haron, 2021](#)). The first declaration of COVID-19 as a global pandemic was announced by [WHO \(2020\)](#) on 11 March 2020. Therefore, the period of work spanned from 11 March 2020 to 31 December 2021 (i.e. until the paper being studied). Considering the availability of data, we used the weekly frequency prices for all variables. The asset prices used in this study were either given in United States dollar (USD) or converted to USD using applicable exchange rates. Thus, these prices were calculated into the return series $((p_1 - p_0)/p_0)$. As seen in [Table 2](#), it portrays the overview of variables and descriptive statistics.

3.2 Quantile regression for panel data

Referring to prior works of safe haven studies ([Jareño et al., 2020](#); [Kang et al., 2020](#); [Liu, 2020](#); [Hasan et al., 2021](#); [Mokni et al., 2021](#)), we employed a panel quantile regression model to estimate between market and SHA assets. The panel quantile regression method has advantages to examine the various responses of the dependent variable to changes in the independent variables using their various quantiles instead of focusing on the mean effect ([Cepoi, 2020](#); [Khalid et al., 2021](#); [Liu, 2020](#)) and is more robust when outliers and fat tails exist ([Huang et al., 2017](#); [Jareño et al., 2020](#)). Therefore, the underlying model of the panel quantile regression is:

$$Q_{y_{it}}(\tau|x_{i,t}) = \alpha_i + x_{i,t}^T\beta(\tau), \tag{1}$$

Most quantile panel data estimators by [Galvao \(2011\)](#), [Koenker \(2004\)](#), and [Ponomareva \(2011\)](#) include the additive fixed effect (α_i). They provide estimates about the distribution of $(Y_{it} - \alpha_i)$ given D_{it} instead of Y_{it} given D_{it} . According to [Powell \(2016\)](#), it is undesirable in many empirical studies because observations close to the top of $(Y_{it} - \alpha_i)$ distribution may be close to the bottom of the Y_{it} . In other words, the additive fixed effect model only shows information about the effect of the policy on the outcome relative to the fixed effect distribution because the disturbance term has been separated.

Hence, [Powell \(2016\)](#) proposed a panel quantile regressions estimator with the nonadditive fixed effect to uphold the nonseparable disturbance term linked with the quantile estimation that may be interpreted similarly to those obtained from a cross-section regression. The equation is as follows

$$Y_{i,t} = D'_{i,t}\beta U_{i,t}^* \text{ with } U_{i,t}^* \sim U(0, 1), \tag{2}$$

where $D'_{i,t}\beta(\tau)$ is strictly escalating in quantile τ , and $U_{i,t}^*$ serve as the function of the disturbance term and proneness for the outcome ([Doksum, 2007](#)). In [equation \(2\)](#),

Table 2.
Summary statistics,
cross section
dependency, panel unit
root and
Westerlund tests

Variable	Obs	Mean	Std. Dev	Min	Max	CD-test	CADF	Westerlund
Gold	950	0.002	0.0236	-0.0587	0.1063	65.3835***	309.6210***	-2.3524***
UCRY Price	950	0.0003	0.0125	-0.0322	0.0401	65.3835***	355.9230***	-3.4083***
SI	950	0.0035	0.0333	-0.2072	0.2019	33.8250***	304.0610***	
GB	950	-0.0008	0.0178	-0.1624	0.1413	14.4747***	218.5160***	
IS	950	0.0038	0.0343	-0.2135	0.1773	25.9048***	297.9690***	
IB	950	0.0006	0.0062	-0.0677	0.0457	49.3389***	173.6580***	
Note(s): Data for Gold, SI, GB, IS, and IB are from www.investing.com , while UCRY price from https://brianmlucey.wordpress.com/ ; *** stands for 1% level of significance								

the structural quantile function (SQF) outlines the quantile outcome variable $Y_d = d'\beta(U^*)$ for randomly selected $U^* \sim U(0, 1)$. This SQF is similar to Chernozhukov and Hansen's (2008) terminology which can be illustrated by the following specification:

$$S_Y(\tau|d) = d'\beta(\tau) \text{ with } \tau \in (0, 1), \quad (3)$$

Consequently, this study designates the panel quantile regression to estimate the response of Gold and UCRY Price against SI, GB, IS and IB under the different market conditions and uncertainties. Thus, the enhancement of equation (1) becomes:

$$(Gold|UCRY \text{ Price})_{i,t}(\tau|\alpha_i, \delta_i, x_{i,t}) = \alpha_i + \delta_i + \beta_{1,\tau}SI_{i,t} + \beta_{2,\tau}GB_{i,t} + \beta_{3,\tau}IS_{i,t} + \beta_{4,\tau}IB_{i,t}, \quad (4)$$

where α_i signifies "the non-adaptive fixed effects" and $x_{i,t}$ signifies the matrix of the regressors at individual countries i and time t .

Considering the quantile, we followed previous research (Das et al., 2020; Zhu et al., 2020) and classify them into three phases: lower (5%–25%), middle (50%) and upper (75%–95%) quantiles. As for gold, it represents the bearish, normal and bullish markets, respectively (Das et al., 2020). A negative significant (insignificant) coefficient signifies (1) a strong (weak) safe haven under bearish, (2) a strong (weak) hedge under normal and bullish condition. A positive coefficient signifies a diversifier. Meanwhile, it represents low, normal and high uncertainty, respectively for UCRY Price (Hasan et al., 2021). Therefore, it has a reverse meaning to gold circumstances. A positive significant (insignificant) coefficient signifies (1) a strong (weak) safe haven under high uncertainty, (2) a strong (weak) hedge under low and normal uncertainty. A negative coefficient signifies a diversifier. This will be able to study the heterogeneous responses of gold return and UCRY Price uncertainty to changes in SI, GB, IS and IB at diverse points of the conditional distribution of Gold and UCRY Price.

Accordingly, the implementation of the panel quantile regression approach required that first we applied the cross-section dependency test based on Pesaran (2004) to ensure that there was cross-sectional dependency. Second, we checked the panel unit root test following Pesaran (2007) for each variable whether they were stationary at the level or first difference. Third, we estimated the cointegration test to identify the long-run relationship among the variables using a Westerlund (2005) test. Overall, the three required tests indicated there was cross-section dependency within the data sets across the countries, the unit root was not present on all of the variables, and both panels (i.e. gold and UCRY Price), showing that the variables had a long-run relationship (see Table 2). Finally, we ran the panel quantile regression using the nonadditive fixed effect model of Powell (2016) to analyze the potential SHA, especially during a bearish market (lower quantile) and high uncertainty (upper quantile) for gold and UCRY price, respectively.

4. Results and discussion

4.1 Panel quantile regression results

4.1.1 Results on gold. In referring to Table 3, we found negative gold coefficients to SI in all market conditions (5%–95%) but these were not significant under bearish (5%) and bullish (90%) markets. This signifies that gold offered a strong safe haven in bearish conditions (10% and 25%) and a weak safe haven in extremely bearish conditions (5%), while there was a strong hedge on normal and bull markets (50%, 75% and 95%). This confirmed Baur and Lucey's (2010) results. The coefficient of gold was significantly negative under bearish (5% and 10%) markets that proved a strong safe haven for GB. It was consistent with the results of Lucey and Li (2015). Meanwhile, there was a strong hedge under a bullish (90%) market. Besides that, it could function as a diversifier on average, reflecting positive results under distinct conditions (i.e. bear: 25%; normal: 50%; bull: 75% and 95%).

Table 3.
Panel quantile result of
gold and UCRY price

Quantiles	DV: Gold				DV: UCRY price			
	SI	GB	IS	IB	SI	GB	IS	IB
0.05	-0.0001	-0.0854***	-0.0039***	-0.4539***	-0.0594***	-0.0674***	0.0542***	0.4817***
0.1	-0.1305***	-0.11238***	0.0659***	-0.0843***	-0.8872***	-0.0252***	0.071***	0.5561***
0.25	-0.3187***	0.0685***	0.1830***	0.5262***	-0.0310***	0.0503***	0.0050***	0.3082***
0.5	-0.1997***	0.0063***	0.1853***	0.1036***	0.0024***	0.0093***	-0.0017***	0.0069***
0.75	-0.2736***	0.0031***	0.2417***	0.1951***	0.0010***	0.0003***	-0.0019***	-0.1663***
0.9	-1.1085***	-0.0798***	0.902***	-0.9777***	0.0191***	-0.3842***	0.0094***	-0.3189***
0.95	-0.8001***	0.2613***	0.6311***	-0.6864***	0.0552***	-0.1098***	-0.2058***	-0.8272***
Note(s): ***, ***, * stands for 1% and 5% level of significance; The significance in italics implied safe haven assets								

For IS, it was found that gold outlines a negative significant coefficient in an extremely bearish (5%) market. Other conditions showed positive significant coefficients, excluding the bullish (90%) market. This implied that gold acted as a safe haven and diversifier against IS as found earlier by [Chkili \(2017\)](#) and [Raza et al. \(2016\)](#), respectively. As for IB, gold was negative and significant under bearish (5%) and bullish (90% and 95%) markets. It implied that gold could be a safe haven for IB in market crises and a hedge on average. Gold was also presented as a diversifier to IB during the various gold market conditions (25%, 50% and 75%), as evidenced by [Maghyereh et al. \(2019\)](#).

4.1.2 Results of the UCRY price. Based on [Table 3](#), UCRY price exhibited positive coefficients to SI from normal (50%) to high (75%–95%) uncertainty. UCRY Price could act as a strong hedge during normal times. It also could be a strong (weak) safe haven against SI under high (extreme high) crypto uncertainty, confirming the findings of [Mariana et al. \(2021\)](#). Furthermore, we found that UCRY Price had a negative significant coefficient at low (5%–25%) uncertainty, acting as a diversifier against stock indices which was similar to [Kristoufek \(2020\)](#). Regarding the UCRY price-GB relationship, it was likely to be a positive and significant coefficient under various cryptocurrency levels (i.e. low: 25%; normal: 50% and high: 75%). This suggested that UCRY Price could function as a safe haven for GB during high uncertainty. It was also in line with [Mokni et al. \(2021\)](#), in which the cryptocurrency also offered a hedge on average. Moreover, the linkage was negative when uncertainty was low (5% and 10%) and high (90% and 95%) implying cryptocurrency could act as a diversifier as it moved in the same direction as bonds ([Baur et al., 2018](#)).

In the case of IS, UCRY price had a positive coefficient under low (5%–25%) and high (90%) uncertainty. Thus, the results corroborated [Chkili et al. \(2021\)](#) who showed that Bitcoin offered a strong hedge on average and could perform as a weak safe haven at high uncertainty. Additionally, UCRY price revealed a negatively significant coefficient to IS at normal (50%) and high (75%) uncertainty, suggesting cryptocurrency could function as a good diversifier against IS. If we considered the coefficients of UCRY Price to IB, we noted significance at all levels of uncertainty. Meanwhile, it was positive on lower (5%–25%) to normal (50%) uncertainty while negative in high (75%–95%) uncertainty. The coefficient also decreased as UCRY Price moved from low to high uncertainty. This finding exhibited that UCRY price served as a strong hedge on average instead of being a SHA against IB, confirming the results of [Mensi et al. \(2020\)](#).

4.2 Robustness analysis

We estimated the results for (1) different periods by separating the full sample into two subsample periods: 2020 and 2021 (2) different country categories for emerging (i.e. Nigeria, Thailand, Indonesia, Malaysia, India and China), and developed countries (i.e. United States, Canada, Taiwan and Japan) [\[6\]](#), and (3) the utilization of CRYPTO CURRENCIES INDEX 30 (CCI30) index to examine whether or not the results changed compared to UCRY Price.

4.2.1 Results of different periods. In the case of Gold, it was consistent with the full sample result (see [Table 4](#)). Specifically, it was negative to SI, GB, IS and IB in the bearish market in 2020, denoting a SHA characteristic. However, the dependence of gold and GB in 2021 has changed as it does not show any safe haven characteristics. As for UCRY Price, it had a positive and significant coefficient to GB and SI under high cryptocurrency uncertainty both in 2020 and 2021 (see [Table 5](#)). Meanwhile, we found UCRY Price also provided a SHA to IS in 2020 by exhibiting a positive coefficient. This confirmed the above results which offered a potential safe haven role.

4.2.2 Results of different country categories. Gold behaved negatively toward SI, GB, IS, and IB during the downside conditions of emerging countries which pointed it out as a SHA (see [Table 6](#)). This was contrary to [Baur and Mcdermott's \(2010\)](#) findings, who found a minor

Table 4.
Results of gold in 2020
and 2021

Quantiles	2020				2021			
	SI	GB	IS	IB	SI	GB	IS	IB
0.05	-0.1637***	-0.1736***	0.0772***	0.0051***	-0.0019***	0.0843***	0.0084***	-2.2011***
0.1	-0.0549**	-0.0726***	-0.0219***	-0.1044***	-7.497	5.2484	4.0636	5.954
0.25	-0.2895***	-0.0204***	0.1393***	1.1285***	0.0017	0.1071***	-0.0069***	0.5875***
0.5	-0.3588***	0.0019	0.2864***	-0.0533***	0.0874***	0.0501***	0.0018	-0.9891**
0.75	-0.1198***	-0.2450***	0.0737***	-1.8785***	-0.0095***	0.0338***	-0.0070***	1.2900***
0.9	-37.3179***	-7.1728***	27.4871***	-59.1972***	-0.0078***	0.0446***	-0.0640***	1.0366***
0.95	-0.2070***	-0.2675***	0.1828***	-0.2743***	-1.1718	0.9815	3.8437	-20.5905
Note(s): ***, ***, * stands for 1% and 5% level of significance; The significance in italics implied safe haven assets								

Quantiles	2020				2021			
	SI	GB	IS	IB	SI	GB	IS	IB
0.05	-0.0214***	0.0247***	-0.0014***	0.0787***	-0.0135***	-0.1055***	-0.0569***	0.6862***
0.1	-0.0024***	0.0067***	-0.0006***	0.0278***	-0.9155***	-0.1119***	0.0149***	0.6820***
0.25	0.0005***	0.0021***	-0.0003***	0.0588***	-0.0809***	-0.0350***	0.0152***	0.1599***
0.5	-0.0214***	-0.0006***	-0.0014***	0.0787***	-0.0393***	-0.0255***	-0.0066***	0.2802***
0.75	-0.0009***	0.0009***	0.0003***	-0.1917***	-0.0062***	-0.0035***	-0.0020***	-0.6926***
0.9	0.0063***	0.0128***	0.0047***	-0.1752***	0.0647***	-0.1610***	-0.0032***	-4.6093***
0.95	0.0313***	0.0119***	0.0006***	-0.2416***	0.1379***	0.5275***	-0.0524***	-4.4943***
Note(s): ***, **, * stands for 1% and 5% level of significance; The significance in italics implied safe haven assets								

Table 5.
Results of UCRY price
in 2020 and 2021

Table 6.
Results of gold in
emerging and
developed countries

Quantiles	Emerging			Developed			IB
	SI	GB	IS	IB	SI	GB	
0.05	0.0049***	0.0447***	-0.0416***	-0.4198***	-0.0251***	-0.3755***	-0.8651***
0.1	-0.0178***	-0.0185***	-0.0473***	-0.0428***	-0.1255***	-0.1341***	0.8777***
0.25	-0.0685***	-0.0056***	-0.0190***	0.6779***	-1.3250***	0.1306***	1.0561***
0.5	-1.2582***	0.4952***	1.478***	0.6771***	-0.3444***	0.0478***	0.6738***
0.75	-0.2569***	-0.0004***	0.2325***	0.2956***	-0.2561***	-0.1953***	0.0982***
0.9	0.4540***	-0.0484***	0.4410***	-1.0211***	-0.1355***	-0.3808***	-1.2963***
0.95	-0.5574***	0.0483***	0.4352***	-2.1872***	-0.0529***	-0.1735***	-2.0225***
Note(s): ***, **, * stands for 1% and 5% level of significance; The significance in italics implied safe haven assets							

SHA ability of Gold in emerging markets. Gold also acted as a SHA to SI, GB and IB except for IS in developed countries. We determined that UCRY Price reacted positively under high uncertainty (1) to SI in emerging and developed countries, and (2) to GB, IS and IB in developed countries (see [Table 7](#)). However, it performed as a strong (weak) safe haven for SI in emerging (developed) countries. This denoted that UCRY Price could only offer a better SHA to GB, IS and IB in the developed countries compared with emerging countries during uncertain times.

4.2.3 Results of the CCI30 index. Compared to UCRY price, we employed the CCI30 index as another representative of the cryptocurrency market ([Rivin and Scevola, 2017](#)). It represents the growth as well as daily and long-term movement of the blockchain sector [\[7\]](#). This index has also been utilized in prior works ([Jalal et al., 2020](#); [Dutta and Bouri, 2022](#); [Vidal-Tomás, 2022](#)). The results exhibited that the CCI30 index performed negatively significant to GB under a bearish condition, implying it as a SHA (see [Table 8](#)) which is in line with the UCRY price results, but contrary with [Lavelle et al. \(2022\)](#). For the rest of the results under a low quantile (i.e. bearish), it only showed crypto as a diversifier.

4.3 Discussion

Our findings consisted of gold and UCRY price results. Gold was a SHA against stocks and bonds for conventional and Islamic markets during the COVID-19 pandemic because risk-averse investors prefer gold in their portfolios. This was predictable because gold has maintained its value throughout various critical times. Uncertain times triggered gold demand and hence price increase since more investors would be searching for safer options ([Gubareva et al., 2022](#)).

For UCRY Price, we discovered that cryptocurrency can serve as a strong (weak) SHA for conventional stocks and bonds (Islamic stocks) under high crypto uncertainty. The beginning of the COVID-19 pandemic caused lower returns or even losses to most conventional assets ([Nomran and Haron, 2021](#)) and Islamic stocks ([Chkili et al., 2021](#)). Meanwhile, the pandemic also impacted cryptocurrency to gain positive media attention. Positive sentiment toward the crypto market increased crypto prices ([Gurdgiev and O'Loughlin, 2020](#)). Thus, if the assets decreased in price under high uncertainty, investors could get a higher return from cryptocurrency to cover their losses. Moreover, UCRY Price qualified to serve as a weak SHA for Islamic stocks during the high uncertainty of crypto states.

Our robustness check confirmed that both gold and UCRY Price could serve more potential SHA characteristics during the pandemic in 2020 than 2021. Notably, the world faced the greatest economic damage in the year 2020 at a time which plunged most countries into a recession due to the spread of the COVID-19 pandemic [\[8\]](#). UCRY price faded in its ability as a SHA in 2021 as the global economy started to recover. Additionally, we inferred gold could be used as a SHA for conventional and Islamic markets in both emerging and developed countries as proven earlier by [Baur and Mcdermott \(2010\)](#). Historically, gold is the most trustable asset for world-wide investors in times of a crisis. Next, UCRY price had more potential to be a SHA for conventional (i.e. GB) and Islamic markets (i.e. IS and IB) in developed (i.e. China, Canada, the US and Japan) than emerging countries, supporting the results of [Stensås et al. \(2019\)](#). Developed countries have higher literacy in utilizing the cryptocurrency than emerging countries. In addition, both UCRY price and the CCI30 index provide a SHA for conventional bonds (i.e. GB) in times of a market crisis, while the rest of the results revealed dissimilar findings. This may be caused by having divergence in the index's base construction; UCRY price is constructed based on news, while the CCI30 index is constructed based on the top 30 cryptocurrencies by market capitalization.

Table 7.
Results of UCRY price
in emerging and
developed countries

Quantiles	Emerging			Developed			IB
	SI	GB	IS	IB	SI	GB	
0.05	-0.1760***	0.0149***	0.1060***	0.2437***	-0.0141***	-0.0428***	1.1229***
0.1	-0.0684***	-0.0017***	0.0286***	0.3436***	0.0064***	-0.0762***	0.7584***
0.25	-0.0231***	0.0375***	0.0025***	0.2535***	-0.0141***	-0.0372***	0.4149***
0.5	0.0041***	0.0107***	-0.0020***	0.0193***	0.0664***	-0.5571***	-0.4204***
0.75	0.0166***	-0.0004***	-0.0297***	-0.1106***	-0.0129***	0.0051***	-0.1102***
0.9	0.1338***	-0.1318***	-0.1278***	-0.3766***	0.001***	-0.0044***	-1.0061***
0.95	4.9393***	-0.6334***	-4.1953***	-7.9924***	-0.5192***	0.3278***	0.3745***
Note(s): *** stands for 1 % level of significance; The significance in italics implied safe haven assets							

5. Conclusion and future research

We found that gold was a SHA for conventional and Islamic investors during the COVID-19 pandemic period. Gold was preferable as it was a stable asset in times of a crisis as well as Shariah-compliant. Besides that, cryptocurrency could be another strong safe haven option for conventional assets but only a weak safe haven for Islamic assets (i.e. IS) under high uncertainty. High crypto uncertainty often leads to highly volatile prices which allow investors to potentially have a higher reward (return). In that sense, conventional investors are likely to invest in crypto as they are more open to speculative elements compared with Islamic investors. We confirmed the safe haven characteristics of the results that the assets were negatively correlated during a market crash but could be positively or negatively correlated on average (Baur and Lucey, 2010) by distinguishing between the first and second year of the COVID-19 pandemic. In addition, gold offered a SHA for emerging and developed countries because it was the most popular choice for safe investments. Despite cryptocurrencies being widely used in emerging countries, cryptocurrency was a better SHA for developed countries as there are more developed countries whose governments classify cryptocurrency as legal [9].

Overall, our results could benefit investors in diversifying their portfolios to mitigate losses as the COVID-19 pandemic has an inconclusive end. Our findings suggest implications for conventional and Islamic investors to add gold and consider cryptocurrency as their SHA during uncertain conditions. For policymakers, regulators and the government, they could provide more discussions on cryptocurrency as an alternative investment opportunity. Notably, it is still essential for them to stay aware and devise guidelines as cryptocurrency has speculative and fluctuating aspects. Specifically, it must warn amateur investors who are more attracted to invest in cryptocurrency during high volatility (Jalal *et al.*, 2020).

We provide recommendations for future studies. First, our method disregards the dependency between the quantile of independent (i.e. financial assets) and dependent (i.e. gold and crypto market) variables. Therefore, future studies could use a quantile-on-quantile method as the quantiles of the independent variable may have different impacts on the quantiles of the dependent variable which has been applied in previous research (Hasan *et al.*, 2021; Bossman *et al.*, 2022). They can benefit from seeing more accurate and clearer relationships between the variables in certain conditions. Second, instead of utilizing only one cryptocurrency index, future studies can compare the SHA ability in various crypto indexes: CCI30, UCRY Price, UCRY Policy and cryptocurrency environmental policy index (ICEA) for different countries or regions in conventional and Islamic markets. Therefore, it can capture different perspectives from each index. It can also be extended to other financial markets: NFTs that show a significant increase of interest among investors recently (Umar *et al.*, 2022b, c; Vidal-Tomás, 2022) and fiat currencies (Umar and Gubareva, 2020; Umar *et al.*, 2021).

Quantiles	DV: CCI30 index			
	SI	GB	IS	IB
0.05	0.3118***	0.3505***	0.3457***	8.8046***
0.1	0.7711***	0.7528***	0.6157***	1.8627***
0.25	0.4544***	-0.0936***	0.4752***	1.1259***
0.5	128.8496	-59.1893	18.4729	-339.8276
0.75	0.2817***	-0.4286***	0.1548***	-4.2725***
0.9	0.2320***	-1.2036***	0.1326***	-3.5178***
0.95	0.8861***	-1.0370***	-0.4560***	-5.9591***

Note(s): ***, ** stands for a 1% and 5% level of significance; interpretation is similar with gold; The significance in italics implied safe haven assets

Table 8.
Results of the
CCI30 index

Third, many predictions have stated that in the year of 2023, it is heading towards a recession. As a result, it would be interesting for future studies to forecast whether gold or crypto can still potentially be SHAs during the recession.

Notes

1. For the average prices for gold worldwide from 2014 to 2025, see: <https://www.statista.com/statistics/675890/average-prices-gold-worldwide/>
2. When the pandemic emerged, Bitcoin could be purchased at \$7,900 but today it costs \$46,000 based on <https://coinmarketcap.com/>
3. See: <https://www.forbes.com/sites/nicolelapin/2021/12/23/explaining-cryptos-volatility/>
4. See: <https://www.statista.com/statistics/675890/average-prices-gold-worldwide/>
5. It includes interest rates from lending money or investments in businesses which are engaged in alcohol production, pork-related products and ammunition.
6. We categorize the countries by the gross national income (GNI) per capita per year. An upper high-income country (GNI >\$12,695) is classified as a developed country and a middle to lower-income country (GNI <\$12,695) is listed as a developing country. See: <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>
7. See: <https://cci30.com/>
8. See: <https://www.worldbank.org/en/news/feature/2020/06/08/the-global-economic-outlook-during-the-covid-19-pandemic-a-changed-world>
9. See: <https://www.thomsonreuters.com/en-us/posts/wp-content/uploads/sites/20/2022/04/Cryptos-Report-Compendium-2022.pdf>

References

- Aharon, D.Y., Umar, Z. and Vo, X.V. (2021), "Dynamic spillovers between the term structure of interest rates, bitcoin, and safe-haven currencies", *Financial Innovation*, Springer Berlin Heidelberg, Vol. 7 No. 1, doi: [10.1186/s40854-021-00274-w](https://doi.org/10.1186/s40854-021-00274-w).
- Ahir, H., Bloom, N. and Furceri, D. (2022), "The world uncertainty index", working paper 29763, National Bureau of Economic Research, February 2022.
- Akhtaruzzaman, M., Boubaker, S., Lucey, B.M. and Sensoy, A. (2021), "Is gold a hedge or safe haven asset in the COVID-19 crisis?", *Economic Modelling*, Vol. 102, p. 105588, doi: [10.2139/ssrn.3621358](https://doi.org/10.2139/ssrn.3621358).
- AlAli, M.S. (2020), "Safe haven assets: are they still safe during COVID-19 pandemic period?", *European Journal of Economic and Financial Research*, Vol. 4 No. 1, pp. 91-98, doi: [10.5281/zenodo.3777255](https://doi.org/10.5281/zenodo.3777255).
- Ali, S., Yousaf, I. and Umar, Z. (2022), "Infectious disease (COVID-19)-related uncertainty and the safe-haven features of bonds markets", *Review of Behavioral Finance*, Vol. ahead-of-print No. ahead-of-print, doi: [10.1108/RBF-04-2021-0069](https://doi.org/10.1108/RBF-04-2021-0069).
- Antonakakis, N., Chatziantoniou, I. and Gabauer, D. (2019), "Cryptocurrency market contagion: market uncertainty, market complexity, and dynamic portfolios", *Journal of International Financial Markets, Institutions and Money*, Vol. 61, pp. 37-51, doi: [10.1016/j.intfin.2019.02.003](https://doi.org/10.1016/j.intfin.2019.02.003).
- Baur, D.G. and Lucey, B.M. (2010), "Is gold a hedge or a safe haven? An analysis of stocks, bonds, and gold", *Financial review*, Vol. 45 No. 2, pp. 217-229, doi: [10.2139/ssrn.952289](https://doi.org/10.2139/ssrn.952289).
- Baur, D.G. and Mcdermott, T.K. (2010), "Is gold a safe haven? International evidence", *Journal of Banking and Finance*, Vol. 34 No. 8, pp. 1886-1898, doi: [10.1016/j.jbankfin.2009.12.008](https://doi.org/10.1016/j.jbankfin.2009.12.008).
- Baur, D.G., Hong, K.H. and Lee, A.D. (2018), "Bitcoin: medium of exchange or speculative assets?", *Journal of International Financial Markets, Institutions and Money*, Vol. 54, pp. 177-189, doi: [10.1016/j.intfin.2017.12.004](https://doi.org/10.1016/j.intfin.2017.12.004).

- Będowska-Sójka, B. and Kliber, A. (2021), "Is there one safe-haven for various turbulences? The evidence from gold, bitcoin, and ether", *North American Journal of Economics and Finance*, Vol. 56 No. 101390, doi: [10.1016/j.najef.2021.101390](https://doi.org/10.1016/j.najef.2021.101390).
- Bossmann, A., Umar, Z. and Teplova, T. (2022), "Modelling the asymmetric effect of COVID-19 on REIT returns: a quantile-on-quantile regression analysis", *Journal of Economic Asymmetries*, Elsevier B.V., Vol. 26 June, p. e00257, doi: [10.1016/j.jeca.2022.e00257](https://doi.org/10.1016/j.jeca.2022.e00257).
- Bouri, E., Shahzad, S.J.H., Roubaud, D., Kristoufek, L. and Lucey, B. (2020), "Bitcoin, gold, and commodities as safe havens for stocks: new insight through wavelet analysis", *Quarterly Review of Economics and Finance*, Vol. 77, pp. 156-164, doi: [10.1016/j.qref.2020.03.004](https://doi.org/10.1016/j.qref.2020.03.004).
- Cepoi, C.O. (2020), "Asymmetric dependence between stock market returns and news during COVID-19 financial turmoil", *Finance Research Letters*, Vol. 36 No. 101658, doi: [10.1016/j.frl.2020.101658](https://doi.org/10.1016/j.frl.2020.101658).
- Chemkha, R., BenSaida, A., Ghorbel, A. and Tayachi, T. (2021), "Hedge and safe haven properties during COVID-19: evidence from bitcoin and gold", *Quarterly Review of Economics and Finance*, Vol. 82, pp. 71-85, doi: [10.1016/j.qref.2021.07.006](https://doi.org/10.1016/j.qref.2021.07.006).
- Chernozhukov, V. and Hansen, C. (2008), "Instrumental variable quantile regression: a robust inference approach", *Journal of Econometrics*, Vol. 142 No. 1, pp. 379-398, doi: [10.1016/j.jeconom.2007.06.005](https://doi.org/10.1016/j.jeconom.2007.06.005).
- Chkili, W. (2017), "Is gold a hedge or safe haven for Islamic stock market movements? A Markov switching approach", *Journal of Multinational Financial Management*, Vol. 42 No. 43, pp. 152-163, doi: [10.1016/j.mulfin.2017.10.001](https://doi.org/10.1016/j.mulfin.2017.10.001).
- Chkili, W., Rejeb, A.B. and Arfaoui, M. (2021), "Does bitcoin provide hedge to Islamic stock markets for pre- and during COVID-19 outbreak? A comparative analysis with gold", *Resources Policy*, Vol. 74 No. 102407, doi: [10.1016/j.resourpol.2021.102407](https://doi.org/10.1016/j.resourpol.2021.102407).
- Conlon, T. and McGee, R. (2020), "Safe haven or risky hazard? Bitcoin during the COVID-19 bear market", *Finance Research Letters*, Vol. 35, p. 101607, doi: [10.1016/j.frl.2020.101607](https://doi.org/10.1016/j.frl.2020.101607).
- Conlon, T., Corbet, S. and McGee, R.J. (2020), "Are cryptocurrencies a safe haven for equity markets? An international perspective from the COVID-19 pandemic", *Research in International Business and Finance*, Vol. 54, p. 101248, doi: [10.1016/j.ribaf.2020.101248](https://doi.org/10.1016/j.ribaf.2020.101248).
- Das, D., Le Roux, C.L., Jana, R.K. and Dutta, A. (2020), "Does bitcoin hedge crude oil implied volatility and structural shocks? A comparison with gold, commodity, and the US dollar", *Finance Research Letters*, Vol. 36, p. 101335, doi: [10.1016/j.frl.2019.101335](https://doi.org/10.1016/j.frl.2019.101335).
- Disli, M., Nagayev, R., Salim, K., Rizkiah, S.K. and Aysan, A.F. (2021), "In search of safe haven assets during COVID-19 pandemic: an empirical analysis of different investor types", *Research in International Business and Finance*, Vol. 58, p. 101461, doi: [10.1016/j.ribaf.2021.101461](https://doi.org/10.1016/j.ribaf.2021.101461).
- Doksum, K. (2007), "Empirical probability plots and statistical inference for nonlinear models in the two-sample case", *The Annals of Statistics*, Vol. 2, doi: [10.1214/aos/1176342662](https://doi.org/10.1214/aos/1176342662).
- Dutta, A. and Bouri, E. (2022), "Outliers and time-varying jumps in the cryptocurrency markets", *Journal of Risk and Financial Management*, Vol. 15, p. 3, doi: [10.3390/jrfm15030128](https://doi.org/10.3390/jrfm15030128).
- Esparcia, C., Jareño, F. and Umar, Z. (2022), "Revisiting the safe haven role of gold across time and frequencies during the COVID-19 pandemic", *North American Journal of Economics and Finance*, Vol. 61, doi: [10.1016/j.najef.2022.101677](https://doi.org/10.1016/j.najef.2022.101677).
- Galvao, A.F. (2011), "Quantile regression for dynamic panel data with fixed effects", *Journal of Econometrics*, Vol. 164 No. 1, pp. 142-157, doi: [10.1016/j.jeconom.2011.02.016](https://doi.org/10.1016/j.jeconom.2011.02.016).
- Gubareva, M., Umar, Z., Sokolova, T. and Vo, X.V. (2022), "Astonishing insights: emerging market debt spreads throughout the pandemic", *Applied Economics*, Routledge, Vol. 54 No. 18, pp. 2067-2076, doi: [10.1080/00036846.2021.1984383](https://doi.org/10.1080/00036846.2021.1984383).
- Gurdgiev, C. and O'Loughlin, D. (2020), "Herdling and anchoring in cryptocurrency markets: investor reaction to fear and uncertainty", *Journal of Behavioral and Experimental Finance*, Vol. 25, p. 100271, doi: [10.1016/j.jbef.2020.100271](https://doi.org/10.1016/j.jbef.2020.100271).

- Haddad, H.B. and Trabelsi, N. (2021), "Better safe havens during COVID-19: a comparison between Islamic and selected financial assets", *Journal of Islamic Monetary Economics and Finance*, Vol. 7 No. 1, pp. 33-82, doi: [10.21098/jimf.v7i0.1343](https://doi.org/10.21098/jimf.v7i0.1343).
- Hasan, M.B., Hassan, M.K., Karim, Z.A. and Rashid, M.M. (2021), "Exploring the hedge and safe haven properties of cryptocurrency in policy uncertainty", *Finance Research Letters*, Vol. 46, p. 102272, doi: [10.1016/j.frl.2021.102272](https://doi.org/10.1016/j.frl.2021.102272).
- Hassan, M.K., Hasan, M.B. and Rashid, M.M. (2021), "Using precious metals to hedge cryptocurrency policy and price uncertainty", *Economics Letters*, Vol. 206, p. 109977, doi: [10.1016/j.econlet.2021.109977](https://doi.org/10.1016/j.econlet.2021.109977).
- Huang, W. and Chang, M.S. (2021), "Gold and government bonds as safe-haven assets against stock market turbulence in China", *SAGE Open*, Vol. 11 No. 1, doi: [10.1177/2158244021990655](https://doi.org/10.1177/2158244021990655).
- Huang, Q., Zhang, H., Chen, J. and He, M.J.J.B.B. (2017), "Quantile regression models and their applications: a review", *Journal of Biometrics and Biostatistics*, Vol. 8 No. 3, doi: [10.4172/2155-6180.1000354](https://doi.org/10.4172/2155-6180.1000354).
- Jalal, R.N.U.D., Sargiacomo, M., Sahar, N.U. and Fayyaz, U.E.R. (2020), "Herding behavior and cryptocurrency: market asymmetries, inter-dependency and intra-dependency", *Journal of Asian Finance, Economics and Business*, Vol. 7 No. 7, pp. 27-34, doi: [10.13106/jafeb.2020.vol7.no7.027](https://doi.org/10.13106/jafeb.2020.vol7.no7.027).
- Jareño, F., de la O González, M., Tolentino, M. and Sierra, K. (2020), "Bitcoin and gold price returns: a quantile regression and NARDL analysis", *Resources Policy*, Vol. 67, doi: [10.1016/j.resourpol.2020.101666](https://doi.org/10.1016/j.resourpol.2020.101666).
- Jawadi, F., Jawadi, N. and Louhichi, W. (2014), "Conventional and Islamic stock price performance: an empirical investigation", *International Economics*, Vol. 137, pp. 73-87, doi: [10.1016/j.inteco.2013.11.002](https://doi.org/10.1016/j.inteco.2013.11.002).
- Ji, Q., Zhang, D. and Zhao, Y. (2020), "Searching for safe-haven assets during the COVID-19 pandemic", *International Review of Financial Analysis*, Vol. 71 No. 101526, doi: [10.1016/j.irfa.2020.101526](https://doi.org/10.1016/j.irfa.2020.101526).
- Kang, S.H., Yoon, S.M., Bekiros, S. and Uddin, G.S. (2020), "Bitcoin as hedge or safe haven: evidence from stock, currency, bond and derivatives markets", *Computational Economics*, Vol. 56 No. 2, pp. 529-545, doi: [10.1007/s10614-019-09935-6](https://doi.org/10.1007/s10614-019-09935-6).
- Karim, S., Naeem, M.A., Mirza, N. and Paule-Vianez, J. (2022), "Quantifying the hedge and safe-haven properties of bond markets for cryptocurrency indices", *The Journal of Risk Finance*, Vol. 23 No. 2, pp. 191-205, doi: [10.1108/JRF-09-2021-0158](https://doi.org/10.1108/JRF-09-2021-0158).
- Kaul, A. and Sapp, S. (2006), "Y2K fears and safe haven trading of the U.S. dollar", *Journal of International Money and Finance*, Vol. 25 No. 5, pp. 760-779, doi: [10.1016/j.jimonfin.2006.04.003](https://doi.org/10.1016/j.jimonfin.2006.04.003).
- Khalid, N., Zafar, R.F., Syed, Q.R., Bhowmik, R. and Jamil, M. (2021), "The heterogeneous effects of COVID-19 outbreak on stock market returns and volatility: evidence from panel quantile regression model", *Etikonomi*, Vol. 20 No. 2, pp. 225-238, doi: [10.15408/etk.v20i2.20587](https://doi.org/10.15408/etk.v20i2.20587).
- Kliber, A., Marszałek, P., Musiałkowska, I. and Świerczyńska, K. (2019), "Bitcoin: safe haven, hedge, or diversifier? Perception of bitcoin in the context of a country's economic situation — a stochastic volatility approach", *Physica A: Statistical Mechanics and Its Applications*, Vol. 524, pp. 246-257, doi: [10.1016/j.physa.2019.04.145](https://doi.org/10.1016/j.physa.2019.04.145).
- Koenker, R. (2004), "Quantile regression for longitudinal data", *Journal of Multivariate Analysis*, Vol. 91 No. 1, pp. 74-89, doi: [10.1016/j.jmva.2004.05.006](https://doi.org/10.1016/j.jmva.2004.05.006).
- Koutmos, D., King, T. and Zopounidis, C. (2021), "Hedging uncertainty with cryptocurrencies: is bitcoin your best bet?", *Journal of Financial Research*, Vol. 44 No. 4, pp. 815-837, doi: [10.1111/jfir.12264](https://doi.org/10.1111/jfir.12264).
- Kristoufek, L. (2020), "Grandpa, grandpa, tell me the one about bitcoin being a safe haven: new evidence from the COVID-19 pandemic", *Frontiers in Physics*, Vol. 8 July, pp. 1-6, doi: [10.3389/fphy.2020.00296](https://doi.org/10.3389/fphy.2020.00296).

- Lahiani, A., Mefteh-Wali, S. and Vasbieva, D.G. (2021), "The safe-haven property of precious metal commodities in the COVID-19 era", *Resources Policy*, Vol. 74 August, p. 102340, doi: [10.1016/j.resourpol.2021.102340](https://doi.org/10.1016/j.resourpol.2021.102340).
- Lavelle, B., Yamamoto, K.N. and Kinnen, M. (2022), "Cryptocurrencies, correlations, and COVID-19: diversifiers, hedge, or safe haven?", *Review of Integrative Business and Economics Research*, Vol. 11 No. 2, pp. 25-35.
- Li, S. and Lucey, B.M. (2017), "Reassessing the role of precious metals as safe havens – what colour is your haven and why?", *Journal of Commodity Markets*, May, pp. 1-14, doi: [10.1016/j.jcomm.2017.05.003](https://doi.org/10.1016/j.jcomm.2017.05.003).
- Liu, W.-h. (2020), "Are gold and government bond safe-haven assets? An extremal quantile regression analysis", *International Review of Finance*, Vol. 20 No. 2, pp. 451-483, doi: [10.1111/irfi.12232](https://doi.org/10.1111/irfi.12232).
- Lucey, B.M. and Li, S. (2015), "What precious metals act as safe havens, and when? Some US evidence", *Applied Economics Letters*, Vol. 22 No. 1, pp. 35-45, doi: [10.1080/13504851.2014.920471](https://doi.org/10.1080/13504851.2014.920471).
- Lucey, B.M., Vigne, S.A., Yarovaya, L. and Wang, Y. (2021), "The cryptocurrency uncertainty index", *Finance Research Letters*, Vol. 45 No. 102147, doi: [10.1016/j.frl.2021.102147](https://doi.org/10.1016/j.frl.2021.102147).
- Maghyereh, A.I., Abdoh, H. and Awartani, B. (2019), "Connectedness and hedging between gold and Islamic securities: a new evidence from time-frequency domain approaches", *Pacific Basin Finance Journal*, Vol. 54, pp. 13-28, doi: [10.1016/j.pacfin.2019.01.008](https://doi.org/10.1016/j.pacfin.2019.01.008).
- Mariana, C.D., Ekaputra, I.A. and Husodo, Z.A. (2021), "Are Bitcoin and Ethereum safe-havens for stocks during the COVID-19 pandemic?", *Finance Research Letters*, Vol. 38 September 2020, doi: [10.1016/j.frl.2020.101798](https://doi.org/10.1016/j.frl.2020.101798).
- Markowitz, H.M. (1952), "Portfolio selection", *The Journal of Finance*, Vol. 7 No. 1, pp. 77-91, doi: [10.1111/j.1540-6261.1952.tb01525.x](https://doi.org/10.1111/j.1540-6261.1952.tb01525.x).
- Mensi, W., Rehman, M.U., Maitra, D., Al-Yahyaee, K.H. and Sensoy, A. (2020), "Does bitcoin co-move and share risk with sukuk and world and regional Islamic stock markets? Evidence using a time-frequency approach", *Research in International Business and Finance*, Vol. 53 No. 101230, doi: [10.1016/j.ribaf.2020.101230](https://doi.org/10.1016/j.ribaf.2020.101230).
- Mokni, K., Bouri, E., Ajmi, A.N. and Vo, X.V. (2021), "Does bitcoin hedge categorical economic uncertainty? A quantile analysis", *SAGE Open*, Vol. 11 No. 2, doi: [10.1177/21582440211016377](https://doi.org/10.1177/21582440211016377).
- Nomran, N.M. and Haron, R. (2021), "The impact of COVID-19 pandemic on Islamic vs conventional stock markets: international evidence from financial markets", *Future Business Journal*, Vol. 7 No. 1, pp. 1-16, doi: [10.1186/s43093-021-00078-5](https://doi.org/10.1186/s43093-021-00078-5).
- Nurhayadi, Y. and Rito, R. (2019), "The distinction between sharia market and conventional market: a study on Indonesia stock exchange", *Muhammadiyah International Journal of Economics and Business*, Vol. 2 No. 1, pp. 70-79, doi: [10.2307/2233838](https://doi.org/10.2307/2233838).
- Pesaran, M.H. (2004), "General diagnostic test for cross section dependence in panels", *Cambridge Working Papers in Economics*, Vol. 6 No. 3, pp. 603-617, available at: emeraldinsight.com/loi/afr
- Pesaran, M.H. (2007), "A simple panel unit root test in the presence of cross-section dependence", *Journal of Applied Econometrics*, Vol. 21 August, pp. 1-21, doi: [10.1002/jae.2012](https://doi.org/10.1002/jae.2012).
- Ponomareva, M. (2011), "Identification in quantile regression panel data models with fixed effects and small t", *University of Western Ontario*, pp. 1-28.
- Powell, D. (2016), "Quantile regression with nonadditive fixed effects", *Empirical Economics*, Vol. 63 No. 5, pp. 2675-2691.
- Raza, N., Ibrahimy, A.I., Ali, A. and Ali, S. (2016), "Gold and Islamic stocks: a hedge and safe haven comparison in time frequency domain for BRICS markets", *The Journal of Developing Areas*, Vol. 50 No. 6, pp. 305-318, doi: [10.1353/jda.2016.0146](https://doi.org/10.1353/jda.2016.0146).
- Rehman, M.U., Asghar, N. and Kang, S.H. (2020), "Do Islamic indices provide diversification to bitcoin? A time-varying copulas and value at risk application", *Pacific Basin Finance Journal*, Elsevier B.V., Vol. 61, p. 101326, doi: [10.1016/j.pacfin.2020.101326](https://doi.org/10.1016/j.pacfin.2020.101326).

- Rivin, I. and Scevola, C. (2017), "An investable cryptocurrency index", arXiv preprint arXiv: 1804.06711, available at: <http://arxiv.org/abs/1803.07138>
- Shahzad, S.J.H., Bouri, E., Roubaud, D., Kristoufek, L. and Lucey, B. (2019a), "Is bitcoin a better safe-haven investment than gold and commodities?", *International Review of Financial Analysis*, Vol. 63, pp. 322-330, doi: [10.1016/j.irfa.2019.01.002](https://doi.org/10.1016/j.irfa.2019.01.002).
- Shahzad, S.J.H., Raza, N., Roubaud, D., Hernandez, J.A. and Bekiros, S. (2019b), "Gold as safe haven for G-7 stocks and bonds: a revisit", *Journal of Quantitative Economics*, Vol. 17 No. 4, pp. 885-912, doi: [10.1007/s40953-019-00163-1](https://doi.org/10.1007/s40953-019-00163-1).
- Shahzad, S.J.H., Bouri, E., Roubaud, D. and Kristoufek, L. (2020), "Safe haven, hedge and diversification for G7 stock markets: gold vs bitcoin", *Economic Modelling*, Vol. 87, pp. 212-224, doi: [10.1016/j.econmod.2019.07.023](https://doi.org/10.1016/j.econmod.2019.07.023).
- Stensås, A., Nygaard, M.F., Kyaw, K. and Trepongkaruna, S. (2019), "Can bitcoin be a diversifier, hedge or safe haven tool?", *Cogent Economics and Finance*, Vol. 7 No.1, doi: [10.1080/23322039.2019.1593072](https://doi.org/10.1080/23322039.2019.1593072).
- Tirosh, I. and Barkai, N. (2007), "Comparative analysis indicates regulatory neofunctionalization of yeast duplicates", *Genome Biology*, Vol. 8 No. 4, pp. 1-22, doi: [10.1186/gb-2007-8-4-r50](https://doi.org/10.1186/gb-2007-8-4-r50).
- Umar, Z. and Gubareva, M. (2020), "A time-frequency analysis of the impact of the COVID-19 induced panic on the volatility of currency and cryptocurrency markets", *Journal of Behavioral and Experimental Finance*, Elsevier B.V., Vol. 28, p. 100404, doi: [10.1016/j.jbef.2020.100404](https://doi.org/10.1016/j.jbef.2020.100404).
- Umar, Z. and Gubareva, M. (2021), "The relationship between the COVID-19 media coverage and the Environmental, Social and Governance leaders equity volatility: a time-frequency wavelet analysis", *Applied Economics*, Routledge, Vol. 53 No. 27, pp. 3193-3206, doi: [10.1080/00036846.2021.1877252](https://doi.org/10.1080/00036846.2021.1877252).
- Umar, Z., Jareño, F. and de la O González, M. (2021), "The impact of COVID-19-related media coverage on the return and volatility connectedness of cryptocurrencies and fiat currencies", *Technological Forecasting and Social Change*, Vol. 172 September 2020, doi: [10.1016/j.techfore.2021.121025](https://doi.org/10.1016/j.techfore.2021.121025).
- Umar, Z., Yousaf, I., Gubareva, M. and Vo, X.V. (2022a), "Spillover and risk transmission between the term structure of the US interest rates and Islamic equities", *Pacific Basin Finance Journal*, Vol. 72 January, p. 101712, Elsevier B.V, doi: [10.1016/j.pacfin.2022.101712](https://doi.org/10.1016/j.pacfin.2022.101712).
- Umar, Z., Abrar, A., Zaremba, A., Teplova, T. and Vo, X.V. (2022b), "The return and volatility connectedness of NFT segments and media coverage: fresh evidence based on news about the COVID-19 pandemic", *Finance Research Letters*, Elsevier, Vol. 49 June, p. 103031, doi: [10.1016/j.frl.2022.103031](https://doi.org/10.1016/j.frl.2022.103031).
- Umar, Z., Gubareva, M., Teplova, T. and Tran, D.K. (2022c), "Covid-19 impact on NFTs and major asset classes interrelations: insights from the wavelet coherence analysis", *Finance Research Letters*, Elsevier, Vol. 47 PB, p. 102725, doi: [10.1016/j.frl.2022.102725](https://doi.org/10.1016/j.frl.2022.102725).
- Vidal-Tomás, D. (2022), "The new crypto niche: NFTs, play-to-earn, and metaverse tokens", *Finance Research Letters*, Elsevier, Vol. 47 PB, p. 102742, doi: [10.1016/j.frl.2022.102742](https://doi.org/10.1016/j.frl.2022.102742).
- Westerlund, J. (2005), "New simple tests for panel cointegration", *Econometric Reviews*, Vol. 24 No. 3, pp. 297-316, doi: [10.1080/07474930500243019](https://doi.org/10.1080/07474930500243019).
- WHO (2020), "Listings of WHO's response to COVID-19", available at: who.int/news/item/29-06-2020-covidtimeline (accessed 4 February 2022).
- Zhu, H., Huang, R., Wang, N. and Hau, L. (2020), "Does economic policy uncertainty matter for commodity market in China? Evidence from quantile regression", *Applied Economics*, Vol. 52 No. 21, pp. 2292-2308, doi: [10.1080/00036846.2019.1688243](https://doi.org/10.1080/00036846.2019.1688243).

Appendix

The supplementary material for this article can be found online.

Safe haven for
stocks and
bonds:
COVID-19

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115

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