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Investigating Cryptocurrencies As a Diversifier Asset for the Saudi Stock Market (TASI)

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ABSTRACT

This study will shed light on cryptocurrencies, specifically the Bitcoin, as a diversifier in the Saudi stock market. Cryptocurrencies have overwhelmingly become a widespread and interesting phenomenon, attracting the attention of academic researchers as well as financial and governmental entities. Investors need to diversify their investments in different markets to manage their risks, particularly during times of crises, which requires understanding of the interconnections various markets. Moreover, the findings of this study will assist Saudi financial officials in better understanding the risks and rewards of cryptocurrencies and exploring investment opportunities more efficiently. We examine the hedging and diversifier properties of cryptocurrencies against TASI using the GARCH (1,1) model covering the daily data from January 1, 2018, to December 31, 2021. Our findings confirm that the Bitcoin can be used as a diversifier in the Saudi stock market.

Keywords: Bitcoin, Cryptocurrency, GRACH (1,1), Saudi stock market (TASI), Saudi vision 2030, Diversifiers.

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العملات المشفرة باعتبارها عامل تنويع في سوق الأسهم السعودية

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ملخص

تسلط هذه الدراسة الضوء على العملات المشفرة، وتحديداً البيتكوين، باعتبارها عامل تنويع في سوق الأسهم السعودية. فقد أصبحت العملات المشفرة ظاهرة واسعة الانتشار ومثيرة للاهتمام بشكل كبير، حيث جذبت انتباه الباحثين الأكاديميين وكذلك الجهات المالية والحكومية. ويحتاج المستثمرون إلى تنويع استثماراتهم في الأسواق المختلفة لإدارة مخاطرهم، خاصة في أوقات الأزمات، الأمر الذي يتطلب فهم الترابط بين الأسواق المختلفة. علاوة على ذلك، ستساعد النتائج المسؤولين الماليين السعوديين على فهم مخاطر ومكافآت العملات المشفرة بشكل أفضل واستكشاف فرص الاستثمار بشكل أكثر كفاءة. نقوم في هذه الدراسة بفحص خصائص التحوط والتنويع للعملات المشفرة مقابل TASI باستخدام نموذج GARCH (1،1) الذي يغطي البيانات اليومية من 1 يناير 2018 إلى 31 ديسمبر 2021. وتؤكد النتائج التي توصلنا إليها أنه يمكن استخدام البيتكوين كأداة للتنويع في سوق الأوراق المالية السعودي.

الكلمات الدالة: العملات المشفرة، البيتكوين، عوامل التنويع، سوق الأسهم السعودية.

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1. Introduction

Cryptocurrencies have overwhelmingly become a widespread and interesting phenomenon that has attracted the attention of academic researchers as well as financial and governmental entities. The idea behind cryptocurrencies fascinates most investors, and they believe that the future belongs to a decentralized digital currency. It is an open-source protocol that is not subject to any authority, such as the government, the central bank, or financial institutions.

As the popularity of cryptocurrency has started to rise, several studies have begun to explore the capabilities of cryptocurrency as a hedge, diversifier, and safe haven. Park et al. (2021) studied the relationship between the Bitcoin and other investment assets. Their results showed an asymmetric information flow from other assets to the Bitcoin, implying that the Bitcoin market interacts with major-asset markets.

Understanding the role of protection is important for portfolio design, asset pricing, and risk management. An effective hedge is described as an asset that is uncorrelated or negatively correlated to a portfolio on average, especially under market turmoil. In terms of diversification and hedging properties, most of the existing literature showed that digital currencies are uncorrelated with traditional assets during normal and critical periods, which could benefit investors in optimal asset allocation.

The primary purpose of this study is to investigate the capabilities of cryptocurrency as a diversifier using the GARCH model. We will examine the hedging and diversifier properties of cryptocurrencies against TASI. Thereafter, the results will help establish a dynamic investment strategy, which can be used by the Saudi financial authorities to hedge against risk when investing in the cryptocurrency market. Moreover, the findings will assist Saudi financial officials in exploring and diversifying investment opportunities more efficiently and investigating whether cryptocurrencies can be used as a hedge or diversifier in the Saudi stock market.

Saudi Arabia is going through an era of great changes toward social and economic liberalization and economic diversification. Diversifying the economy and unleashing the potential of promising economic sectors require investment in all resources. The second pillar of Saudi Arabia's 2030 vision is that the country would focus on becoming a global investment powerhouse by utilizing its strong investment skills to stimulate the economy and diversify revenue streams. One of the goals of the 2030 vision is to increase investment capabilities by engaging in significant international corporations and emerging technologies around the world. This way, Saudi Arabia will be able to become a market maker in certain areas, as well as a leader in competitive asset, funding, and investment management.

This study will serve Saudi Arabia's 2030 vision by exploring and testing new ways of protection as an important aspect of portfolio design, asset pricing, and risk management. Investigating whether cryptocurrencies could be used as a hedge or diversifier against TASI will be in line with the 2030-vision objectives of expanding investment capabilities. This move will enhance financial resources and economic stability, which will be re-invested for long-term benefit. With the goal of diversifying government resources and the economy, it will improve the management efficiency and return on investment on the fund in the Saudi economy.

Furthermore, following the outbreak of COVID-19 pandemic, investigations into the economic effect of the pandemic became a study priority, and numerous scholars have studied the impact from various angles. The studies on hedge or diversifier properties of cryptocurrencies during times of turmoil are limited in the existing literature. This study sheds some light on the capabilities of cryptocurrency as a diversifier asset against uncertainty, as most of the selected period is during the COVID-19 pandemic. This period could allow us to understand and explain the risk effects

during uncertain times to facilitate risk management in cryptocurrency markets.

This research will assist Saudi financial authorities in diversifying their investments in different markets to manage their risks, particularly during times of crisis, which requires an understanding of the interconnectedness of various markets. Furthermore, providing the Saudi stock market with a new diversification strategy would encourage/ensure local and foreign investors, hence increasing economic growth.

Saudi Arabia owns almost 16% of the world's proven petroleum reserves, plays a principal role in OPEC, is one of the world's largest crude oil producers and exporters, and is a large-scale oil refiner and natural gas producer. Petroleum accounts for roughly 87% of budget revenues, 42% of GDP, and 90% of export earnings. This study will help Saudi government officials diversify investment and implement a hedging strategy that increases foreign investment, which would stimulate the economy and diversify revenue streams.

2. Literature Review

Using the DECO-FIGARCH (1,1) model specification, Kang et al. (2019) investigated whether the Bitcoin could be identified as a hedge or safe haven against T-bonds, the stock market, the US dollar currency index, and gold. They stated that the Bitcoin can act as an effective safe haven to reduce downside risks. As such, it could reinforce the advantage of diversification over other tradable asset classes in the market, especially aiming for growing financialization. However, they found significant time-varying correlations that suggest that institutional investors should frequently modify their portfolio structure after adjusting the long memory process efficiently.

Charfeddine et al. (2020) studied the dynamic relationship between cryptocurrencies and traditional assets (gold, oil, and S&P 500), using a battery of time-varying copula methods and DCC models. They found that, depending on economic shocks, the cross-correlation with financial assets changes over time, and that cryptocurrencies can be useful for financial diversification, but not for hedging.

Bouri et al. (2017) used the DCC model to examine the volatility co-movements between the Bitcoin and financial assets, such as stock indices, bonds, oil, gold, the general commodity index, and the US-dollar index. They found that the Bitcoin can be considered an effective diversifier in most cases. Furthermore, Zeng et al. (2020) used the VAR model to examine the dynamic interdependence of returns between the Bitcoin and traditional financial assets. They found limited links between the Bitcoin and traditional assets, suggesting that the Bitcoin can act as a diversifier.

Matkovskyy and Jalan (2021) investigated the relationship between Bitcoin returns and expected and unexpected inflation, conditional on investor sentiment in Bitcoin markets and the inflation in the US, Eurozone, UK, and Japan. They stated that the relationship between Bitcoin returns and realized inflation depends upon the magnitude of inflation shocks and Bitcoin market state (bullish *vs*. bearish). However, in terms of unexpected inflation, this relationship depends more on the magnitude of inflation shocks than on Bitcoin-investor sentiment. They suggested that the Bitcoin can be considered a macro-hedge against realized inflation in bullish Euro, GBP, and JPY markets, offering higher returns during periods of very high inflation. They pointed out that their results are consistent with the asymmetric return–inflation relationship across different market states and inflation levels already observed in other markets, such as equities (Kim & Ryoo, 2011), real estate (Simpson et al., 2007), and gold (Wang et al., 2011).

Using the VARMA(1,1)-DCC-GJR-GARCH model, Guesmi et al. (2019) investigated the volatility spillover effects between the Bitcoin and other financial assets (stock indices, currencies, gold, oil, and the implied volatility index [VIX]). Their findings showed that a short position in the Bitcoin market can be used to hedge against a variety of financial assets.

Moreover, the authors pointed out that a gold, oil, VIX, and Bitcoin portfolio can greatly minimize risks. Demir et al. (2018) concluded that the Bitcoin in financial portfolios can help mitigate risks. However, Kristoufek (2020) investigated the safe-haven properties of the Bitcoin and gold using S&P 500 returns and the US VIX index. According to the findings, gold was a better safe-haven asset during the COVID-19 pandemic. Moreover, Klein et al.'s (2018) empirical results showed that the Bitcoin cannot be used as a hedging tool, because it is affected by market shocks.

Zhang et al. (2021) calculated the hedging effectiveness (HE) value to examine the dynamic correlation and volatility spillover and assess the risk reduction of the Bitcoin future to spot. They used the VAR-DCC-GARCH model to investigate the dynamic correlation and the VAR-BEKK-GARCH model to investigate the volatility spillover. Their results showed that the Bitcoin spot and future markets are highly connected; second, there was a bi-directional volatility spillover between the spot and future market; third, the HE value is equal to 0.6446, which indicates that Bitcoin future can indeed hedge the risks in the Bitcoin spot market.

Following the COVID-19 outbreak, investigations into the economic effects of the pandemic became a study priority, and numerous scholars have studied the impact from various angles. Mokni et al. (2021) inspected the impact of the categorical US Economic Policy Uncertainty (EPU) indices on Bitcoin returns. They employed quantile regressions augmented with dummy variables to consider various states of the Bitcoin market. Their results indicate that the Bitcoin is a strong hedge and safe haven against some categorical EPU, including fiscal policy, taxes, national security, and trade policy under bullish market conditions.

Kalyvas et al. (2019) examined the drivers behind Bitcoin price crash risk by studying the relationship between Bitcoin crash risk and economic uncertainty and behavioral factors. They found evidence that the Bitcoin price crash risk shares a negative and significant relationship with the uncertainty factors, while the behavioral factors display a weaker association with Bitcoin price crash risk. They suggested that investors could benefit if they consider the Bitcoin as an investment when economic uncertainty is high.

3. Materials and Methods

3.1 Data Description

This study uses the daily spot closing price of the Bitcoin and the TASI price index, covering the period from January 1, 2018 to December 31, 2021. The Bitcoin price is sourced from the Bloomberg terminal, and the rest of the time series data is sourced from Tadawul and the World Bank. As Bitcoin trades 24/7 and the TASI index data is only available on working days, we use the data of working days for similarity between the variables.

3.2 Method

This study uses the GARCH process to investigate the pairwise relationship between Bitcoin return and Saudi stock market return (TASI), one variable at a time.

$$R_{it}R_t = \beta_0 + \beta_1 TASI_{t-1} + \varepsilon_t$$

where

$$\varepsilon \sim N(0, \alpha_t^2)$$

$$\delta_t^2 = \text{Ш}_0 + \beta_2 \varepsilon_{t-1}^1 + \beta_3 \alpha_{t-1}^2$$

$R_{it}R_t$ is the Bitcoin return at time t and $TASI_{t-1}$ is the index return at time t. Error is normally with a zero mean and a variance of α_t^2. The conditional variance (α^2) follows a GARCH (1,1) process to capture the optimal decision and seek good hedging and diversification features and the significance level that discloses the relationship. Baur and Lucey (2010) concluded that a negative correlation implies a robust hedging relationship, while a positive correlation implies or is inferred to be a diversifier. According to Chan et al. (2018), the most desired and least complex

application to minimize risk in the real world is a strong hedging structure.

4. Results

Table 1
Descriptive statistics for all variables

	Return (Bitcoin)	Return (TASI)
OBJ.	1000	999
Mean	.001538	0.000450
Median	0.000812	0.000975
Max.	0.255129	0.068315
Min.	-0.317282	-.086846
Std. Dev.	0.046359	0.010478
Skewness	-.582131	-1.536161
Kurtosis	8.398627	17.63744
Jarque-Bera	1270.86	9311.250
Probability	0.0000	0.00000
Sum	1.537629	.449915
Sum Sq. Dev.	2.1470	0.1095656

Table 1 shows the descriptive statistical results of the Bitcoin and Saudi stock returns. The skewness and kurtosis statistics reveal that the time series are asymmetric and leptokurtic. Additionally, the Jarque-Bera values are statistically significant, which means that the data is not normally distributed.

Table 2
Unit-root test

Unit-troot test	Augmented Dickey–Fuller	
	Z(t)	**p-value**
Bitcoin return	-31.055	0.000
TASI return	-10.726	0.000

Table 2 represents the stationarity of the data using a unit-root test. The Augmented Dickey–Fuller of Bitcoin return and TASI return are stationary.

Table 3
Empirical results

Return BTC	Coefficient	p-value
$(e^{rbtc}{}_{t-1})^2$	0.033009	0.0000
	$(0.00075)^{***}$	
$(h^{rtasi}{}_{t-1})$	0.9053995	0.0000
	$(0.01288)^{***}$	
N	999	

Table 3 shows the GARCH (1,1) results of the Bitcoin return and the Saudi stock market return, which were statistically significant. The results confirm that the volatility spillover effect from Bitcoin to TASI in the selected period does not exist. Based on these findings, we can conclude that the Bitcoin has no impact on the Saudi stock market, which leads to investing more in Bitcoin as a safe haven. Our findings are related to Jamal et al.'s (2016) findings, implying that the Bitcoin is highly speculative.

5. Conclusion

This research intended to investigate the impact of the Bitcoin on the Saudi stock market and to find out whether it can be used as a diversifier. Using the GARCH (1,1) during the selected period, we found no evidence that the Bitcoin and the Saudi stock market are correlated. Based on this, we can conclude that the Bitcoin can be used as a diversifier. The results also suggest that the Bitcoin cannot be used as a hedge against the Saudi stock market, as the volatility is high in the Bitcoin market. Moreover, as most of the selected period is during the COVID-19 pandemic, we can also conclude that the Bitcoin can be used as a

diversifier when economic uncertainty is high. The COVID-19 pandemic is a very unique situation, and its magnitude as a pandemic is something that we have never experienced before. Therefore, we need to further investigate the capabilities of the Bitcoin as a hedge or diversifier during different periods and perhaps include different types of economic uncertainties to better facilitate risk management in cryptocurrency markets.

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