

Safe Haven for Asian Equity Markets During Financial Distress: Bitcoin Versus Gold

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Abstract

This study aims to analyse the role of bitcoin and gold as safe haven assets for Asian equity markets during periods of high market uncertainty related to the global COVID-19 pandemic, high volatility and extreme stock market conditions. Our empirical analysis employs the DCC-GARCH methodology to estimate the time-varying relationship between bitcoin/gold and the Asian stock market from 2016 to 2023. Our findings reveal that bitcoin serves as a strong hedge for Taiwan and Pakistan, whereas gold can be considered a strong hedge for Japan, Singapore, India, Thailand and Vietnam. Interestingly, we observe that bitcoin does not exhibit safe haven properties in any of the Asian countries observed. In contrast, gold demonstrates strong safe haven abilities for Singapore, India and Thailand. These results remain consistent across various measures of market turmoil, including the volatility index, COVID-19-related periods and low quantiles on the stock market. Furthermore, our results suggest that the perception and adoption of gold as a safe haven asset in Japan and Vietnam is mainly influenced by global events and uncertainties, rather than localized stock market conditions. These findings offer valuable information for investors, financial institutions as well as policy makers and regulators as to how cryptocurrency and gold have evolved as hedge and safe haven assets in Asia during uncertainty periods.

Keywords

Hedge; Safe haven; Cryptocurrency; Gold; Covid-19; Investment; VIX.

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1 Introduction

Today, many investors are constantly looking for strategies to protect their portfolios from market risks, especially during financial distress such as crises, epidemics, etc., since these crises affect most assets in some way (Smutny et al., 2021). Some investors are shifting their investments away from hazardous assets to safer ones. Traditionally, gold has been used as an effective hedge tool for various asset classes (Baur & McDermott, 2010; Lucey et al., 2017). Furthermore, gold can always be considered a secure and efficient investment during market turmoil (Baur & Lucey, 2010; Wen & Cheng, 2018). According to the consumer price index (CPI), gold is relatively stable during uncertain or deflationary periods and has the potential for diversification during inflationary periods (Bredin et al., 2015).

Bitcoin is another attractive asset, a completely decentralized cryptocurrency independent of all governmental authorities and can be exchanged anonymously through a third party such as a digital wallet. Unknown Satoshi Nakamoto announced bitcoin in the prospectus of a peer-to-peer payment network in 2008. On 3 January 2009, it started to be used as a medium of exchange and a substitute for currency. Bitcoin is the first digital money to overcome the issue of double spending and to be secure by relying on the blockchain and applying it to itself. Due to its tradability on specialized exchanges, bitcoin has evolved into an investment asset, although its returns are sometimes accompanied by substantial swings (Polasik et al., 2015). Bitcoin is a good diversifier due to its weak correlation with other traditional assets, making it an excellent hedging tool. Furthermore, bitcoin, which is considered a relatively stable asset, appeals to investors seeking a safe haven to protect their investment portfolio from fluctuations in the global economy (Bouri et al., 2017; Shahzad et al., 2019) or in the context of the banking crisis (2012–2013) and the European public debt crisis (2010–2013) (Luther & Salter, 2017). However, some studies present different points of view, as the bitcoin market is characterized by high downside risk, high volatility, high transaction cost and low liquidity compared to other traditional markets during high uncertainty periods (Conlon et al., 2020; Smales, 2019). In December 2017, CME Group and CBOE published futures contracts using bitcoin as the underlying asset, which can further support its legitimacy. Bitcoin may now be traded on futures markets alongside commodities such as gold, eventually emerging as a popular alternative to traditional investments. A special collection of characteristics, such as attraction (Kristoufek, 2015), user anonymity (Ober et al., 2013) or illegal activities, affect the value of bitcoin (Yelowitz & Wilson, 2015). One may argue that the attractiveness of bitcoin is related to its monetary characteristics. Although bitcoin and gold are very different in many ways, there are also some similarities. It is independent of inflation, as no central body regulates bitcoin mining and transactions (Baur et al., 2018). It is unclear whether commodities such as bitcoin and gold (stock market indices) provide the same safe haven functions.

To address this problem, we first extract the dynamic correlation between return series using the DCC-GARCH process. Then, we run regression using these dynamic correlations with dummy variables to assess whether bitcoin and gold function as hedges or safe havens in Asian countries during different turbulent periods. Our findings suggest that bitcoin is a strong hedge for the Taiwan and Pakistan equity markets, while gold is a strong hedge for the equity markets of Japan, Singapore, India, Thailand and Vietnam. Furthermore, the magnitude of the gold hedge benefits is greater than that of bitcoin. These results are robust regardless of the volatility measurement. In particular, bitcoin does not serve as a safe haven for all Asian equity markets considered during COVID-19 times (see Figure 1) or when the volatility index is high. In contrast, gold also seems to be a better safe haven than bitcoin, since it shows strong safe haven properties for Japan, Singapore, India, Thailand and Vietnam stocks during the high volatility and COVID-19 circumstances. Furthermore, gold provides a safe haven asset characteristic in India and Thailand with the most extreme volatility in the stock market of 1% (also in Singapore at the 2.5% quantile).

Our contribution to the literature is made in several ways. Firstly, most of the research suggests that the relationship between gold/bitcoin and other asset classes varies over time and that these two assets play

different roles in the hedge and safe haven sphere during different times of stress (Al-Nassar et al., 2023; Baur & McDermott, 2010; Li & Lucey, 2017; Liu & Lee, 2022; Nguyen, 2022; Yousaf et al., 2023). For example, Al-Nassar et al. (2023) found that gold was a flight-to-safety asset for Saudi Arabia's stock market during the COVID-19 pandemic, while bitcoin was not. Our study adds to previous research into the hedge and safe haven characteristics of gold and bitcoin by determining the extent to which gold/bitcoin can operate as a hedge, safe haven and diversifier against Asian equity markets under different market conditions and with varying indicators of uncertainty. This technique allows us to detect key aspects of the relationship between bitcoin/gold returns and Asian stock returns while controlling for several uncertainty proxies that earlier studies neglected. A DCC-GARCH model, which includes a dummy representing financial distress, provides a measure of time-varying dependence between gold/bitcoin markets and Asian stock markets, conditional on different states of crisis. Evidence on the hedge and safe haven properties of gold and bitcoin is important for investors and portfolio managers to hedge their risk exposure to various market conditions of turmoil. This extensive information will assist those investors in efficiently hedging against uncertain exposure, building more effective portfolios and clearly understanding the similarities and contrasts in the hedge and safe haven characteristics of gold and bitcoin in various situations.

Secondly, this research investigates whether the hedge and safe haven characteristics of bitcoin and gold change when the uncertainty variable is factored in. At this stage, there has been very little research into the impact of various uncertainty contexts on the safe haven properties of gold and bitcoin. Almost all of these investigations are concerned with particular uncertainty indicators such as the political and economic uncertainty index (Li & Lucey, 2017; Selmi et al., 2018), the VIX index (Bouri et al., 2017), the global financial crisis (Baur & McDermott, 2010; Zagaglia & Marzo, 2013) or the pandemic period (Al-Nassar et al., 2023; Liu & Lee, 2022; Nguyen, 2022; Yousaf et al., 2023). In this analysis, we account for three uncertainty indicators, including the worldwide arrival date of COVID-19, the VIX index and extreme returns of the stock market, to reflect the fundamental impacts of uncertainty on the gold-stock and bitcoin-stock links. These indicators are not bound to any specific phenomenon and help us determine whether the hedge and safe haven characteristics of gold and bitcoin change when different uncertainty factors are considered.

Thirdly, we focus on comparing the safe haven features of bitcoin and gold between developed and developing Asian countries during various turbulent conditions. Therefore, our research gives an overall picture of the benefits of portfolio diversification of bitcoin and gold in Asian countries under different regional contexts and market conditions.

This study is structured as follows. Section 2 is a review of the literature. The third section looks at our empirical models. Section 4 includes both empirical findings and a discussion. Finally, Section 5 summarizes our findings.

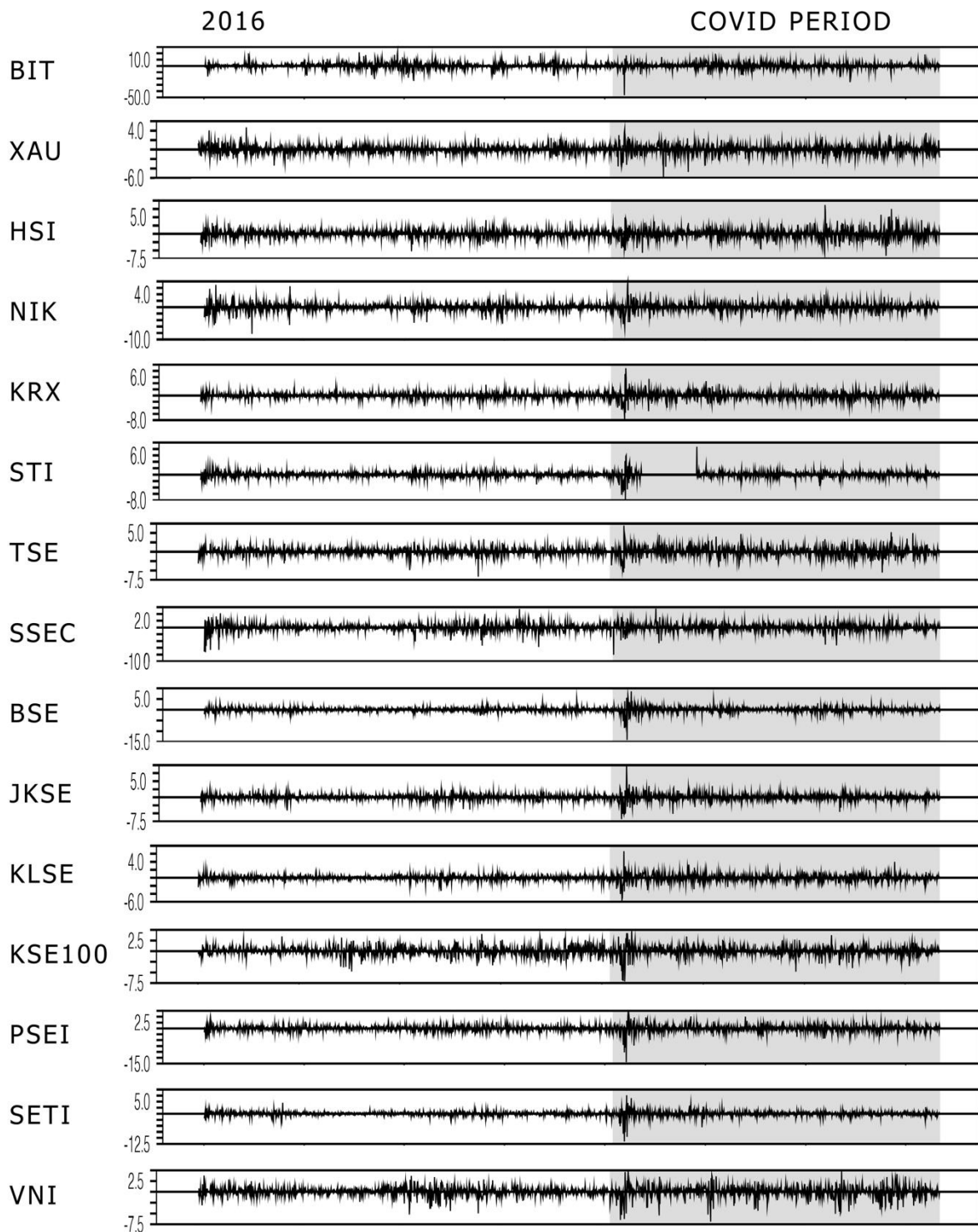


Figure 1. Bitcoin, gold and Asian stock returns from 2016 to 5 May 2023. The shaded zone is the COVID-19 period from 30 January 2020 to 5 May 2023.

2 Literature Review

2.1 Hedge and safe haven definition

During periods of high uncertainty, investors and financial institutions may tend to seek safe haven tools to reduce risk, limit potential losses and protect the value of their portfolios. Previous studies have established distinctions between definitions such as hedge, diversifier and safe haven, although these terms are frequently used interchangeably in the popular financial press. Baur & Lucey (2010) defined a

hedge as an asset that is negatively correlated or uncorrelated with another asset or portfolio on average, while a safe haven is an asset that is uncorrelated or negatively correlated with another asset or portfolio in a turmoil or uncertainty period. A diversified asset is positively correlated with another asset or portfolio on average, except for the case of perfect positive correlation. Building on these definitions of Baur & Lucey (2010), the length of the effect is a crucial component that Baur & McDermott (2010) expanded upon further. They also distinguished between a strong hedge and a weak hedge, as well as a strong safe haven and a weak safe haven. A strong (weak) hedge is defined as an “asset that is negatively correlated (uncorrelated) with another asset or portfolio on average”; and a strong (weak) safe haven is defined as an “asset that is negatively correlated (uncorrelated) with another asset or portfolio in certain periods only, for example, in times of falling stock markets” (Baur & McDermott, 2010). The key property of the hedge is that it must hold on average, whereas the key property of the safe haven is that it must only hold during specific periods, such as a financial crisis. Instead of using the original “rolling regression” for the return series, which relies on equal weights of all observations within the sample window, subsequent studies utilized the dynamic conditional correlation technique to account for the time-varying nature of the comovement between assets (Baur & McDermott, 2010; Ratner & Chiu, 2013).

2.2 Gold and bitcoin as hedge and safe haven

Gold is globally perceived as a diversifier or hedge against other assets such as commodities (Al-Nassar et al., 2023; Al-Yahyaee et al., 2019; Baur et al., 2018; Bouri et al., 2017), stocks (Bredin et al., 2015; Feng et al., 2018) or foreign currencies (Bouri et al., 2017; Feng et al., 2018) because gold does not correlate or has a negative relationship with other asset classes. During high uncertainty periods, gold can be used as a refuge for safety (Baur & McDermott, 2010; Bouri et al., 2020). The topic of dependence of gold on other assets in both calm and turbulent times has been extensively studied in previous empirical works; however, the hedging and safe haven features of gold appear to be market-specific. Gold is a safe haven asset and can be used as a store of value when things are uncertain financially in Europe and America. Gold has strong enough fundamentals to operate as a safe haven asset in the short term (Baur & McDermott, 2010). Gold provides a strong hedging function in the EMU, Indonesia, Russia and Turkey, while it does not offer a hedge property in the case of China, Germany and the index of the entire world (Beckmann et al., 2015). In all other economies, gold seems to perform a weak hedging function at the monthly frequency. Beckmann et al. (2015) assessed the ability of gold to serve as a haven and indicate that gold exhibits a strong safe haven function for India and the UK.

In contrast, gold does not show a safe haven function in the EMU, Indonesia and Russia. In other economies, gold appears to be a weak safe haven asset in turbulent times. Al-Nassar et al. (2023) suggested that gold may have served as a hedge in the Saudi stock market during the early stages of COVID-19. Additionally, investors on emerging markets can consider gold as a flight-to-safety asset. Using a Markov-switching CAPM to analyse US and UK markets, He et al. (2018) found that gold is consistently a hedge but does not display safe haven properties on these two markets. Anand & Madhogaria (2012) examined the causal relationship between gold and stock market performance in six countries and concluded that gold operates as a safe haven asset. For commodities, Reboredo (2013) found that gold cannot hedge against oil price movements, but can act as an effective safe haven against extreme oil price movements. Gold is a safe haven for the oil market under long-term market uncertainty (Liu & Lee, 2022); Australia, Canada, Japan and emerging markets, on the other hand, have yet to gain from this safe haven and hedging asset. Ciner et al. (2013) point out that gold acts as a safe haven for most assets, except oil.

Another noteworthy point is that the hedge and safe haven properties of gold also depend on the observed timeframes. Using wavelet analysis, Bredin et al. (2015) found that gold serves as a hedge for several international equities and debt markets for timeframes of up to a year. They also argued that gold consistently acted as a safe haven for equity investors in the US, UK and Germany during the financial crisis. Interestingly, Yousaf et al. (2023) showed that blue chip tech stocks such as Facebook, Apple,

Amazon, Netflix and Alphabet could be a safety blanket against gold, bitcoin and US T-bonds during the COVID-19 pandemic.

Since bitcoin was introduced, there have been numerous perspectives on bitcoin as a potential solution for portfolio diversification (Bouri & Azzi, 2017; Luther & Salter, 2017). Several studies have been conducted to study the usefulness of bitcoin as a hedging and safe haven instrument for investors; nevertheless, the results of these studies have been inconsistent. Bouri et al. (2017) assessed the role of bitcoin as a diversifier, hedge or safe haven for the price movements of energy derivatives. They recognized that while bitcoin can be used as an effective hedge and safe haven against swings in commodity indices, it cannot be utilized to hedge against non-energy commodities. Using an intraday analysis, Urquhart & Zhang (2019) employed an ADCC model and indicated that bitcoin can be an intraday hedge and safe haven for several currencies, such as CHF and GBP. Wang et al. (2019) examined the spillover effect between bitcoin and the Chinese market from 2013 to 2017 using the VAR-GARCH-BEKK model and concluded that bitcoin can be hedged against stocks, bonds and SHIBOR and is a safe haven when extreme price changes occur on the monetary market. Kliber et al. (2019) evaluated the safe haven properties of bitcoin for Japan, Venezuela, China, Estonia and Sweden and found that bitcoin is a safe haven only for Venezuela and a diversifier for Japan and China and is a weak hedge for Sweden and Estonia. However, other studies do not support the safe haven properties of bitcoin. According to Klein et al. (2018) and Smales (2019), bitcoin fails as both a hedge and a safe haven for developed markets. In a similar spirit, Choi & Shin (2022) found that, even though bitcoin prices seem to be independent of government decisions, bitcoin prices have declined in response to financial uncertainty shocks during the last decade, rejecting the safe haven characteristic. The results are still valid during the COVID-19 pandemic.

Other studies have compared the hedge and safe haven properties of gold and bitcoin. Selmi et al. (2018) employed a quantile-on-quantile approach to confirm that both bitcoin and gold can operate as a hedge and a safe haven against oil price volatility, but that these features fluctuate with time. The relationship between bitcoin/gold prices and oil prices appears to be nonlinear. Chemkha et al. (2021) assessed the ability of gold and bitcoin to serve as a hedge and safe haven for major global stock indices and currencies. They found that while bitcoin and gold are hedge assets, only gold could be redeemed as a weak safe haven during COVID-19. In a similar spirit, Hussain Shahzad et al. (2020) showed that gold exhibits a superior hedge property compared to bitcoin for several G7 countries.

Additionally, gold also offers better diversification benefits when included in a portfolio. Yang et al. (2022) also concluded that bitcoin offers better hedging capacity for currency portfolios in the long term, while gold is an effective and robust safe haven for currencies. In the COVID-19 pandemic, neither gold nor bitcoin could be used as a reliable hedge or safe haven against economic policy uncertainty under normal conditions (Wu et al., 2019). However, under extreme market conditions, gold and bitcoin can act as a weak hedge and safe haven against economic policy uncertainty.

3 Data and Methodology

3.1 Data

The DCC-GARCH model was estimated for bitcoin, gold and 13 Asian stock indices, including five developed markets: South Korea, Hong Kong, Japan, Singapore and Taiwan, and eight developing markets: China, India, Indonesia, Malaysia, Pakistan, the Philippines, Thailand and Vietnam, see Table 1. The data on bitcoin prices are collected from CoinMarketCap. We collected the stock and gold price data from Investing.com. The daily returns are calculated as natural logarithmic price differences from the daily closing price. The sample period spans from 1 January 2016 to 5 May 2023, producing 1,915 daily observations. The pre-COVID-19 period (from 1 January 2016 to 29 January 2020) and the COVID-19 period (from 30 January 2020 to 5 May 2023) are included in our sample periods. (The WHO has classified

the new coronavirus epidemic as the highest-level alarm, a public health emergency of international concern (PHEIC), on 30 January 2020, and then declared the end of the COVID-19 pandemic as a global health emergency on 5 May 2023. Therefore, we have decided to choose these two dates as the start and end days of the COVID-19 period.) The purpose of the turbulence dummy variable is to measure how upheaval affects returns and how volatility spreads between Asian stock markets and those for gold and cryptocurrencies.

Table 1. Description of variables.

Variable	Category	Description	Country
BIT	Assets	Logarithm of returns of bitcoin	
XAU	Assets	Logarithm of returns of gold	
HSI	Developed country	The Hang Sen Index log returns	Hong Kong
NIK		Nikkei 225 Index log returns	Japan
KRX		Korea Composite Stock Price Index log returns	South Korea
STI		Straits Times Index log returns	Singapore
TSE		Taiwan Stock Exchange Weighted Index log returns	Taiwan
SSEC		Developing country	Shanghai Stock Exchange Composite Index log returns
BSE	S&P Bombay Stock Exchange Sensitive Index log returns		India
JKSE	Jakarta Composite Index log returns		Indonesia
KLSE	Kuala Lumpur Stock Exchange Index log returns		Malaysia
KSE100	Karachi Stock Exchange 100 Index log returns		Pakistan
PSEI	Philippine Stock Exchange Index log returns		Philippines
SETI	Stock Exchange of Thailand Index log returns		Thailand
VNI	Vietnam Index log returns		Vietnam
COVID	Dummy		The dummy captures the effect of the pandemic, equals 1 from 30 January 2020 to 5 May 2023, and 0 otherwise.
VIX	Dummy	The dummy variable receives the value of 1 if the volatility index > 30 and 0 otherwise.	

3.2 Methodology

First, we employ the dynamic conditional correlation GARCH (DCC-GARCH) methodology proposed by Engle (2002) to analyse the dynamic correlation between return series. We estimate the model separately for each pair of return series in two stages. The univariate generalized autoregressive conditional model is predicted in the first stage. Then, the standardized residuals are used to generate the time-varying correlation matrix.

The DCC-GARCH model is represented as:

$$r_t = \mu_t + \omega r_{t-1} + \varepsilon_t \quad (1)$$

$$\varepsilon_t = H_t^{1/2} \eta_t \quad (2)$$

Where r_t is an n -row, 1-column logarithmic return matrix for price indices, μ_t is a vector of constant terms, and own-lagged, η_t is the sequence of independently and identically distributed random errors, ε_t is a vector of residuals and $H_t^{1/2}$ is the conditional variance-covariance matrix. We estimate the conditional volatility H_t from the GARCH(1,1) process as follows:

$$H_t = c + \theta_1 \varepsilon_{t-1}^2 + \theta_2 H_{t-1} \quad (3)$$

Where $c > 0$; θ_1 and θ_2 are the coefficients used to capture the short-term and long-term persistence effects of volatility, respectively.

Q_t is the time dynamic conditional correlation of the error terms, defined as:

$$Q_t = (1 - \alpha - \beta)\bar{Q} + \alpha\varepsilon_{t-1}\varepsilon'_{t-1} + \beta Q_{t-1} \quad (4)$$

$\alpha \geq 0$ and $\beta \geq 0$ are directionless coefficients that represent the effects of prior shocks concerning prior DCCs on the relevant current DCC, with $\alpha + \beta < 1$. \bar{Q} is the matrix of unconditional correlation ε_t .

The assets i and j have a conditional correlation that is expressed as follows:

$$\rho_{ij,t} = \frac{q_{ij,t}}{\sqrt{q_{ii,t}}\sqrt{q_{jj,t}}} \quad (5)$$

Several autocorrelations and heteroskedasticity tests are used to make sure that the DCC model is a good fit. However, we do not intend to elaborate on the DCC modelling and parameter estimation. Still, we only extract pairwise dynamic conditional correlations, as shown in Equation (5), and then use them to examine the hedge and safe haven properties of bitcoin and gold against the stock market.

Next, to explore the extent to which bitcoin and gold can be considered a diversifier, a hedge or a safe haven against stocks, we extract the conditional correlation between the asset i (stock) and the asset j (bitcoin/gold) at the time t from the bivariate DCC-GARCH process into separate time series. We then consider estimating the following regression to explore the dynamics of the conditional correlations for the bitcoin-stock and gold-stock pairs:

$$\rho_{ij,t} = m_0 + m_1 D_t + v_t \quad (6)$$

In Equation (6) above, $\rho_{ij,t}$ indicates the pairwise conditional correlation between bitcoin/gold and stocks. The dummy D_t represents the turmoil periods. It takes a value of one during turmoil periods (COVID-19 period/ high volatility period), and zero otherwise. If m_0 is positive, bitcoin/gold is a diversifier against stock movement. Bitcoin/gold is a weak hedge against stock movement if m_0 is zero or a strong hedge if m_0 is negative. If the correlation between bitcoin/gold and a stock does not change during the COVID-19 period (m_1 is not significantly different from zero) and the sum of the parameters m_0 and m_1 is nonpositive, it can be considered a weak safe haven against the stock; otherwise, if the correlation between bitcoin/gold and a stock witnesses a significant decrease during distress periods (m_1 is significantly negative) together with a nonpositive value in the sum of the parameters m_0 and m_1 , it can be defined as a strong safe haven.

Finally, we test the hedge and safe haven characteristics of bitcoin and gold during extreme volatility periods of stock indices. We follow Baur & Lucey (2010) and run the following regressions:

$$\rho_{ij,t} = m_0 + m_1 D(r_i q_5) + m_2 D(r_i q_{2.5}) + m_3 D(r_i q_1) \quad (7)$$

The dummy variables $D(r_i q_x)$ are used to capture extreme stock market movements when the stock market exceeds the $x\%$ quantile of the return distribution. There is a nonlinear relationship between bitcoin/gold and the stock market if at least one parameter (m_1, m_2, m_3) is significantly different from zero. Bitcoin/gold can be considered a weak (strong) hedge if there is evidence that m_0 is zero (negatively different from zero) and is a safe haven if the sum of the parameters is significantly negative.

4 Results and Discussion

Table 2 provides the values of the descriptive statistics for the full sample period. During the observed period from 4 January 2016 to 5 May 2023, bitcoin, gold and most stock indices experienced positive mean returns. Bitcoin had the highest average return (0.220) with the highest standard error (4.527), while gold had lower average returns (0.034) along with a lower standard error (0.872). The average return on bitcoin

was almost five times higher than that of the highest-yielding country in the period (India: 0.449). From basic descriptive statistics, gold seems to be a safer asset than bitcoin, and bitcoin exhibits the properties of a high-risk, high-return asset.

Table 2. Descriptive statistics.

Series	Obs.	Mean	Std. error	Minimum	Maximum
BIT	1915	0.220	4.527	-46.473	22.512
XAU	1915	0.034	0.872	-5.898	4.693
HSI	1915	-0.005	1.298	-6.567	8.693
NIK	1915	0.022	1.220	-8.253	7.731
KRX	1915	0.015	1.084	-7.925	8.868
STI	1915	0.007	0.837	-7.637	8.717
TSE	1915	0.034	1.078	-6.637	6.943
SSEC	1915	-0.003	1.085	-8.039	5.554
BSE	1915	0.044	1.087	-14.102	8.595
JKSE	1915	0.020	0.944	-6.805	9.704
KLSE	1915	-0.009	0.698	-5.405	6.626
KSE100	1915	0.013	1.074	-7.102	4.684
PSEI	1915	-0.002	1.239	-14.322	7.172
SETI	1915	0.009	0.928	-11.428	7.653
VNI	1915	0.031	1.163	-6.908	4.860

For the stock indices, only Hong Kong, China, Malaysia and the Philippines experience negative average returns of -0.5%, -0.3%, -0.9% and -0.2%, respectively. The standard error of these return series is quite large, ranging from 0.698 (Malaysia's KLSE) to 1.298 (Hong Kong's HSI).

The time series of the time-varying correlation $\rho_{ij,t}$ between bitcoin and each Asian stock index and between gold and each Asian stock index from 2016 to 2023 are extracted from the DCC-GARCH model and graphed in Figure 2 and Figure 3, respectively. The magnitude of negativity/positivity and variety of the correlation coefficients fluctuates by asset pair. It should be noted that during the COVID-19 pandemic, the time-varying correlation of practically all asset pairs analysed displays a considerable fluctuation (shaded areas). The correlation between stocks and bitcoin is predominantly negative for Taiwan and Pakistan and positive for the remaining countries. This suggests that bitcoin could be used as a portfolio hedge in the former countries. The DCCs between gold and stock returns in Japan, Singapore, India, Thailand and Vietnam are negative throughout the sample period, indicating that gold may be a good hedge for these equity indices. In contrast, the DCCs between gold and stock returns in the remaining countries are positive, indicating that gold is a diversifier rather than a hedge.

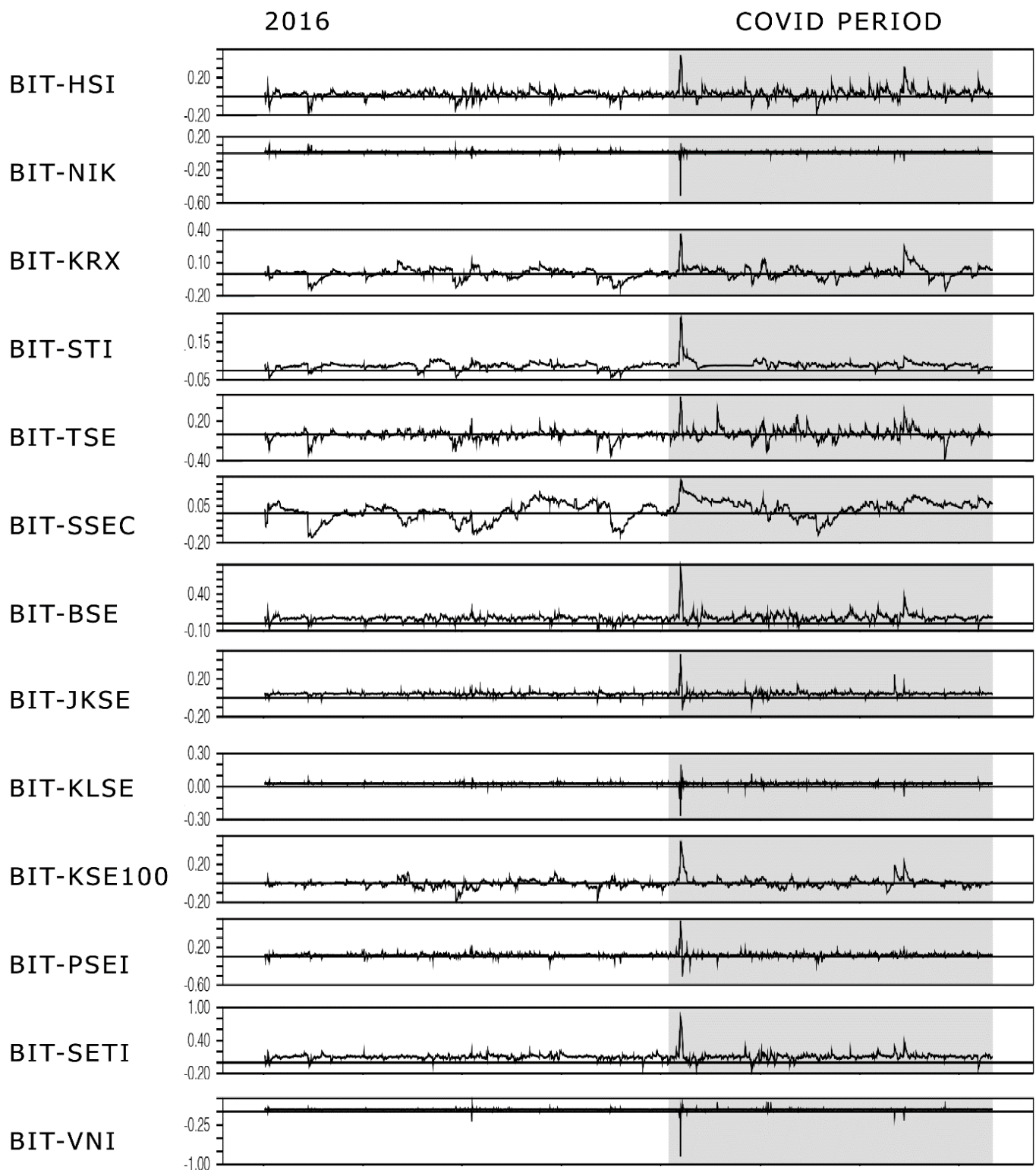


Figure 2. Dynamic conditional correlations between bitcoin and stock markets from 2016 to May 5, 2023. The shaded zone is the COVID-19 period from 30 January 2020 to 5 May 2023.

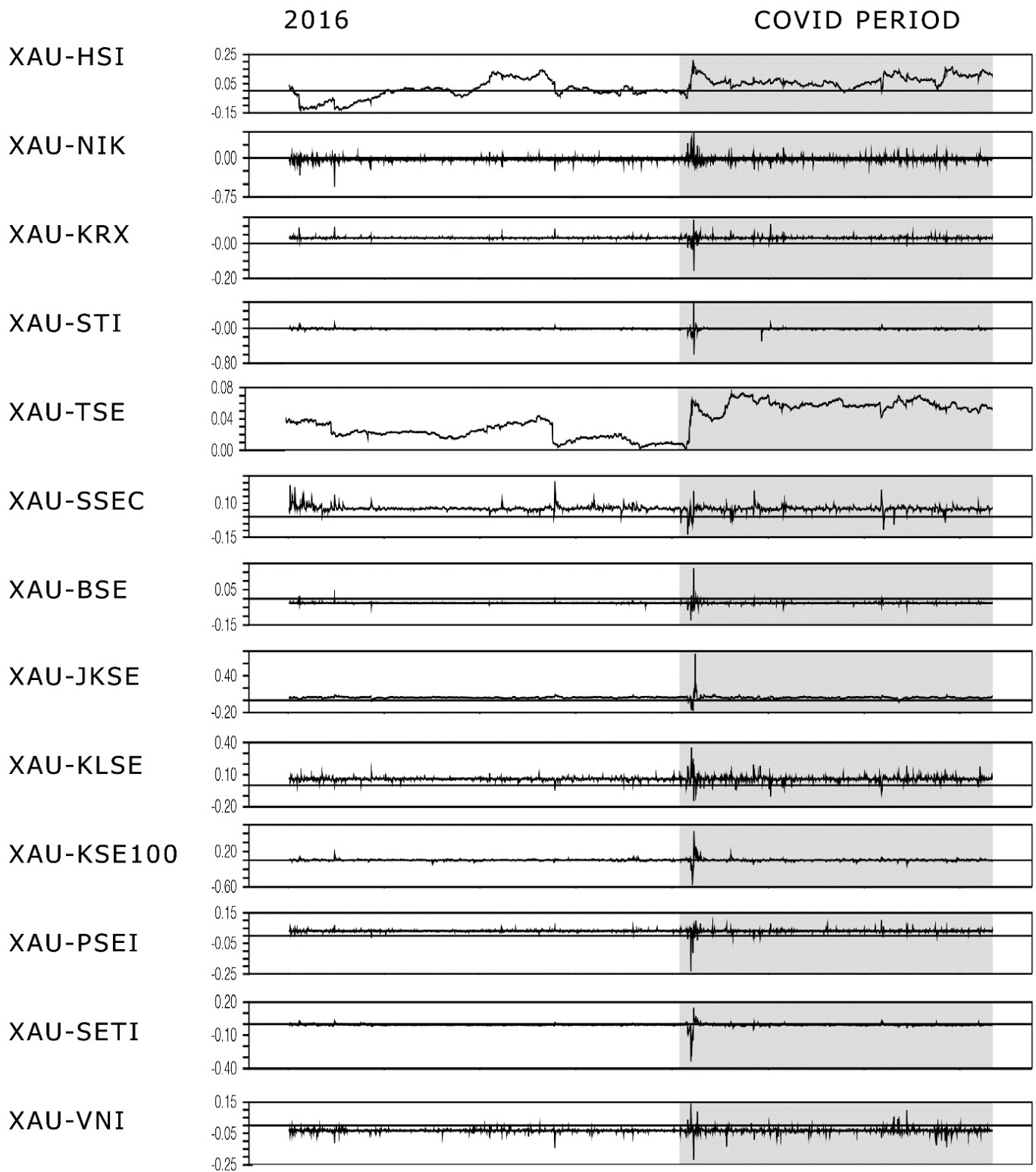


Figure 3. Dynamic conditional correlations between gold and stock markets from 2016 to 5 May 2023. The shaded zone is the COVID-19 period from 30 January 2020 to 5 May 2023.

Table 3. Comparison of hedge and safe haven properties of bitcoin and gold across markets during high volatility periods.

	VIX (BIT-stock)		VIX (XAU-stock)	
	m_0	m_1	m_0	m_1
HSI	0.026***	0.024***	0.026***	0.051***
NIK	0.016***	-0.005***	-0.028***	0.012***
KRX	0.004***	0.037***	0.032***	-0.003***
STI	0.024***	0.024***	-0.012***	-0.010***
TSE	-0.005***	0.037***	0.036***	0.013***
SSEC	0.017***	0.069***	0.061***	-0.008***
BSE	0.070***	0.048***	-0.025***	0.000
JKSE	0.044***	0.008***	0.044***	0.003
KLSE	0.027***	-0.003***	0.058***	0.002
KSE100	-0.004***	0.052***	0.004***	0.005*
PSEI	0.035***	0.018***	0.031***	-0.003***
SETI	0.101***	0.040***	-0.006***	-0.004***
VNI	0.041***	-0.008***	-0.033***	0.005***

Notes: This table reports the estimates of Equation (6).

***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 3 displays the estimates of Equation (6), focusing on comparing the link between bitcoin-stock and gold-stock. The DCC coefficients $\rho_{ij,t}$ are regressed on a constant (m_0) and a dummy variable representing the effect of the volatility periods (when the volatility index is greater than 30) on the dynamic correlation between two assets (m_1). In other words, the regression coefficients m_0 represent the hedge properties of bitcoin, while m_1 represents its safe haven characteristics. The results of the regional stock indices show that bitcoin is a strong hedge for Taiwan and Pakistan. At the same time, gold is a strong hedge for Japan, Singapore, India, Thailand and Vietnam at the 1% significance level. The results also indicate that the relationship between bitcoin, gold and stock returns is nonlinear. One possible explanation is that economic and political factors can affect the choice of safe haven assets among countries (Li & Lucey, 2017).

Interestingly, bitcoin does not show the safe haven characteristic in any of the observed countries, while gold is a strong safe haven for 4 out of the 13 countries, namely Japan, Singapore, Thailand and Vietnam, and a weak safe haven for India. We explain that many countries in Asia do not expect bitcoin to be a safe haven asset. Therefore, traditional precious metals are considered safer when volatility is expected to be high. This result is consistent with Baur et al. (2018), who found that bitcoin is mainly used as a speculative investment. Gold may benefit investors in Japan, Singapore, Thailand, Vietnam and India beyond its long-term hedge. In other words, gold reduces risk on these stock markets during periods of high volatility. These results align with those of Baur & Lucey (2010), Ji et al. (2020), Kumar & Padakandla (2022) and Shahzad et al. (2021).

To further explore the hedge and safe haven characteristics of bitcoin and gold during turmoil, we look specifically at the recent COVID-19 period. We rerun the regression for Equation (6) with the dummy variable taking the value of 1 for the COVID-19 period from 30 January 2020 to 5 May 2023.

Table 4. Comparison of hedge and safe haven properties of bitcoin and gold across markets during COVID-19 period.

	COVID (BIT-stock)		COVID (XAU-stock)	
	m_0	m_1	m_0	m_1
HSI	0.021***	0.015***	-0.001	0.069***
NIK	0.017***	-0.001**	-0.029***	0.005***
KRX	0.000	0.016***	0.032***	-0.001**
STI	0.022***	0.010***	-0.011***	-0.003***
TSE	-0.015***	0.027***	0.022***	0.034***
SSEC	0.003*	0.043***	0.064***	-0.006***
BSE	0.066***	0.018***	-0.025***	0.000
JKSE	0.043***	0.003***	0.045***	-0.002
KLSE	0.027***	-0.001	0.058***	0.001
KSE100	-0.007***	0.015***	0.005***	-0.001
PSEI	0.036***	0.003	0.031***	-0.001
SETI	0.100***	0.007***	-0.006***	-0.002***
VNI	0.040***	-0.001	-0.032***	0.000

Notes: This table reports the estimates of Equation (6).

***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

The results confirm our previous findings. Bitcoin was a strong hedge for Taiwan and Pakistan during the COVID-19 period. These are the same countries as in the previous results, where we used the volatility index as an indicator of a period of high uncertainty. Interestingly, bitcoin was a weak hedge for the South Korean stock market during COVID-19. Similarly, gold was a strong hedge for the stock markets of Japan, Singapore, India, Thailand and Vietnam and a weak hedge for Hong Kong. In summary, we find evidence that bitcoin is a strong hedge asset for some countries, and gold is a strong hedge asset for other markets. These results are robust whether using the volatility index or COVID-19 as an indicator of turmoils.

During the COVID-19 pandemic, it is evident that bitcoin did not exhibit safe haven characteristics on any Asian stock market. This study recognizes the need for an asset that provides nonnegative returns and low correlation with the stock market during these uncertain times. On the other hand, gold continues to demonstrate strong (weak) safe haven qualities for Japan, Singapore and Thailand (India and Vietnam). However, in certain countries, there is a requirement for additional layers of diversification in safe haven options.

Baur & Lucey (2010) also identified similar findings regarding gold. They reveal that gold only assumes the role of a safe haven during extreme market conditions. Interestingly, although bitcoin may offer hedge properties for selected Asian countries during calmer periods or prior to the COVID-19 pandemic, it cannot be regarded a safe haven asset for any Asian stock market during both high volatility periods and the COVID-19 pandemic. In contrast, where gold demonstrates a strong hedge capacity, it also maintains a strong or weak safe haven capacity. However, where gold exhibits a weak hedge capacity, it does not offer safe haven properties for the stock market during periods of high volatility and the COVID-19 crisis. We go one step further and test whether there is a “flight-to-safety” phenomenon during extreme stock market conditions. We define the extreme stock market at 5%, 2.5% and 1% as a movement of the stock market exceeding the 5%, 2.5% and 1% quantile of the return distribution, respectively.

Table 5. Hedge and safe haven property of bitcoin on Asian markets during extreme stock market conditions.

QUANTILE (BIT-stock)	m_0	m_1 (5%)	m_1 (2.5%)	m_1 (1%)
HSI	0.027***	0.020***	-0.028**	0.049***
NIK	0.016***	0.004*	-0.005	-0.029***
KRX	0.006***	0.002	0.050***	0.006
STI	0.025***	-0.002	0.024***	0.020***
TSE	-0.004**	-0.001	0.034**	0.079***
SSEC	0.021***	0.020**	-0.015	0.011
BSE	0.072***	0.013*	0.035***	0.043***
JKSE	0.045***	-0.003	-0.001	0.045***
KLSE	0.027***	0.000	-0.005*	-0.002
KSE100	-0.001	0.000	-0.005	0.114***
PSEI	0.036***	-0.001	0.002	0.042***
SETI	0.103***	0.003	0.004	0.039**
VNI	0.040***	0.003	-0.013**	0.010

Notes: This table reports the estimates of Equation (7).

***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 6. Hedge and safe haven property of gold on Asian markets during extreme stock market conditions.

QUANTILE (XAU-stock)	m_0	m_1 (5%)	m_1 (2.5%)	m_1 (1%)
HSI	0.029***	0.037***	-0.023	0.024
NIK	-0.027***	0.005	-0.007	0.017
KRX	0.032***	0.000	-0.004**	0.000
STI	-0.012***	0.001	-0.011*	-0.010
TSE	0.037***	0.007**	0.004	-0.005
SSEC	0.061***	-0.001	0.009*	-0.009
BSE	-0.025***	0.000	-0.003*	0.005***
JKSE	0.044***	0.003	-0.007	-0.001
KLSE	0.058***	0.001	-0.001	0.016**
KSE100	0.005***	0.003	-0.002	0.008
PSEI	0.031***	0.000	-0.001	0.003
SETI	-0.007***	0.000	0.001	-0.017***
VNI	-0.032***	0.000	-0.004	0.005

Notes: This table reports the estimates of Equation (7).

***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 5 shows the regression results of Equation (7), where $\rho_{ij,t}$ indicates the pairwise dynamic conditional correlation between bitcoin and each Asian stock index. The analysis reveals that bitcoin serves as a strong hedge for Taiwan and a weak hedge for Pakistan. Notably, during very extreme market conditions (at the 1% quantile), bitcoin is significantly positively correlated with the stock indices of 8 out of the 13 markets, except Japan, where bitcoin displays a strong safe haven property. The results suggest that ordinary investors in Taiwan and Pakistan can derive benefit by including bitcoin as a hedging tool for their equity portfolio. Additionally, Japanese investors can utilize bitcoin to safeguard their investment portfolio during periods of extreme stock market volatility. We then compare the hedge and safe haven properties

of bitcoin and gold by repeating the regression of Equation (7), where $\rho_{ij,t}$ indicates the pairwise dynamic conditional correlation between gold and each stock index. The results are presented in Table 6.

Unsurprisingly, gold exhibits a strong hedge property in several countries, namely Japan, Singapore, India, Thailand and Vietnam, as indicated by the significantly negative coefficients m_0 at the 1% level. The magnitude of the hedge property is particularly highest in Vietnam, followed by Japan. On the contrary, gold seems to move in the same direction as the stock market in the remaining countries. Therefore, gold can be recognized as a superior safe haven asset for Asian equity markets compared to bitcoin, as it shows characteristics of a safe haven asset in India and Thailand during the most extreme stock market conditions at the 1% quantile. Similarly, gold serves as a safe haven asset in Singapore, albeit at the 2.5% quantile. Interestingly, Japan and Vietnam exhibit a distinctive pattern in their use of gold as a safe haven asset, since our findings show that gold does not provide additional portfolio diversification benefits beyond its hedge features for the equity markets in Japan and Vietnam during local crises characterized by extreme stock market conditions specific to these countries. However, when faced with global turmoils, such as the COVID-19 pandemic or a high volatility period, investors in both Japan and Vietnam turn to gold as a safe haven for their stock portfolios. This suggests that the perception and adoption of gold as a refuge asset in these countries are more closely tied to global events and uncertainties than to localized market conditions. In general, these findings highlight the strength of gold as a hedge and safe haven asset, positioning it as a favourable choice in portfolio diversification compared to bitcoin for Asian equity markets.

Investor behaviour typically tends to shift from lucrative and hazardous schemes to safer ones during economic instability. The "flight-to-safety" phenomenon (Bernanke et al., 1996) occurs when traders and investors want to hedge their holdings with a lower likelihood of suffering a loss rather than speculating on significant gains. Our findings indicate that investors in Asia primarily perceive gold, rather than bitcoin, as a refuge asset. The high volatility and uncertainties surrounding the long-term prospects of bitcoin hinder its recognition as a widely known and secure asset, as is the case with gold. Another possible explanation is that bitcoin is still predominantly considered an investment rather than a safe haven asset, given its inherent high risk and potential for high returns. Consequently, during high uncertainty periods, investors choose a "flight to safety" by investing in gold or other secure assets, which fall beyond the scope of this paper, instead of rebalancing their portfolios with bitcoin. This preference for safer alternatives aligns with the goal of minimizing potential losses and protecting their wealth in distress times. Furthermore, the disparity in safe haven properties between bitcoin and gold can be attributed to variations in investment cultures in different Asian countries. Gold generally outperforms bitcoin in terms of serving as a hedge asset due to its lower volatility. The gold market is perceived to be more stable and reliable, leading investors to have greater confidence in its performance. This can be attributed to the fact that the gold market is more developed and subject to more stringent regulations in comparison with the relatively new and less regulated bitcoin market.

5 Conclusions

Our study adds to previous research into the hedge and safe haven features of gold and bitcoin by determining the extent to which gold/bitcoin may operate as a hedge, safe haven and/or diversifier against Asian equity markets under different conditions, with varying indicators of uncertainty. We use the DCC-GARCH model, which incorporates a dummy for financial uncertainty, to assess the time-varying correlation between gold/bitcoin markets and Asian stock markets under various levels of crisis.

The results show that bitcoin is a strong hedge asset for Taiwan and Pakistan while gold is a strong hedge asset for other markets (Japan, Singapore, India, Thailand and Vietnam). These results are robust whether using the volatility index, COVID-19 or low quantile on the stock market as an indicator of turmoil periods. Gold holds the status of a prominent hedge asset within specific Asia-Pacific nations such as

Japan, Singapore, India, Thailand and Vietnam due to its capacity to confer liquidity, stability and diversification to portfolios, as highlighted by the World Gold Council (2023). However, in accordance with a comprehensive report published by PwC (2022), the assets under management (AuM) of crypto hedge funds exhibited a notable upswing during the years 2020 and 2021. This surge was particularly pronounced in regions characterized by high inflation rates, currency devaluation concerns or regulatory ambiguities. These dynamics potentially provide insight into the robust status of bitcoin as a potent hedge asset in the context of Taiwan and Pakistan. Furthermore, both Taiwan and Pakistan have encountered episodes of currency volatility and implementation of capital controls. In Pakistan, despite the government's increasingly stringent stance against cryptocurrencies, retailers continue to employ cryptocurrencies as a means to safeguard their financial interests against the backdrop of a devaluing Pakistani rupee. Similarly, Taiwan's political uncertainty together with its robust technology sector and a population that exhibits a proclivity for embracing innovative technologies such as blockchain and cryptocurrencies, may contribute to a heightened propensity for the acceptance of bitcoin as a viable hedge asset.

We also find evidence that bitcoin does not display the safe haven characteristic in any of the observed Asian countries in all uncertainty periods under consideration, including the global COVID-19 pandemic, high volatility periods and extreme stock market conditions. At the same time, gold is a strong safe haven for 5 out of 13 Asian countries, namely Japan, Singapore, India, Thailand and Vietnam during both the COVID-19 and high volatility periods (when the volatility index is greater than 30) and a weak safe haven for Hong Kong only during high volatility periods. We explain that many countries in Asia do not expect bitcoin to be a safe haven asset, but instead think of it as a speculative investment. Therefore, when volatility is expected to be high, traditional precious metals are receiving more attention.

Moreover, gold has better hedge and safe haven properties during very extreme stock market conditions (at the 1% quantile) than bitcoin in Asian countries. Bitcoin is significantly positively correlated with the stock indices of 8 of 13 markets, except Japan, where bitcoin displays a safe haven property. The results imply that during periods of extreme volatility on the stock market, only Japanese investors can use bitcoin as a shelter for their equity portfolio. On other markets, bitcoin is nothing but another risky asset during high-volatility markets. Gold also appears to be a better safe haven than bitcoin, as it shows a safe haven characteristic in India and Thailand with the most extreme stock market volatility of 1% (also in Singapore with the 2.5% quantile). It is interesting to note that Japan and Vietnam exhibit a unique pattern in their utilization of gold as a safe haven asset. To be more specific, investors in both Japan and Vietnam choose gold as a safe haven tool for their equity portfolios when faced with global turmoil, such as the COVID-19 pandemic or high VIX periods. However, when faced with local crises characterized by extreme stock market conditions specific to these countries, gold does not seem to be used as a safe haven. Factors such as market turnover, stock price volatility and capital flow openness are possible explanations that could be held responsible for the differences between the characteristics of gold and bitcoin between countries.

Our results should interest individual investors, financial advisors, institutional investors, policymakers and regulators as to how cryptocurrency and gold have evolved as a hedge and safe haven asset for equity markets during turmoil periods. However, a detailed assessment of all possible factors driving the development between gold prices and stock prices for all economies is beyond the scope of our study.

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