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Cross-Asset Connectedness of Bitcoin, Gold, and Equity Markets: A Macroprudential Systematic Review (2018–2025)

Keterkaitan Antar-Aset antara Pasar Bitcoin, Emas, dan Saham: Tinjauan Sistematis Makroprudensial (2018–2025)

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Abstract

This study aims to synthesize empirical evidence on spillovers and connectedness among Bitcoin, gold, and stock markets from a macroprudential perspective during the period 2018–2025. The research applies a narrative systematic review (NSR) approach by conducting a structured literature search in Scopus and Google Scholar, followed by screening, eligibility assessment, and thematic synthesis of relevant studies. From an initial pool of 62 articles, nine empirical studies met the inclusion criteria and were analyzed. The findings indicate that cross-asset connectedness is dynamic and tends to intensify during periods of market stress, particularly during the COVID-19 pandemic. In many global and advanced markets, Bitcoin often acts as a net transmitter of volatility spillovers, while gold generally exhibits lower connectedness and frequently functions as a diversifier or hedging asset. However, evidence from emerging markets remains mixed. This study contributes by providing a structured synthesis of recent empirical evidence and highlighting macroprudential implications for monitoring cross-asset risk transmission in increasingly integrated financial markets.

Keywords: Bitcoin; Cross-Asset Connectedness; Gold; Macroprudential; Volatility Spillovers

Abstrak

Penelitian ini bertujuan untuk menyintesis bukti empiris mengenai spillover dan connectedness antara Bitcoin, emas, dan pasar saham dari perspektif makroprudensial pada periode 2018–2025. Metode yang digunakan adalah narrative systematic review (NSR) dengan melakukan pencarian literatur secara terstruktur pada basis data Scopus dan Google Scholar, kemudian dilanjutkan dengan proses penyaringan, penilaian kelayakan, serta sintesis tematik terhadap studi yang relevan. Dari total 62 artikel yang teridentifikasi, sembilan studi empiris memenuhi kriteria inklusi dan dianalisis lebih lanjut. Hasil penelitian menunjukkan bahwa connectedness antar aset bersifat dinamis dan cenderung meningkat selama periode tekanan pasar, khususnya selama pandemi COVID-19. Di pasar global dan maju, Bitcoin sering berperan sebagai net transmitter dalam spillover volatilitas, sementara emas umumnya menunjukkan tingkat keterhubungan yang lebih rendah dan berfungsi sebagai aset diversifikasi atau lindung nilai. Penelitian ini berkontribusi dengan menyediakan sintesis terstruktur atas bukti empiris terbaru serta menyoroti implikasi makroprudensial dalam pemantauan transmisi risiko lintas aset pada sistem keuangan yang semakin terintegrasi.

Kata Kunci: Bitcoin; Connectedness Lintas Aset; Emas; Makroprudensial; Spillover Volatilitas

INTRODUCTION

Over the past decade, the crypto-asset market has evolved from a community-driven speculative instrument into an increasingly institutionalized asset class integrated into the architecture of modern finance. The expansion of market capitalization, the rise in ownership by both retail and institutional investors, and the development of infrastructure—such as centralized exchanges, derivatives products, ETFs or similar products in some jurisdictions, custody services, and professional liquidity providers—have strengthened crypto's connectedness with the traditional financial system.[1] This connectedness reshapes how risk is transmitted, such that crypto price movements no longer reflect only ecosystem-specific factors but are increasingly influenced by macroeconomic conditions, interest rates, U.S. dollar appreciation, and shifts in global risk appetite.[2]

When crypto volatility surges, investors may deleverage, face margin calls, or rebalance positions, triggering cross-asset portfolio reallocations. At the same time, sentiment channels can amplify these effects, as negative news and regulatory uncertainty intensify risk-off behavior simultaneously.[3] Consequently, shocks originating in crypto markets may spill over into other markets through liquidity mechanisms and rising correlations, making them a growing concern for authorities tasked with safeguarding macroprudential financial stability and designing an appropriate regulatory perimeter.[4] In this sense, examining the links between crypto and traditional assets is not merely a portfolio diversification issue; it is also crucial for mitigating systemic risk, monitoring leverage accumulation, and identifying sources of vulnerability in global market networks.[5]

Within the finance literature, discussions about protective assets typically distinguish the concepts of hedges and safe havens from the mechanisms of risk transmission across markets (spillovers/connectedness). Gold is often positioned as a protective asset when uncertainty rises, while risky assets tend to exhibit higher comovement during stress episodes due to flight-to-quality dynamics.[6] However, the role of Bitcoin and other crypto assets remains contested: some studies find diversification potential under certain conditions, whereas others show that crypto behaves more like a risky asset—especially during crises—when cross-asset correlations tend to increase and diversification benefits narrow.[7] Therefore, an approach that asks only "Is

1 Tony Klein, Hien Pham Thu, and Thomas Walther, "Bitcoin Is Not the New Gold – A Comparison of Volatility, Correlation, and Portfolio Performance," International Review of Financial Analysis 59 (October 2018): 105–16, https://doi.org/10.1016/j.irfa.2018.07.010.

2 Haider Abbas abdullah Aljanabi, "Measuring The Cointegration Between The Trading Volume In The Stock Market And Local Monetary Policy," World Economics and Finance Bulletin 42 (2025): 255–62, https://scholarexpress.net/index.php/wefb/article/view/5042.

3 Krzysztof Echaust and Małgorzata Just, "Is Gold Still a Safe Haven for Stock Markets? New Insights through the Tail Thickness of Portfolio Return Distributions," Research in International Business and Finance 63 (December 2022): 101788, https://doi.org/10.1016/j.ribaf.2022.101788.

4 Financial Stability Board, "High-Level Recommendations for the Regulation, Supervision and Oversight of Cryptoasset Activities and Markets: Final Report," FSB Policy Paper 17 (2023).

5 Afzol Husain, "Portfolio Risk Management in the Crypto Era: A Quantitative Analysis on Cryptocurrency's Safe Haven Status for BRICS and G7 Portfolios Using Wavelet Coherence, DCC-MGARCH and Value at Risk Approach" (Swinburne, 2024).

6 Sangyup Choi and Junhyeok Shin, "Bitcoin: An Inflation Hedge but Not a Safe Haven," Finance Research Letters 46 (May 2022): 102379, https://doi.org/10.1016/j.frl.2021.102379.

7 Qiwei Xie et al., "COVID-19 and Risk Spillovers of China's Major Financial Markets: Evidence from Time-Varying Variance Decomposition and Wavelet Coherence Analysis," Finance Research Letters 52 (March 2023): 103545, https://doi.org/10.1016/j.frl.2022.103545.

Bitcoin a safe haven?" is often insufficient to capture dynamic market realities. This article adopts a network perspective by positioning Bitcoin and gold as nodes within a broader market system and examining how their returns and volatilities transmit to global stock indices and, specifically, the Indonesian stock market.[8] A connectedness perspective is relevant because it emphasizes direction, intensity, and time variation—dimensions that are often missed by static correlations. Methodologically, a key reference in the spillover literature is the VAR-based connectedness framework and forecast error variance decomposition popularized, which has since been extended in various ways, including models based on conditional volatility, tail dependence, and frequency-domain analyses that distinguish short-run from long-run transmission.[9]

Empirical findings on crypto–gold–equity spillovers across studies remain heterogeneous and are strongly shaped by research design choices: sample periods (pre- versus post-specific crises), data frequency (daily versus intraday), the definition of stress episodes, variable selection (returns, realized volatility, implied volatility), and econometric approaches (ARDL, VAR, DCC-GARCH, copula, wavelet, regime-switching, or other time-varying models).[10] According to Bouri et al., many early studies focused on Bitcoin's formative phase when crypto markets were relatively segmented from the global financial system.[11] In contrast, post-2020 research highlights rising integration, particularly during stress episodes when markets tend to move more "in sync" and contagion becomes more evident.[12]

At the same time, evidence for emerging markets—including Indonesia—remains relatively limited compared with advanced markets,[13] even though local characteristics such as liquidity depth, investor structure, retail investor dominance, and the policy and regulatory environment may affect the strength of transmission and the way markets respond to global shocks. Against this backdrop, this study conducts a narrative systematic review (NSR) of empirical research examining spillovers/connectedness among Bitcoin, gold, and stock markets over the period 2018–2025. The research questions focus on: (1) the direction and intensity of return and volatility spillovers across different market regimes, (2) the range of econometric methods employed and the sensitivity of results to model specification, and (3) implications for macroprudential oversight and the delineation of the regulatory perimeter.[14] The article contributes by constructing a structured map of evidence, identifying areas of consensus and

8 Irene Henriques and Perry Sadorsky, "Can Bitcoin Replace Gold in an Investment Portfolio?," Journal of Risk and Financial Management 11, no. 3 (August 14, 2018): 48, https://doi.org/10.3390/jrfm11030048.

9 Francis X. Diebold and Kamil Yilmaz, "Better to Give than to Receive: Predictive Directional Measurement of Volatility Spillovers," International Journal of Forecasting 28, no. 1 (January 2012): 57–66, https://doi.org/10.1016/j.ijforecast.2011.02.006.

10 Granada Anggita Alexa Putri, Ainun Roifa, and Gunawan Aji. 2026. "Analyzing Social Media Sentiment Using Brand24 to Assess Stock Investment Decisions in the Indonesian Capital Market: (Analisis Sentimen Media Sosial Menggunakan Brand24 Untuk Mengevaluasi Keputusan Investasi Saham Di Pasar Modal Indonesia)". *SYMPHONIA: Journal of Theory and Research Output* 1 (1): 70-78. https://doi.org/10.12026/sym.v1i1.079.

11 Elie Bouri et al., "On the Hedge and Safe Haven Properties of Bitcoin: Is It Really More than a Diversifier?," Finance Research Letters 20 (February 2017): 192–98, https://doi.org/10.1016/j.frl.2016.09.025.

12 Thomas Conlon and Richard McGee, "Safe Haven or Risky Hazard? Bitcoin during the Covid-19 Bear Market," Finance Research Letters 35 (July 2020): 101607, https://doi.org/10.1016/j.frl.2020.101607; Roshan Iyer and Adina Popescu, New Evidence on Spillovers between Crypto Assets and Financial Markets (International Monetary Fund, 2023).

13 ANDRÉS Murcia, ANNA Kovner, and ALEXANDRE Tombini, "Financial Stability Risks from Cryptoassets in Emerging Market Economies," BIS Papers 138 (2023).

14 Mohd Fahmi Ghazali, Hooi-Hooi Lean, and Zakaria Bahari, "Is Gold a Hedge or a Safe Haven? An Empirical Evidence of Gold and Stocks in Malaysia," International Journal of Business and Society 14, no. 3 (2013): 428.

divergence, and proposing a replicable research agenda that is relevant to both global and Indonesian contexts. The remainder of the article is organized as follows: the methods section outlines the systematic review protocol; the results and discussion summarize study characteristics and synthesize findings; and the conclusion highlights implications, limitations, and directions for future research.

Method

This study employs a narrative systematic review (NSR) approach to synthesize empirical evidence on spillovers and connectedness among Bitcoin, gold, and stock markets. The NSR method combines a structured literature search with narrative and thematic synthesis, allowing the study selection process to remain transparent while accommodating heterogeneous research designs, including differences in sample periods, data frequency, and econometric techniques.[15] The literature search was conducted using major academic databases relevant to economics and finance, particularly Scopus and Google Scholar, complemented by additional sources to capture open-access studies and regional research contexts. The review focused on publications from 2018 to 2025 to reflect the period of increasing integration between crypto markets and the traditional financial system, especially during major stress episodes such as the COVID-19 pandemic.[16]

To ensure the relevance and quality of the reviewed literature, several inclusion criteria were applied. First, the selected studies had to examine spillover or connectedness relationships among Bitcoin, gold, and stock markets, either globally or in specific regional contexts such as Indonesia. Second, the studies had to be empirical and use financial market data, including prices, returns, or volatility measures. Third, the articles needed to report clear empirical findings regarding the direction or intensity of spillovers, such as identifying net transmitters or receivers of shocks or documenting changes in market comovement during crisis periods. Finally, only studies published between 2018 and 2025 were considered to capture the period characterized by rising crypto-market integration and significant market turbulence.[17]

The article selection process followed several stages, beginning with a structured keyword search related to Bitcoin, cryptocurrency, gold, stock markets, and spillover or connectedness dynamics. After removing duplicate records, the remaining studies were screened through titles and abstracts based on the inclusion criteria, followed by full-text verification to ensure that the articles were empirical and reported relevant connectedness findings. Limited snowballing from the references of key studies was also conducted to identify additional relevant literature. The selected studies were subsequently classified according to several analytical dimensions, including market scope, asset combinations, spillover objects, econometric methods, and crisis regimes. Data analysis employed qualitative content analysis and comparative synthesis to identify common patterns, methodological differences, and macroprudential implications of cross-asset risk transmission.[18]

15 Hannah Snyder, "Literature Review as a Research Methodology: An Overview and Guidelines," Journal of Business Research 104 (November 2019): 333–39, https://doi.org/10.1016/j.jbusres.2019.07.039.

16 Chung Baek and Thomas Jackman, "Safe-Haven Assets for U.S. Equities during the 2020 COVID-19 Bear Market," Economics and Business Letters 10, no. 3 (August 2, 2021): 331–35, https://doi.org/10.17811/ebl.10.3.2021.331-335.

17 Dona Ertika Shafira et al., "Analisis Korelasi Dan Pergerakan Bersama Saham, Emas Dan Bitcoin Studi Kasus Pasar Indonesia," Journal of Management and Business Review 20, no. 3 (November 10, 2023): 207–20, https://doi.org/10.34149/jmbr.v20i3.604.

18 Vera Mita Nia et al., "Identification Of Market Volatility With Solid Var Autoregression Validity In Indonesia Cryptocurrencies Or Gold," JIMFE (Jurnal Ilmiah Manajemen Fakultas Ekonomi) 9, no. 1 (June 30, 2023), https://doi.org/10.34203/jimfe.v9i1.6146.

RESULTS AND DISCUSSION

Literature Selection Process and Study Characteristics

This section summarizes the results of the literature search and selection process on spillovers/connectedness among Bitcoin, gold, and stock markets. The initial search identified a total of 62 articles, comprising 24 articles from Scopus and 38 articles from Google Scholar. After duplicate removal, 10 articles were eliminated. The title and abstract screening stage yielded 16 articles deemed relevant for further review. Following full-text assessment, 7 articles were excluded because they did not meet the inclusion criteria (e.g., they did not empirically test spillovers/connectedness, did not involve the focal assets/markets, or the results could not be extracted). Accordingly, 9 articles met all criteria and were designated as the final included studies in this review.

Table 1. Literature Review on the Connectedness Between Cryptocurrency, Gold, and Stock Markets

Study	Asset	Sample Period	Method	Main Findings
Iyer & Popescu (2023)	Crypto, gold, global equities	2014–2023	DY Spillover	Spillover effects surged during the COVID-19 pandemic; cryptocurrencies often act as a transmitter to financial markets, particularly equities, the VIX, and gold.
Ibrahim et al. (2024)	BTC, gold, global equity indices	2011–2022	DCC-GARCH	There is long-term volatility contagion between BTC–gold and BTC–equities; short-term contagion emerged primarily during the COVID-19 pandemic.
Hanif et al. (2023)	BTC/ETH, gold, oil, equities	2020–2022	DY + Baruník–Křehlík	The highest connectedness occurs in volatility and price spikes during periods of uncertainty; gold and oil have the lowest connectedness, making them potential safe-haven assets.
Ha & Nham (2022)	Oil, gold, stocks, crypto	2018–2021	TVP-VAR	System connectivity increased and peaked during the COVID-19 pandemic; gold and equities were net recipients, while crypto showed time-varying patterns.
Attarzadeh et al. (2024)	Bitcoin, gold, energy, stocks	2013–2022	TVP-VAR	Bitcoin's connectedness is relatively weak during normal periods; the Bitcoin–gold relationship

				weakens during periods of crisis.
Sinlapates et al. (2023)	Bitcoin, gold, ASEAN+6 equities	2017–2023	DCC-GARCH & BEKK	There is a two-way relationship between Bitcoin and equities; Bitcoin and gold often do not serve as safe havens in many ASEAN markets.
Kakinuma (2022)	Bitcoin, gold, equities (Singapore & Thailand)	2013–2021	VAR-BEKK-GARCH	Interdependence has increased during the pandemic; Bitcoin has not protected Southeast Asian investors, while gold has proven effective as a hedging asset.
Ghorbel et al. (2024)	Cryptocurrencies, gold, G7 equities	2020	DY Connectedness	Bitcoin is the largest transmitter of volatility; gold acts as a net receiver and exhibits safe-haven behavior.
Firdausia & Nasrudin (2024)	Crypto index, gold futures, IHSG	2020–2022	EGARCH & BEKK	Gold serves as a safe haven for cryptocurrencies and a diversifier for equities; equities can help diversify the risks associated with cryptocurrencies at the height of the pandemic.

Source: Literature Data by The Author

Table 1 summarizes the nine included studies analyzed in this NSR. Overall, these studies cover diverse market contexts, ranging from global/advanced markets and emerging markets in Southeast Asia to the Indonesian context, with a strong focus on the stress episode of the COVID-19 pandemic. Most studies employ daily data with long sample periods, while one study uses 5-minute intraday data to capture risk transmission over short horizons. In terms of methodology, the literature is dominated by connectedness/spillover approaches based on variance decomposition, conditional correlation models, and multivariate GARCH variants, which collectively confirm that cross-asset connectedness is dynamic and rises sharply when market uncertainty increases.[19]

Thematic Synthesis of Spillover/Connectedness Findings

The thematic synthesis indicates a relatively consistent pattern across studies: measures of connectedness/spillovers tend to rise sharply during stress periods and decline as market conditions normalize, although the magnitude of the surge varies across markets and horizons. At the global level, Iyer and Popescu find that return and volatility spillovers between crypto assets and financial assets increase over time, peak during the COVID-19 pandemic, and then rise again during the 2022 crypto turmoil episode.[20] Consistent evidence is also reported by

19 Bassam A. Ibrahim et al., "Volatility Contagion between Cryptocurrencies, Gold and Stock Markets Pre-and-during COVID-19: Evidence Using DCC-GARCH and Cascade-Correlation Network," Financial Innovation 10, no. 1 (March 11, 2024): 104, https://doi.org/10.1186/s40854-023-00605-z.

20 Iyer and Popescu, New Evidence on Spillovers between Crypto Assets and Financial Markets.

TVP-VAR–based studies, which document that system-wide connectedness reached its highest level during COVID-19.[21] In advanced markets, Ibrahim et al. (2024) show the presence of long-run volatility contagion between Bitcoin–gold and Bitcoin–equities, while short-run contagion is more pronounced during the COVID-19 turbulence phase in certain markets. At the intraday level, Hanif et al. confirm that connectedness in volatility and the jump component is highest when uncertainty increases, and that differences in investment horizons (short- versus long-term) also shape the strength of transmission.[22]

In terms of asset roles, Bitcoin in many studies appears as a source of shocks—particularly in the volatility dimension—yet this role is time-varying and can reverse in certain periods. IMF analysis suggests that crypto assets, in general, more frequently transmit spillovers to other financial markets, although some stress episodes exhibit role reversals. Using a 2020 pandemic sample, a connectedness study on G7 stock indices identifies Bitcoin as a dominant net transmitter of volatility, whereas gold tends to receive shocks.[23] At the same time, multiple findings position gold as an asset with relatively low connectedness and often as a net receiver, consistent with its function as a diversifier/hedge under turbulent conditions.

However, results for emerging markets are more heterogeneous: in Southeast Asia, Bitcoin–gold–equity interdependence increased during the pandemic and Bitcoin was not consistently protective, while gold was more often recommended in certain proportions for hedging.[24] A study on ASEAN+6 even reports bidirectional transmission of shocks and volatility, concluding that neither Bitcoin nor gold necessarily acts as a safe haven across many markets in the sample.[25] Evidence specific to Indonesia remains limited, but Firdausia and Nasrudin show that gold can serve as a safe haven for crypto at the pandemic peak yet functions only as a diversifier for equities; meanwhile, equities can help diversify crypto risk during the peak phase.[26] This strengthens the argument that local conditions moderate cross-asset risk transmission channels.

Heterogeneity in results is also driven by econometric choices, volatility proxies, and how stress periods are defined. The Diebold–Yilmaz framework and its extensions are effective for mapping transmission direction, identifying transmitters/receivers, and capturing spillover spikes during stress episodes.[27] DCC-GARCH and multivariate GARCH variants emphasize

21 Le Thanh Ha and Nguyen Thi Hong Nham, "An Application of a TVP-VAR Extended Joint Connected Approach to Explore Connectedness between WTI Crude Oil, Gold, Stock and Cryptocurrencies during the COVID-19 Health Crisis," Technological Forecasting and Social Change 183 (October 2022): 121909, https://doi.org/10.1016/j.techfore.2022.121909.

22 Waqas Hanif et al., "Dynamic Connectedness and Network in the High Moments of Cryptocurrency, Stock, and Commodity Markets," Financial Innovation 9, no. 1 (May 5, 2023): 84, https://doi.org/10.1186/s40854-023-00474-6.

23 Achraf Ghorbel, Sahar Loukil, and Walid Bahloul, "Connectedness between Cryptocurrencies, Gold and Stock Markets in the Presence of the COVID-19 Pandemic," European Journal of Management and Business Economics 33, no. 4 (October 25, 2024): 466–87, https://doi.org/10.1108/EJMBE-10-2021-0281.

24 Yosuke Kakinuma, "Nexus between Southeast Asian Stock Markets, Bitcoin and Gold: Spillover Effect before and during the COVID-19 Pandemic," Journal of Asia Business Studies 16, no. 4 (June 27, 2022): 693–711, https://doi.org/10.1108/JABS-02-2021-0050.

25 Parichat Sinlapates, Tanit Sriwong, and Surachai Chancharat, "Risk Spillovers between Bitcoin and ASEAN+6 Stock Markets before and after COVID-19 Outbreak: A Comparative Analysis with Gold," Journal of Risk and Financial Management 16, no. 2 (February 8, 2023): 103, https://doi.org/10.3390/jrfm16020103.

26 Farah Amira Firdausia and Nasrudin Nasrudin, "Spillover Volatility Effect Return Of Stock, Gold, and Cryptocurrency: Evidence of Peak Pandemic and Transition towards Endemic COVID-19 in Indonesia," Journal of Economics and Financial Analysis 8, no. 2 (2024): 89–113.

27 Refk Selmi et al., "Is Bitcoin a Hedge, a Safe Haven or a Diversifier for Oil Price Movements? A Comparison with Gold," Energy Economics 74 (August 2018): 787–801, https://doi.org/10.1016/j.eneco.2018.07.007.

conditional correlation dynamics and volatility transmission, making them more sensitive to regime shifts and shock distributions. Meanwhile, TVP-VAR is particularly useful for identifying gradual parameter changes and assessing dynamic connectedness without relying on rigid rolling windows.[28] These methodological differences help explain why some studies characterize Bitcoin/gold as protective at certain horizons, while others document heightened contagion over the same period. Accordingly, interpretations such as "Bitcoin as a safe haven" or "a risky asset" should always be tied to the market regime, investment horizon, and the risk metrics employed.[29]

Macroprudential Implications and the Regulatory Perimeter

From a macroprudential perspective, the pattern of increasing connectedness during stress periods indicates that crypto markets may act as an amplification channel when financial uncertainty rises. As correlations between asset classes tend to strengthen during crises, shocks originating in one market can propagate more quickly across other markets, potentially weakening diversification benefits and intensifying systemic risk. In this context, monitoring cross-asset connectedness becomes increasingly important for financial authorities seeking to identify early signals of contagion. Incorporating connectedness indicators into financial stability surveillance frameworks may therefore help policymakers better understand how volatility and shocks are transmitted between crypto assets and traditional financial markets, particularly during periods of heightened market stress.[30]

In addition, the evidence reviewed in this study highlights that the effectiveness of traditionally protective assets—such as gold—varies across market contexts. While gold often demonstrates lower connectedness and may serve as a diversifier or hedge in global markets, the results are less consistent in emerging markets. Differences in market liquidity, investor composition, financial market depth, and institutional structures may influence how assets respond to shocks and how risk is transmitted across markets. Consequently, macroprudential risk assessments should incorporate local market characteristics rather than relying solely on findings derived from advanced economies. Such contextual analysis is particularly relevant for countries like Indonesia, where financial market structures and regulatory environments differ from those in more developed markets.[31]

Finally, defining an appropriate regulatory perimeter is essential for mitigating potential contagion channels associated with crypto-market integration. Regulatory attention can be directed toward activities that may strengthen linkages between crypto and traditional financial systems, including the growing use of derivatives, the involvement of liquidity providers and custodial services, and concentrated exposures among financial institutions. As crypto assets become more embedded within the broader financial ecosystem, these linkages may increase the probability that shocks originating in crypto markets spill over into conventional financial markets. Strengthening oversight of such channels can therefore support financial stability by

28 Amirreza Attarzadeh, Mugabil Isayev, and Farid Irani, "Dynamic Interconnectedness and Portfolio Implications among Cryptocurrency, Gold, Energy, and Stock Markets: A TVP-VAR Approach," Sustainable Futures 8 (December 2024): 100375, https://doi.org/10.1016/j.sftr.2024.100375.

29 Arum Kumala Sari, Nur Imamah Baety, and Gunawan Aji. 2026. "Integrating Cloud, AI, and Blockchain Technologies in Payroll Accounting: A Systematic Review of Benefits, Challenges, and Innovation Trends: (Integrasi Teknologi Cloud, Kecerdasan Buatan (AI), Dan Blockchain Dalam Akuntansi Gaji: Tinjauan Sistematis Tentang Manfaat, Tantangan, Dan Tren Inovasi)". *SYMPHONIA: Journal of Theory and Research Output* 1 (1): 118-27. https://doi.org/10.12026/sym.v1i1.098.

30 Board, "High-Level Recommendations for the Regulation, Supervision and Oversight of Cryptoasset Activities and Markets: Final Report."

31 Bouri et al., "On the Hedge and Safe Haven Properties of Bitcoin: Is It Really More than a Diversifier?"

ensuring that emerging crypto-related risks are monitored and managed within a comprehensive macroprudential framework.

Limitations of the Review

This review has several limitations that should be acknowledged when interpreting the findings. First, the number of included studies is relatively limited, as only nine articles met the predefined inclusion criteria. This constraint arises from the narrow focus of the review on spillover and connectedness relationships specifically among Bitcoin, gold, and stock markets within the 2018–2025 period. While this targeted scope helps maintain conceptual clarity and relevance to recent developments in crypto–financial market integration, it also reduces the breadth of available evidence. As a result, the synthesis reflects a relatively small subset of the broader literature on cross-asset interactions, which may limit the comprehensiveness of conclusions regarding the dynamics of spillovers across different financial markets.

A second limitation concerns the substantial heterogeneity across the selected studies. The reviewed articles differ in several methodological dimensions, including sample periods, data frequency (daily versus intraday), definitions of crisis regimes, and the choice of volatility proxies or connectedness indicators. Moreover, the econometric approaches employed—such as VAR-based connectedness frameworks, multivariate GARCH models, and time-varying parameter models—capture different aspects of market interdependence. These methodological differences make it difficult to conduct a quantitative meta-analysis or direct statistical comparison across studies. Consequently, this review relies on a thematic synthesis approach to identify patterns and interpret the direction and intensity of spillovers across different contexts and market regimes.[32]

Finally, empirical evidence focusing specifically on Indonesia remains limited within the current literature. Most studies on Bitcoin–gold–equity connectedness concentrate on global or advanced markets, while emerging markets—particularly Indonesia—receive comparatively little attention. This scarcity of localized evidence means that conclusions regarding the Indonesian market must be interpreted cautiously, as institutional structures, market liquidity, investor composition, and regulatory frameworks may shape spillover dynamics differently from those observed in developed markets. Future research could address this gap by expanding Indonesia- and ASEAN-focused studies, utilizing higher-frequency data such as intraday observations, examining tail dependence during stress episodes, and exploring how domestic regulatory policies influence the transmission of cross-asset financial risks.

CONCLUSION

This study provides a narrative systematic review of empirical research on spillovers and connectedness among Bitcoin, gold, and stock markets during the period 2018–2025. The synthesis of nine selected studies shows that cross-asset connectedness is dynamic and tends to intensify during stress episodes, particularly during the COVID-19 pandemic. In many global and advanced market contexts, Bitcoin frequently acts as a net transmitter of volatility shocks, although its role may vary depending on market regimes and investment horizons. Gold generally exhibits lower connectedness and often functions as a net receiver, supporting its role as a diversifier and potential hedging asset. However, evidence from emerging markets indicates that the protective properties of gold and Bitcoin are not always consistent, highlighting the importance of considering local market conditions when interpreting spillover dynamics.

32 Luisanna Cocco, Roberto Tonelli, and Michele Marchesi, "Bitcoin as a Safe Haven during COVID-19 Disease," Future Internet 14, no. 4 (March 22, 2022): 98, https://doi.org/10.3390/fi14040098.

Based on these findings, several recommendations can be proposed for both policymakers and future research. From a policy perspective, financial authorities should strengthen monitoring of cross-asset connectedness indicators as part of macroprudential surveillance, particularly during periods of elevated market uncertainty when contagion risks may intensify. Regulatory frameworks should also consider the growing integration between crypto assets and traditional financial markets, especially through channels such as derivatives, financial institutions' exposures, and market infrastructure linkages. For future academic research, greater attention should be directed toward emerging markets, including Indonesia and the broader ASEAN region, where empirical evidence remains limited. Expanding the use of higher-frequency data, regime-based analysis, and tail-risk measures could help provide a more comprehensive understanding of cross-asset spillovers and their implications for financial stability.

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