



Can Gold Be the Key to Stability in Shariah-Compliant Cryptocurrency?

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Paper Submitted : 21 August 2025 Paper Revised : 13 September 2025 Paper Published : 1 October 2025

Abstract

This study investigates volatility differences between gold-backed and non-asset-backed cryptocurrencies to assess their potential alignment with Shariah principles. From an Islamic finance perspective, excessive uncertainty (gharar), speculative behavior (maysir), and non-compliance with ribawi exchange rules are key concerns in evaluating digital assets. This study uses ARCH and GARCH(1,1) models to analyze the volatility of cryptocurrencies. The selected cryptocurrencies include three asset-backed (KAU, XAUT, PAXG) and three non-asset-backed (BTC, ETH, XRP). The findings indicate that gold-backed cryptocurrencies exhibit lower volatility persistence, meaning that price shocks dissipate more rapidly compared to non-asset-backed tokens. This relative stability suggests a reduced tendency toward speculative fluctuations, thereby mitigating volatility-related gharar. However, Shariah compliance extends beyond price stability and also depends on contractual structure, ownership transfer (taqabud), and adherence to sarf requirements in gold-based exchanges. By integrating econometric volatility analysis with Islamic jurisprudential considerations, this study contributes to the discourse on Shariah governance of digital assets and offers insights for regulators and Shariah authorities in evaluating the permissibility and institutional oversight of asset-backed cryptocurrencies.

Keywords:

cryptocurrency;
volatility;
GARCH; gold-
backed token;
Shariah
compliance

Abstrak

Penelitian ini mengkaji perbedaan volatilitas antara cryptocurrency berbasis emas (gold-backed) dan yang tidak berbasis aset untuk menilai potensi kesesuaiannya dengan prinsip-prinsip Syariah. Dalam perspektif keuangan Islam, ketidakpastian yang berlebihan (gharar), perilaku spekulatif (maysir), serta ketidakpatuhan terhadap aturan pertukaran barang ribawi merupakan isu utama dalam mengevaluasi aset digital. Penelitian ini menggunakan model ARCH dan GARCH(1,1) untuk menganalisis volatilitas cryptocurrency. Aset yang diteliti meliputi tiga cryptocurrency berbasis emas (KAU, XAUT, PAXG) dan tiga cryptocurrency non-asset-backed (BTC, ETH, XRP). Hasil penelitian menunjukkan bahwa cryptocurrency berbasis emas memiliki persistensi volatilitas yang lebih rendah, yang berarti guncangan harga cenderung mereda lebih cepat dibandingkan dengan cryptocurrency yang tidak berbasis aset. Stabilitas relatif ini mengindikasikan kecenderungan spekulatif yang lebih rendah, sehingga dapat mengurangi gharar yang bersumber dari volatilitas harga. Namun demikian, kepatuhan Syariah tidak hanya ditentukan oleh stabilitas harga, tetapi juga bergantung pada struktur kontraktual, mekanisme perpindahan kepemilikan (taqabud), serta pemenuhan ketentuan sarf dalam transaksi berbasis emas. Dengan mengintegrasikan analisis volatilitas secara ekonometrik dan pertimbangan yurisprudensi Islam, penelitian ini berkontribusi pada diskursus tata kelola Syariah atas aset digital serta memberikan wawasan bagi regulator dan otoritas Syariah dalam mengevaluasi status kebolehan dan pengawasan institusional terhadap cryptocurrency berbasis aset.

Kata kunci:

cryptocurrency;
volatilitas;
GARCH, token
berbasis emas;
kepatuhan
Syariah



Introduction

Cryptocurrency has emerged as one of the most prominent financial innovations of the past decade. The launch of Bitcoin in 2009 marked the beginning of a new era in the global financial system, one that does not rely on centralized authorities but instead operates on blockchain technology, which is decentralized, transparent, and secure (Panda et al., 2023; Taskinsoy, 2021). Over time, various types of cryptocurrencies have emerged including Ethereum, Binance Coin, Ripple, as well as stablecoins and asset backed cryptos. These are used not only as a medium of exchange but also as an alternative investment instrument (Kohergin, 2022; Smales, 2024; H. Zhang et al., 2021).

According to the 2024 Crypto Ownership Across the World report by Triple A, more than 562 million people worldwide own cryptocurrency, representing approximately 6.8 percent of the global population (Kgomongwe & Antw, 2024). The highest adoption rates are found in India, Nigeria, Vietnam, and the United States. Southeast Asia also shows significant growth, with Indonesia estimated to have over 17 million crypto users by early 2024 (Umoru et al., 2024). A report by Chainalysis in 2023 noted that Central, South, and Southeast Asia experienced a 40 percent surge in crypto adoption over the past two years (Paesano & Siron, 2022). Additionally, data from the Finder Crypto Adoption Index indicates that over 30 percent of global crypto users utilize these assets as long term investments rather than merely for transactional purposes.

The popularity of cryptocurrency as an investment instrument is largely driven by its potential for high short-term returns. However, on the flip side, its extreme price volatility makes it unstable and highly speculative (Ben Yaala & Henchiri, 2025; Hairudin & Mohamad, 2024; Khiari et al., 2025; Manahov, 2022; D. Zhang et al., 2023a). For instance, the price of Bitcoin reached an all-time high of nearly USD 69,000 in November 2021 but then plunged dramatically to below USD 20,000 by mid-2022, raising concerns about systemic risks and significant losses for retail investors. This instability makes cryptocurrency less ideal as a reliable store of value, especially when compared to traditional instruments like gold.

The adoption of cryptocurrency has also begun to gain traction among Muslim communities, although it still faces several normative and regulatory challenges. A report by Islamic Finance News (IFN) indicated a growing interest in Shariah-compliant cryptocurrencies, particularly in countries such as Malaysia, the United Arab Emirates, and Turkey (Al-Nassr et al., 2024; Wiwoho et al., 2024a; Yildiran & Kahf, 2021). Countries with large Muslim populations such as Malaysia and Pakistan have also begun to explore Islamic crypto initiatives as part of broader digital financial inclusion strategies.

However, global fatwa institutions demonstrate divergent positions regarding the permissibility of cryptocurrency. In Indonesia, the Dewan Syariah Nasional – Majelis Ulama Indonesia (DSN-MUI) has declared that cryptocurrency cannot function as a lawful currency and is generally impermissible due to elements of gharar and speculative uncertainty. In



contrast, several Shariah scholars in jurisdictions such as Turkey and the United Arab Emirates have adopted more accommodative views, particularly when crypto assets are structured as investment instruments rather than currency substitutes. This divergence reflects a broader epistemological debate within contemporary Islamic finance concerning asset-backing, intrinsic value, and *maqasid*-oriented financial innovation. This normative fragmentation underscores the urgency of developing a structured analytical framework capable of classifying and evaluating cryptocurrency within a coherent Shariah governance perspective.

Nevertheless, an alternative approach has emerged to develop cryptocurrencies that are more aligned with Shariah principles by creating cryptocurrencies backed by real assets (*asset-backed crypto*) (Arief Jailani & Muneeza, 2023; Dahlan, 2025; Hafiz, A., Napisah Napisah, Ismail Jalili, Armasito Armasito, 2025). One of the most prominent forms is gold-backed cryptocurrencies, such as PAX Gold (PAXG), Tether Gold (XAUT), and KAU. Gold has long been recognized as a stable, inflation-resistant asset with strong intrinsic value, widely accepted in both conventional finance and Islamic jurisprudence (Heidt, Cedric, Philipp Sandner, 2024; Hutagalung, Muhammad Wandisyah R., 2024; Khalil, 2021; Sauce, 2025). Historically, gold has demonstrated lower volatility compared to fiat currencies or other speculative instruments, making it an ideal underlying asset in Shariah-compliant crypto frameworks (Mohammed., 2024; Wiwoho et al., 2024b; Zaman et al., 2025). However, the Shariah compliance of gold-backed cryptocurrencies remains subject to debate, particularly concerning the requirement of *taqabud* (possession or constructive transfer of ownership) in *sarf* contracts. In Islamic jurisprudence, transactions involving gold must be conducted on a spot basis and must ensure either physical possession (*qabd haqiqi*) or legally recognized constructive possession (*qabd hukmi*). This raises critical questions regarding whether token holders genuinely acquire ownership rights over the underlying gold, whether the gold is segregated and verifiable, and whether redemption mechanisms satisfy the criteria of lawful transfer. Therefore, while gold-backed cryptocurrencies are often positioned as more Shariah-aligned alternatives, their compliance ultimately depends on the governance structure, custodial transparency, audit mechanisms, and enforceability of ownership rights.

Previous studies, such as those conducted by (Al-Nassar et al., 2023; Chemkha et al., 2021; Liu & Lee, 2022; Salisu et al., 2021), have shown that gold serves effectively as a safe haven during periods of financial uncertainty, offering price stability and reliability as a store of value. In contrast, most cryptocurrencies tend to display sharp price fluctuations, driven largely by speculative behavior and market sentiment (Kim et al., 2022; D. Zhang et al., 2023b). Additional literature suggests that the presence of a tangible asset like gold can help dampen market shocks and support greater price stability, an essential value in Islamic finance (Li & Umair, 2023; Maghyereh et al., 2025).

However, the majority of existing studies remain limited to descriptive or correlational analyses and often lack robust empirical statistical models to



directly compare the two categories. Moreover, few studies have explicitly applied such analytical frameworks within the context of Islamic finance, despite the fact that Shariah principles emphasize the importance of stability (*istiqrar*), justice (*'adl*), and public benefit (*maslahah*) in economic instruments. This highlights a critical gap in the literature and underscores the need for a more rigorous investigation.

This study seeks to address the central question: Do gold-backed (asset-backed) cryptocurrencies exhibit lower volatility compared to non-asset-backed cryptocurrencies, particularly in relation to their alignment with Shariah financial principles? To answer this question, the study aims to empirically compare the volatility levels between both types of cryptocurrencies using the ARCH/GARCH modeling approach. Through this method, the research intends to uncover whether the presence of a tangible underlying asset such as gold genuinely contributes to price stability, thereby justifying the inclusion of asset-backing as a key criterion in constructing Shariah-compliant cryptocurrencies—anchored in values such as stability, transparency, and fairness.

Accordingly, this study not only contributes to the academic discourse in Islamic finance and blockchain technology, but also offers significant practical value to various stakeholders. For Shariah authorities and scholars, it provides empirical insight into the volatility and stability of asset-backed cryptocurrencies particularly those backed by gold as a basis for assessing their compliance with Islamic principles, including justice (*'adl*), minimal uncertainty (*gharar*), and the prevention of harm (*dharar*). For Muslim investors and fintech practitioners, the findings offer deeper understanding of the risk-return profile of Shariah-compliant digital assets, thus supporting more informed investment decisions aligned with Islamic ethical values. Meanwhile, for regulators, this research can inform the formulation of policies related to digital assets that are more inclusive, resilient, and in line with Islamic financial norms especially in anticipating the ethical and sustainable growth of the digital economy. With a strong methodological foundation and high relevance to the current needs of the Muslim community, this study is expected to address existing challenges while opening new pathways for the adoption of more stable, ethical, and Islamically-aligned cryptocurrencies

Literature Review

Cryptocurrencies have emerged as a disruptive innovation in the financial world, challenging traditional monetary systems and raising critical questions within the context of Islamic finance. One of the main debates surrounding cryptocurrency revolves around its compliance with Shariah principles, especially regarding volatility, intrinsic value, and speculative behavior.

In Islamic jurisprudence, transactions involving high levels of *gharar* (uncertainty) and *maysir* (speculation) are prohibited. Consequently, many scholars have raised concerns about the permissibility of cryptocurrencies like



Bitcoin and Ethereum due to their extreme price volatility and lack of underlying assets (Hafiz et al., 2025). These characteristics can render them speculative in nature, resembling gambling rather than investment.

To address these concerns, scholars have proposed asset-backed cryptocurrencies, particularly those pegged to gold, as a potentially Shariah-compliant alternative. Gold has long been recognized in Islamic finance as a legitimate store of value and medium of exchange. The importance of volatility analysis in determining Shariah compliance. A less volatile cryptocurrency is less likely to encourage speculative behavior and more likely to serve real economic purposes such as savings or transactions. Thus, understanding and comparing the volatility levels of asset-backed versus non-asset-backed cryptocurrencies has become a crucial part of Islamic financial evaluation.

In addition to price volatility, *gharar* in cryptocurrency transactions may also arise from technological and contractual uncertainties embedded in smart contract systems. Smart contracts operate through automated code execution on blockchain networks such as Ethereum, where transaction terms are governed by programmed algorithms rather than traditional legal documentation. While automation enhances efficiency, it may introduce ambiguity if the contractual terms are not fully transparent, understandable to users, or legally enforceable. Coding vulnerabilities, oracle dependency risks, and protocol governance changes can create uncertainty regarding the execution and finality of transactions. From a Shariah perspective, such technological opacity may conflict with the requirement of contractual clarity (*bay' al-ma'lum*) and certainty in rights and obligations, thereby constituting a form of non-price-related *gharar*.

The literature also highlights the growing interest of Islamic financial institutions in integrating blockchain-based assets into their portfolios, provided that these assets meet Shariah criteria. The emergence of gold-pegged tokens like PAX Gold (PAXG) and Tether Gold (XAUT) reflects this trend, offering more stable and transparent alternatives to traditional cryptocurrencies.

In summary, previous literature underscores the potential compatibility of asset-backed cryptocurrencies with Shariah principles, particularly those backed by gold. Their inherent stability, lower volatility, and alignment with the *maqasid al-shariah* (objectives of Islamic law) suggest they may be more suitable for Muslim investors. As the cryptocurrency ecosystem evolves, further research is needed to explore how digital assets can be harmonized with Islamic values without compromising financial innovation.

Method

This study employs a quantitative approach with comparative research. The data used in this research consist of two main categories of cryptocurrencies: those that are asset-backed with physical gold support, and those that are not backed by any specific asset (non-asset-backed). This classification is intended to examine the differences in volatility characteristics



and value stability between the two types of digital assets. The data utilized are secondary data in the form of daily cryptocurrency prices, obtained from the Investing.com website. The selected cryptocurrencies are as follows:

Table 1. Selected Cryptocurrencies

No	Cryptocurrency	Ticker	Backed by	Initial release date
Asset-backed cryptocurrencies				
1.	Kinesis Gold	KAU	Gold (1:1)	April 18, 2023
2.	Tether Gold	XAUT	Gold (1:1)	March 22, 2020
3.	PAX Gold	PAXG	Gold (1:1)	September 29, 2019
Non-asset-backed cryptocurrencies				
1.	Bitcoin	BTC	None (decentralized)	January, 1 2015
2.	Ethereum	ETH	None (decentralized)	August 7, 2015
3.	Ripple	XRP	None (network token)	December 17, 2014

The selection of assets is based on the highest market capitalization ranking within each category to ensure a representative and balanced comparison. To maintain consistency and fairness in the analysis, this study applies an overlapping data period starting from 18 April 2023 to 31 May 2025. This starting point was determined based on the availability of historical data for Kinesis Gold (KAU), which is the most recently launched asset among all the cryptocurrencies examined. By aligning the analysis timeframe, this approach avoids time-period bias and ensures that all cryptocurrencies are evaluated under the same market conditions.

Econometric Approach

Before conducting volatility modeling, a stationarity test was performed using the Augmented Dickey-Fuller (ADF) test to ensure that the return series of each cryptocurrency was suitable for time series analysis. Stationarity is a critical prerequisite in time series modeling, as it ensures that the statistical properties of the data, such as mean and variance, remain constant over time.

To analyze the volatility characteristics of asset-backed and non-asset-backed cryptocurrencies, this study employs the Autoregressive Conditional Heteroskedasticity (ARCH) and Generalized Autoregressive Conditional Heteroskedasticity (GARCH) models. These models are well-suited for capturing volatility clustering, a common phenomenon in financial markets where high-volatility periods are followed by more high-volatility periods, and low by low.

The GARCH(1,1) model is particularly useful in modeling the time-varying volatility of cryptocurrency returns. In this study, the persistence of volatility is calculated as the sum of the estimated coefficients α (alpha) and β (beta). This $\alpha + \beta$ value reflects how long a shock to volatility remains in the system. A higher persistence value indicates that the impact of volatility shocks decays more slowly over time, suggesting a more volatile and less stable return



series. Conversely, a lower persistence value implies quicker mean reversion and, therefore, lower sustained volatility.

By comparing the persistence values across cryptocurrencies, this study is able to assess and compare the relative volatility of asset-backed versus non-asset-backed tokens. This approach provides empirical insights into how the presence of a tangible underlying asset (such as gold) influences the stability of a cryptocurrency.

Results

This section presents the results of this study in two sections, first illustrates the preliminary statistics of the dataset and empirical result of ARCH and GARCH

Preliminary Statistics

Table 2. Preliminary Statistics

Cryptocurrencies	Mean	Max.	Min.	Std. Dev.	Skewness	Kurtosis
KAU	-0.0003521	0.05600123	-0.05893215	0.00987142	0.2375112	5.5623712
XAUT	-0.0004303	0.05693348	-0.063957	0.01105026	0.14697801	5.38640275
PAXG	-0.0001971	0.05693348	-0.063957	0.00868291	0.25292257	5.84050557
BTC	0.00128781	0.10715037	-0.0926511	0.03164002	0.14953472	2.10230085
ETH	-0.0002953	0.17901484	-0.1717269	0.03257808	0.09508297	4.64431611
XRP	0.00084779	0.42196319	-0.2309176	0.04270648	1.49502135	16.9510916

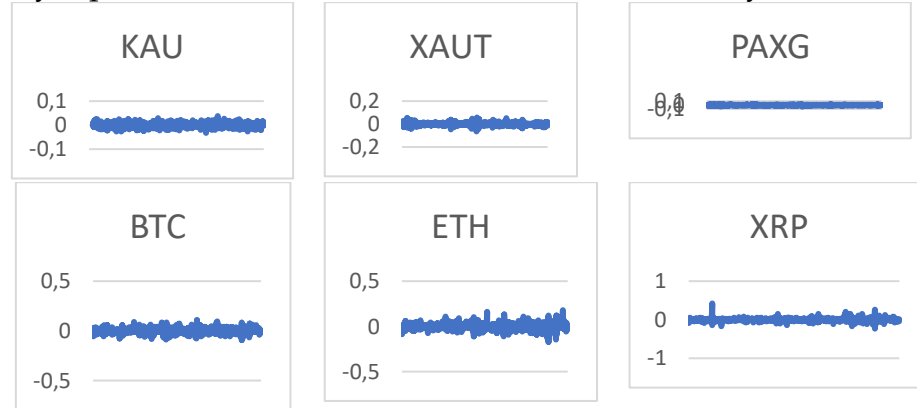
The descriptive statistics of the selected cryptocurrencies comprising both asset-backed (KAU, XAUT, PAXG) and non-asset-backed types (BTC, ETH, XRP) highlight notable differences in their volatility and distributional characteristics. The standard deviation serves as an initial indicator of volatility. Asset-backed cryptocurrencies, particularly those backed by gold like PAXG and XAUT, show relatively low standard deviations compared to non-asset-backed tokens such as BTC and XRP. This reflects a more stable price movement, suggesting the underlying gold reserve plays a role in tempering extreme price fluctuations. KAU, despite being gold-backed, exhibits unusually high skewness and kurtosis, likely due to limited trading volume and low market liquidity, which amplifies its statistical distortions. This anomaly underscores the importance of liquidity in maintaining volatility stability, even among asset-backed crypto.

Moreover, non-asset-backed tokens display fatter tails and higher peaks in their distributions, especially XRP with a kurtosis exceeding 16, signaling the presence of extreme price movements. This reinforces the general perception of conventional cryptocurrencies being more speculative and subject to higher market sentiment fluctuations. In contrast, the relatively moderate skewness and platykurtic tendencies of PAXG and XAUT indicate a more symmetric and predictable return pattern, in line with the role of gold as a safe haven. This supports the theoretical framework that asset-backing, particularly by a



historically stable asset like gold, can mitigate speculative spikes and provide price anchoring.

The following are the log return series derived from the daily closing prices of the selected cryptocurrencies. These log returns represent the percentage change in price on a continuous compounding basis and are used as the primary input for further statistical and econometric analysis.



This transformation stabilizes the variance and converts the price series into a return series that is more suitable for time series analysis. The log return series serves as the primary input for subsequent stationarity testing and volatility modeling using ARCH-GARCH. Prior to applying volatility models, the Augmented Dickey-Fuller (ADF) test was performed to check the stationarity of the cryptocurrency return series. The results are shown below.

Table 3. Stasionerity Test

Cryptocurrency	t-statistic ADF	p-value	Conclusion
KAU	-28.42634	0.0000	Stationary
XAUT	-34.96772	0.0000	Stationary
PAXG	-25.991116	0.0000	Stationary
BTC	-30.01275	0.0000	Stationary
ETH	-39.89106	0.0000	Stationary
XRP	-29.03660	0.0000	Stationary

The results of the stationarity test indicate that all selected cryptocurrency return series are stationary, confirming the absence of unit roots and suggesting that the data are suitable for further time series analysis such as volatility modeling using ARCH and GARCH approaches.

Empirical Result of ARCH and GARCH

Table 4. Heteroskedasticity Test Results

Cryptocurrency	F-statistic	Prob. F	Obs*R-squared	Prob. Square	Chi-
KAU	12.34123	0.0005	11.98532	0.0005	
XAUT	81.55883	0.0000	73.96587	0.0000	
PAXG	9.212743	0.0025	9.127684	0.0025	
BTC	14.79522	0.0001	14.55461	0.0001	
ETH	10.28214	0.0014	10.10572	0.0015	

XRP	24.16974	0.0000	23.49672	0.0000
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Based on the ARCH test results, all cryptocurrencies in this study show probability values below 0.05 for both the F-statistic and Chi-Square tests. This indicates that all return series exhibit heteroskedasticity, thus justifying the use of ARCH/GARCH models to measure volatility.

Table 5. Variance equation of GARCH model

Cryptocurrency	ω (omega)	α (alpha)	β (beta)	$\alpha + \beta$ (Persistence)
KAU	0.000411	0.045101	0.835122	0.88022
XAUT	0.000382	0.000382	0.859207	0.92042
PAXG	0.000419	0.063400	0.854090	0.91749
BTC	0.000671	0.127801	0.719063	0.82387
ETH	0.000910	0.148876	0.834531	0.98341
XRP	0.000730	0.139754	0.822432	0.96219

The volatility persistence values from the GARCH (1,1) estimation indicate notable differences between asset-backed and non-asset-backed cryptocurrencies. Persistence, measured as the sum of alpha and beta, reflects how long the impact of volatility shocks remains in the market. Asset-backed cryptocurrencies such as KAU, XAUT, and PAXG demonstrate lower persistence values compared to most non-asset-backed ones. This suggests that price fluctuations in asset-backed tokens tend to stabilize more quickly, making them less prone to prolonged periods of high volatility. For instance, KAU and PAXG exhibit relatively moderate persistence levels, while XAUT is slightly higher but still within a stable range. On the other hand, non-asset-backed cryptocurrencies such as ETH and XRP show much higher persistence values, indicating that volatility shocks in these tokens last longer and have more enduring effects. ETH, in particular, has the highest persistence, implying that market turbulence impacts its price movements more significantly over time. These findings reinforce the argument that asset-backed cryptocurrencies, especially those backed by gold, tend to offer greater price stability. This characteristic aligns more closely with Shariah principles, which prefer financial instruments that minimize excessive uncertainty and speculation.

Discussion

Asset-Backed Cryptocurrencies and Their Potential Shariah Compliance

The GARCH (1,1) results reveal a clear distinction in volatility behavior between asset-backed and non-asset-backed cryptocurrencies. Cryptocurrencies backed by tangible assets, such as gold, namely KAU, XAUT, and PAXG demonstrate lower levels of volatility persistence compared to their non-asset-backed counterparts like Bitcoin (BTC), Ethereum (ETH), and Ripple (XRP). This lower persistence means that any shocks or fluctuations in the market have a shorter-lasting effect on these



tokens, allowing them to return to equilibrium more rapidly and reducing the potential for speculative bubbles.

This relatively stable behavior aligns with prior studies which argue that gold-backed cryptocurrencies offer a more secure and reliable store of value. Gold has long been viewed as a stable, inflation-resistant asset, and its use as a backing for digital tokens merges the advantages of traditional finance with modern technology. Prior literature, such as the works of (Heidt, Cedric, Philipp Sandner, 2024; Hutagalung, Muhammad Wandisyah R., 2024), emphasize that gold-backed instruments are more acceptable within Islamic finance due to their tangible nature and reduced *gharar* (uncertainty).

From a Shariah perspective, stability and asset-backing are two essential components. Islam prohibits excessive speculation (*gharar*) and gambling (*maysir*), both of which are often associated with the high volatility and purely speculative nature of mainstream cryptocurrencies. By contrast, asset-backed cryptocurrencies provide an underlying intrinsic value, helping mitigate speculation and making their use potentially more acceptable under Islamic law. This is especially true for gold-backed tokens, as gold itself has historically been a Shariah-compliant medium of exchange and a standard for value measurement. Given these findings, asset-backed cryptocurrencies, especially those backed by gold could serve as a middle ground between modern fintech innovation and Islamic financial ethics. Their relatively lower volatility and tangible backing make them promising candidates for digital financial instruments in the Muslim world. Consequently, these tokens deserve further attention from Shariah scholars and regulators when formulating fatwas or regulatory frameworks concerning cryptocurrency usage in Islamic contexts.

As a recommendation, it would be prudent for financial authorities, such as national Shariah advisory councils or Islamic finance regulatory bodies, to consider supporting further research and potentially developing guidelines for asset-backed cryptocurrencies. These instruments offer a path forward that balances innovation with compliance, ensuring that Muslim consumers can benefit from digital financial advancements without compromising their religious principles.

Shariah Implications Beyond Volatility: Sarf and Contractual Structure

While the empirical findings confirm that gold-backed cryptocurrencies such as PAX Gold (PAXG) and Tether Gold (XAUT) exhibit lower volatility persistence compared to non-asset-backed tokens, price stability alone is insufficient to establish Shariah compliance. In Islamic jurisprudence, transactions involving gold fall under the rules of *sarf* (currency exchange), which impose strict requirements concerning immediacy and equivalence.

A central issue lies in the classification of cryptocurrency. If crypto assets are treated as money (*thaman* or *atsman*), then exchanges between crypto and gold would constitute a form of *sarf* contract. Under such circumstances, the transaction must be conducted on a spot basis with immediate transfer of



ownership (*taqabud*). Even if cryptocurrency is instead classified as a digital commodity, the involvement of gold – being a ribawi asset – still subjects the exchange to Shariah conditions regarding possession and delivery. Any delay in settlement or ambiguity in ownership rights may introduce elements of *riba nasi'ah* (deferred exchange) or excessive uncertainty.

Furthermore, Shariah compliance depends on whether token holders acquire legally recognized ownership (*qabd hukmi*) of the underlying gold. This requires clarity regarding asset segregation, custodial arrangements, audit transparency, and redemption mechanisms. If the underlying gold remains merely symbolic or inaccessible to token holders, the structure may fail to satisfy the requirements of effective possession under Islamic law.

Therefore, while asset-backing significantly mitigates volatility-related *gharar*, compliance with Shariah principles ultimately depends on the contractual and operational structure of the token. Stability enhances its economic suitability, but juridical validity requires conformity with the rules governing ribawi assets and lawful transfer of ownership. This distinction is crucial in assessing whether gold-backed cryptocurrencies genuinely represent a Shariah-aligned financial innovation rather than merely a more stable digital instrument.

Conclusion

This study aimed to analyze and compare the volatility of asset-backed and non-asset-backed cryptocurrencies using the GARCH(1,1) model, with a specific focus on volatility persistence as a measure of risk and market stability. The findings reveal that asset-backed cryptocurrencies, particularly those backed by gold such as KAU, XAUT, and PAXG, generally exhibit lower volatility persistence compared to non-asset-backed counterparts like BTC, ETH, and XRP. This indicates that price shocks in asset-backed cryptocurrencies tend to dissipate more quickly, suggesting greater market stability and less speculative behavior. These results are consistent with previous studies that highlight the stabilizing role of physical assets, such as gold, in supporting digital financial instruments. Gold-backed cryptocurrencies benefit from the intrinsic value and historical role of gold as a safe haven, which likely contributes to their lower volatility. From a Shariah perspective, the relative stability of asset-backed tokens, particularly those linked to gold, strengthens their potential compatibility with Islamic finance principles, which emphasize risk sharing, transparency, and the avoidance of excessive uncertainty (*gharar*). Hence, this study recommends that regulatory bodies and Shariah scholars consider gold-backed cryptocurrencies as promising candidates for Shariah-compliant digital assets, subject to further scrutiny on their operational and contractual mechanisms. Beyond financial regulation aimed at ensuring market stability, there is also a need for institutional Shariah governance tailored to digital assets. Specifically, the establishment of a dedicated digital Shariah supervisory framework or specialized Shariah certification mechanism for



asset-backed tokens may be necessary. Such a framework should assess compliance with *sarf* requirements, ownership transfer (*taqabud*), custodial transparency, and redemption enforceability. By integrating regulatory oversight with structured Shariah supervision, gold-backed cryptocurrencies may better align with Islamic legal principles while maintaining technological innovation. Ultimately, this research contributes to the growing discourse on Islamic digital finance and provides valuable insights for investors, regulators, and Shariah boards in evaluating the suitability of cryptocurrencies for faith-based financial inclusion.

References

- Al-Nassar, N. S., Boubaker, S., Chaibi, A., & Makram, B. (2023). In search of hedges and safe havens during the COVID-19 pandemic: Gold versus Bitcoin, oil, and oil uncertainty. *The Quarterly Review of Economics and Finance*, 90, 318–332. <https://doi.org/10.1016/j.qref.2022.10.010>
- Al-Nassar, A. N. M. N., Alazab, M., & Al-Siddiqi, E. H. M. (2024). A Study on Viability of Cryptocurrency Adoption in Qatar: A Thematic Coding Approach of Fifty Reviews. 2024 *International Conference on Computer and Applications (ICCA)*, 1–15. <https://doi.org/10.1109/ICCA62237.2024.10928144>
- Arief Jailani, M., & Muneeza, A. (2023). CRYPTO ASSETS: THE NEED FOR SHARIAH SCREENING CRITERIA FOR DIGITAL ASSETS IN MALAYSIA. *International Journal of Islamic Economics and Finance Research*, 1, 27–47. <https://doi.org/10.53840/ijiefer111>
- Ben Yaala, S., & Henchiri, J. E. (2025). Climate risks and cryptocurrency volatility: evidence from crypto market crisis. *China Finance Review International*. <https://doi.org/10.1108/CFRI-09-2024-0575>
- Chemkha, R., BenSaïda, A., Ghorbel, A., & Tayachi, T. (2021). Hedge and safe haven properties during COVID-19: Evidence from Bitcoin and gold. *The Quarterly Review of Economics and Finance*, 82, 71–85. <https://doi.org/10.1016/j.qref.2021.07.006>
- Dahlan, S. P. (2025). Addressing Sharia issues in cryptocurrency: Analyzing the case of Bitcoin and Blockchain Technology. *Journal of Islamic Economic Insights.*, 1(1), 47–54.
- Hafiz, A., Napisah Napisah, Ismail Jalili, Armasito Armasito, & A. K. H. Solihu. (2025). Crypto Currency Investment from an Islamic Law Perspective: An Overview of Guidelines and Considerations. *Nurani: Jurnal Kajian Syari'ah Dan Masyarakat*, 25(1), 200–218. <https://doi.org/https://doi.org/10.19109/nurani.v25i1.26315>
- Hairudin, A., & Mohamad, A. (2024). The isotropy of cryptocurrency volatility. *International Journal of Finance & Economics*, 29(3), 3779–3810. <https://doi.org/10.1002/ijfe.2857>
- Heidt, Cedric, Philipp Sandner, and M. A. (2024). *Missing Links: Current Trends and Future Potential in the Application of Blockchain Oracles*.
- Hutagalung, Muhammad Wandisyah R., and D. M. (2024). From Tradition to Innovation: Tokenizing Dinar and Dirham for the Islamic Digital Economy. *Ournal of Islamic Financial Technology*, 3(2).
- Kgomongwe, M. M., & Antw, M. A. (2024). DETERMINANTS OF FINANCIAL CHALLENGES FACING SMALLHOLDER AND EMERGING SHEEP AND GOAT FARMERS IN THABO MOFUTSANYANA DISTRICT, FREE STATE. *SSIRC*.
- Khalil, R. (2021). *Alternative finance: what are the advantages?* Diss. Université de Pau et des Pays de l'Adour.
- Khiari, W., Lajmi, A., Neffati, A., & El Fahem, A. (2025). Cryptocurrency fraud and its effects on price volatility in the cryptocurrency market. *Journal of Chinese Economic and Foreign Trade Studies*. <https://doi.org/10.1108/JCEFTS-05-2024-0034>
- Kim, K., Lee, S.-Y. T., & Assar, S. (2022). The dynamics of cryptocurrency market behavior: sentiment analysis using Markov chains. *Industrial Management & Data Systems*, 122(2), 365–395. <https://doi.org/10.1108/IMDS-04-2021-0232>
- Kochergin, D. (2022). Crypto-assets: Economic Nature, Classification and Regulation of Turnover. *International Organisations Research Journal*, 17(3), 75–130. <https://doi.org/10.17323/1996-7845-2022-03-04>
- Li, Y., & Umair, M. (2023). The protective nature of gold during times of oil price volatility: An analysis of the COVID-19 pandemic. *The Extractive Industries and Society*, 15, 101284. <https://doi.org/10.1016/j.exis.2023.101284>
- Liu, M., & Lee, C.-C. (2022). Is gold a long-run hedge, diversifier, or safe haven for oil? Empirical evidence based on DCC-MIDAS. *Resources Policy*, 76, 102703. <https://doi.org/10.1016/j.resourpol.2022.102703>
- Maghyereh, A., Al-Shboul, M., & Awartani, B. (2025). Gold-backed cryptocurrencies in cryptocurrency portfolios: Evaluating their hedging capabilities and safe-haven characteristics during extreme market conditions. *Oeconomia Copernicana*, 2025(16), 317–388. <https://doi.org/10.24136/oc.3272>
- Manahov, V. (2022). Cryptocurrency liquidity during extreme price movements: is there a problem with virtual money? *Chapman and Hall/CRC*, 731–762.
- Mohammed., M. (2024). Guiding Fiqh Analysis of Crypto Assets: A Proposed Framework. *HKAM: Jurnal Ilmu Syariah*, 24(2).
- Paesano, F., & Siron, D. (2022). *Working Paper 38: Cryptocurrencies in Asia and beyond: law, regulation and enforcement*.

