



Determinants of Cryptocurrency Prices in Indonesia

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This study explores the key determinants influencing cryptocurrency in Indonesia, focusing on macroeconomic variables including inflation, money supply, gold prices, and crude oil prices over the period from 2013 to 2023. It investigates the dynamic relationships between these variables and Bitcoin, the most widely recognized cryptocurrency globally. The research offers a novel contribution by integrating both domestic economic indicators and external commodity prices into a comprehensive framework for cryptocurrency pricing tailored specifically to the Indonesian market context. This innovative and comprehensive approach significantly enhances the understanding of how macroeconomic factors interact with cryptocurrency behavior, which is crucial for various stakeholders and policymakers alike. The findings aim to provide valuable insights to support the formulation of effective monetary policies in an evolving, increasingly complex financial landscape. Future studies are encouraged to build upon this framework by examining the connections between cryptocurrency and other components of the broader financial system.

INTRODUCTION

The evolving landscape of Indonesia's digital finance sector has introduced new uncertainties regarding cryptocurrency pricing, macroeconomic behavior, and investment dynamics (Ramadhani, 2022). As a small open economy, Indonesia is inherently exposed to global liquidity cycles and capital flow volatility, which transmit external monetary shocks through changes in exchange rates, inflation, and the financial system (Danladi and Sanusi, 2024; Budiman, Juhro, and Safuan, 2024). Indonesia's economic growth and price stability have been empirically shown to be adversely affected by external shocks in the long term (Febrian and Wahed, 2025).

In addition, recent global investment in cryptocurrencies is believed to exert a greater impact on the domestic economy by introducing a new channel of global liquidity (Gapurbaeva, Orozobekova, and Orozobekov, 2023). The rapid growth of cryptocurrencies in Indonesia (Samputra and Putra, 2020) makes it crucial to assess the potential of digital assets to enhance, hedge against, or destabilize macroeconomic fluctuations, which is essential for maintaining the effectiveness of monetary policy and financial stability. While previous studies primarily focus on advanced economies (Umar et al., 2023; Shahzad et al., 2023), evidence on Indonesia remains limited, particularly methodologically. Most studies in Indonesia employ static or piecemeal approaches to examine the relationships between Bitcoin and variables such as inflation, the money supply, exchange rates, and global commodity prices. In small open economies, these variables operate as an interconnected system; therefore, a VAR-based dynamic framework is appropriate for capturing bidirectional causality and shock transmission.

Several empirical studies have examined the relationship between cryptocurrency and macroeconomic variables in Indonesia. Ramadhan, Ermawati, and Fariyanti (2023) analyze the effects of inflation and interest rates on herding behavior in large cryptocurrency markets in Indonesia; however, their study

focuses on behavioral aspects rather than price dynamics. Other studies show that external macroeconomic factors, such as global interest rates and geopolitical crises, affect Bitcoin prices in Indonesia. However, they consider only a limited set of variables and employ partial regression methods. Using a VECM approach, Sukamulja and Sikora (2018) identify both short- and long-run relationships between Bitcoin and macro-financial variables, including gold prices and global financial market indices. However, their analysis emphasizes long-term relationships and does not adequately capture short-term shock dynamics. In a global context, Havidz, Karman, and Mambela (2021) find that macro-financial variables and liquidity influence Bitcoin prices. Overall, these studies suggest that certain macroeconomic variables influence cryptocurrency prices; however, none explicitly examine the Indonesian context by modeling dynamic interactions and shock transmission using a VAR framework.

Although a growing number of studies have begun to examine cryptocurrencies in Indonesia, the literature remains limited and is largely based on static or partial approaches that isolate individual macroeconomic variables. Moreover, there remains a lack of empirical research on the direct impact of macroeconomic shocks on cryptocurrency prices, rather than their mere co-movement. This leaves unresolved the question of whether Bitcoin functions as a macroeconomically sensitive asset, a hedge, or a speculative instrument in Indonesia. This study seeks to address this gap by employing a Vector Autoregression (VAR) approach to analyze Bitcoin price responses to shocks in inflation, money supply, gold prices, and crude oil prices. By treating these variables as a dynamic, interrelated system, this study aims to capture bidirectional causality and shock transmission mechanisms, while providing empirical evidence that complements and extends previous studies on the macroeconomic drivers of cryptocurrency in developing economies.

The evolution of Bitcoin prices alongside key macroeconomic indicators in Indonesia is presented in Figures 1–5. Bitcoin exhibits

substantial volatility, yet it has a strong upward trend. Inflation shows a declining trend with a slight rebound, while the money supply continues to increase. Gold and crude oil prices exhibit cyclical fluctuations, reflecting global

economic conditions. The co-movement between Bitcoin price volatility and fluctuations in money supply, inflation, and commodity prices suggests the presence of macro-financial linkages.

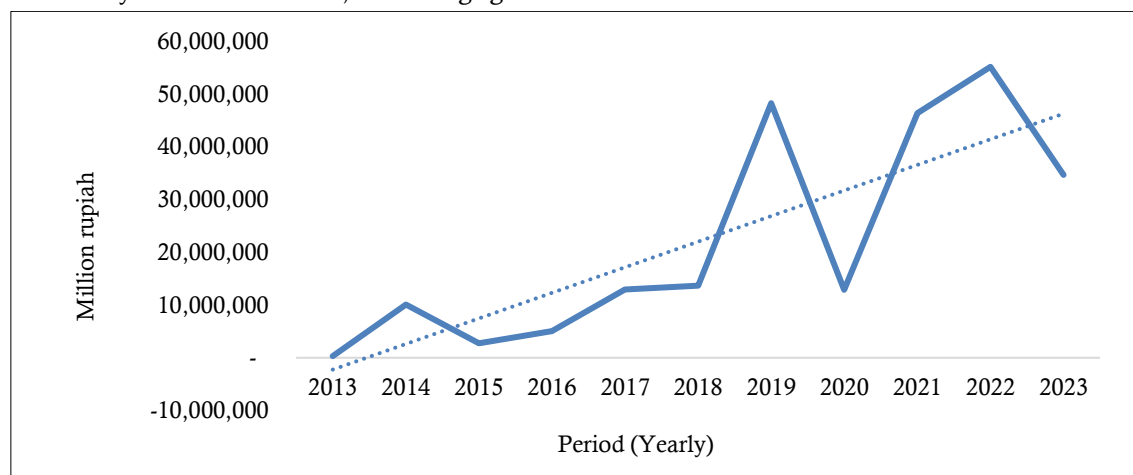


Figure 1. Bitcoin Price Development

Source: CoinMarketCap, 2023 (data processed by the authors)

Bitcoin price volatility in Indonesia from 2013 to 2023 is illustrated in Figure 1. A substantial price increase occurred in 2013, reaching approximately Rp1,000,000. In 2014, the price rose to around Rp10,000,000 before declining to about Rp3,000,000 in 2015. Gradual increases were observed in 2016, when the price reached Rp5,000,000. In 2017, the price rose to Rp13,000,000, followed by Rp14,000,000 in 2018. In 2019, another significant surge occurred, with the price reaching Rp48,000,000. In 2020, the price corrected to approximately Rp13,000,000. An upward trend resumed in 2021, with the price reaching around Rp46,000,000, peaking at Rp55,000,000 in 2022 before declining to Rp35,000,000 in 2023.

Furthermore, modern economic theory suggests that the prices of cryptocurrencies and traditional assets fluctuate significantly over time (Shahzad et al., 2020), while Liu and Tsyvinski (2021) argue that internal mechanisms within the crypto ecosystem may be more influential than direct macroeconomic variables. This perspective implies that price dynamics in the modern economy are driven not only by speculative behavior but also by structural factors within the crypto market. In recent years, Bitcoin price

fluctuations have coincided with increased interest from domestic investors, consistent with trends observed in developing countries that are adopting digital assets more rapidly (International Monetary Fund, 2024; Chainalysis, 2025).

Recent studies further indicate that Bitcoin prices are highly responsive to global liquidity conditions and monetary policy. Apergis and Payne (2024) show that changes in liquidity and policy interest rates influence digital asset returns. Moreover, Bitcoin prices are increasingly linked to global liquidity cycles and monetary policy, as changes in interest rates and liquidity levels significantly affect cryptocurrency returns (Erdinc Akyildirim, Shaen Corbet, and Ryan, 2024).

Bitcoin's valuation in Indonesia can be understood in the context of global asset pricing and international liquidity movements. In developing economies, global factors play a significant role in influencing Bitcoin and other risk assets. As the global financial system expands, increased liquidity enhances investors' risk appetite, encouraging investment in speculative assets such as Bitcoin. Conversely, contractions in the global financial system may trigger capital reallocation toward safer assets, leading to withdrawals from Bitcoin and declines in the

speculative value of other assets. This mechanism explains how global liquidity contractions can affect Bitcoin's value in Indonesia (Miranda-Agrippino and Rey, 2020).

The relationship between Bitcoin and macroeconomic variables in Indonesia is becoming increasingly important, particularly regarding inflation. In conditions of inflation uncertainty, investors may hedge by allocating funds to digital assets, especially in developing economies with higher price volatility. This

argument is supported by recent findings (Kuchkarov, Takhir; Mamadiyarov, Zokir; Khakimov, 2025). Within the Inflation Transmission Hypothesis and in the face of uncertainty, Bitcoin may serve as an alternative asset when inflation expectations rise. In Indonesia, where price pressures frequently arise in the energy and food sectors, inflation fluctuations may influence investors' decisions to use Bitcoin as a risk-mitigation instrument.

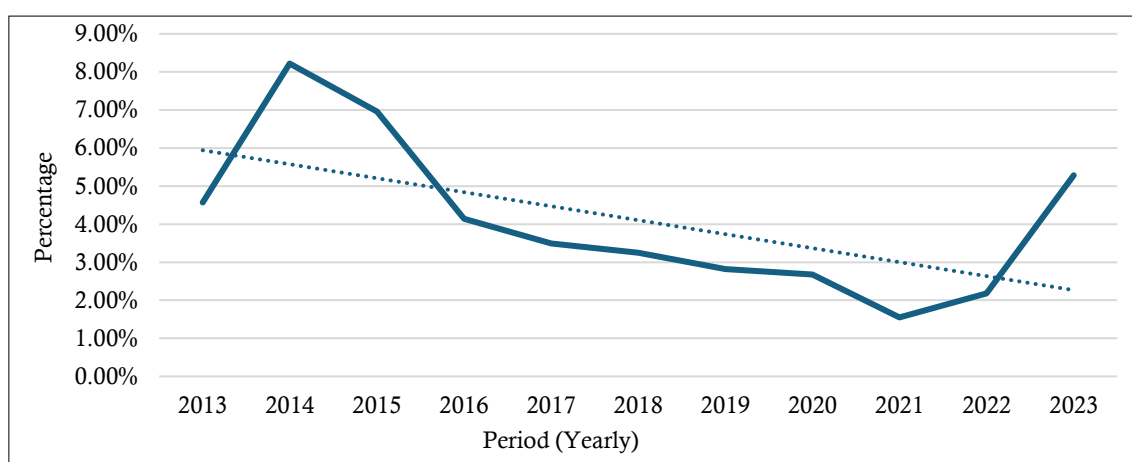


Figure 2. Inflation Developments

Source: Central Bureau of Statistics, 2023 (data processed by the authors)

This graph illustrates percentage changes between 2013 and 2023, showing a fluctuating pattern with an overall downward trend. At the beginning of 2013, the percentage was approximately 4.5%, before increasing sharply to over 8% in 2014. This was followed by a significant decline in 2015, which continued gradually until 2020. The most pronounced decrease occurred between 2015 and 2016, followed by a steadier downward trend, reaching a low of approximately 1.5% in 2021. However, after reaching this low point, the trend reversed, with values increasing again in 2022 and rising significantly in 2023 to above 5%. Overall, despite year-to-year fluctuations, the general pattern indicates a decline from 2014 to 2021, followed by a recovery in the final two years of the period.

Figure 2 shows that inflation fluctuations in Indonesia between 2013 and 2023 generally remained manageable, despite a prolonged spike

driven by global food and energy prices. Although inflation in emerging markets is highly susceptible to commodity shocks and external transmission (Choi et al., 2018), it remained relatively low in 2020 due to the pandemic and the weakening of domestic economic activity.

In this context, inflation may influence Bitcoin prices through two distinct channels, potentially in opposing directions. First, rising commodity prices can increase demand for Bitcoin as a hedge against the declining purchasing power of the Rupiah, positioning Bitcoin as an alternative store of value. Second, inflation may affect Bitcoin prices through monetary policy responses, particularly increases in interest rates intended to curb inflation. Higher interest rates raise the opportunity cost of holding non-yielding assets such as Bitcoin (Ha, Kose, and Ohnsorge, 2019; Smales, 2021). Some studies also suggest that Bitcoin behavior may be associated with financial instability driven by inflation expectations.

Therefore, in an economy such as Indonesia, the relationship between Bitcoin and inflation may not be linear or directly correlated, as it is influenced by multiple interacting factors, including monetary policy, exchange rate movements, and market demand conditions (Kyriazis, 2020).

Within the framework of New Monetarism, money is viewed as an institution that emerges from frictions in exchange and the need for liquidity in the modern economy. Unlike classical monetarism, this approach emphasizes the role of alternative liquid assets within the financial system, particularly under conditions of uncertainty surrounding fiat currencies. In the context of digital assets, Bitcoin can be considered a quasi-monetary asset that serves as a partial substitute for conventional money when inflation expectations rise or when confidence in the

monetary system declines. Williamson (2023) formally proposes that crypto assets can function as a store of value in periods of inflationary instability. In Indonesia, when inflation rises and the rupiah's purchasing power declines, this substitution mechanism may drive up demand for Bitcoin (Williamson, 2023).

In addition to inflation, the money supply also influences Bitcoin prices. Recent studies indicate that increased global liquidity can raise the value of crypto assets such as Bitcoin. Cong et al. (2024) show that when the money supply expands and real yields decline, investors tend to shift toward riskier assets, including Bitcoin. In Indonesia, data released by Bank Indonesia indicate an increase in the money supply, which may enhance domestic liquidity and subsequently flow into digital asset markets, particularly in a low real interest rate environment.

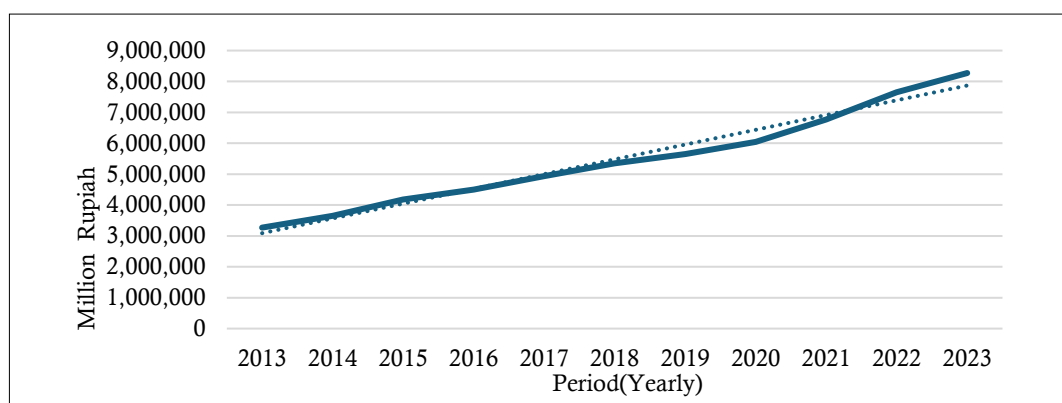


Figure 3. Development of Money Supply

Source: Central Bureau of Statistics (2023) (data processed by the authors)

The money supply in Indonesia increased steadily from 2013 to 2023. In 2013, the money supply was approximately Rp3,200,000 billion, rising to over Rp8,000,000 billion by 2023. This increase became more pronounced after 2020. According to Bank Indonesia, this growth was driven by a more accommodative monetary policy stance. For instance, Bank Indonesia reduced interest rates and relaxed reserve requirement regulations to enhance liquidity and support economic stability following the pandemic.

Nugroho and Trinugroho (2023) find that post-pandemic liquidity in Indonesia flowed more rapidly into financial markets than into the real sector. Similarly, Siregar, Prabheesh, and

Ward (2024) report that increases in the money supply have a significant impact on asset prices, primarily through portfolio adjustments and changing expectations.

Therefore, growth in the money supply not only affects overall economic stability but also plays a crucial role in influencing asset price movements, including those of digital assets. The Global Liquidity Cycle Theory posits that changes in global liquidity, whether expansions or contractions, are largely driven by the monetary policies of major central banks, such as the Federal Reserve. These changes influence capital flows into emerging markets and riskier assets. Rey (2023) further argues that in a highly

interconnected global financial system, the monetary policies of major economies can affect asset valuations in developing countries, even in the absence of changes in domestic economic fundamentals. Increased global liquidity often

drives people to seek higher-yielding investments. Bitcoin is one such option. Therefore, the increase in the money supply (M2) and looser global liquidity conditions may explain the rise in Bitcoin prices, not only globally but also in Indonesia.

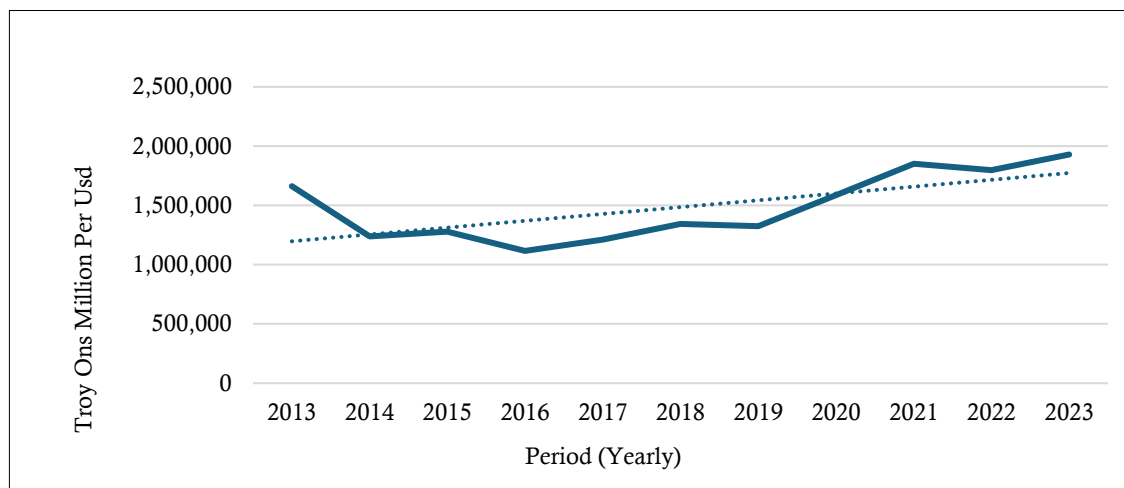


Figure 4. Gold Price Developments

Source: Investing, 2023 (data processed by the authors).

The relationship between Bitcoin and gold prices has become more widely accepted in recent studies. Research by Smales (2024) showed that the relationship between gold and Bitcoin is not fixed but rather changes over time. Both can serve as safe-haven assets during times of global uncertainty. However, under normal market conditions, gold and Bitcoin can substitute for each other. According to the Portfolio Substitution Theory, investors tend to choose between gold and Bitcoin based on their expectations about risk and global liquidity. In Indonesia, which has a high level of gold ownership, changes in global gold prices can influence investors' portfolio diversification choices. They may choose between physical assets like gold and digital assets like Bitcoin.

Between 2013 and 2023, the price of gold did not experience significant fluctuations. In 2013, the price of gold was around USD 1,650 per troy ounce, then dropped to around USD 1,100 in 2016. After that, the price of gold rose again, reaching around USD 1,900 in 2020. The price of gold remained high between USD 1,800 and USD 1,950 until 2023. In Indonesia, the increase in the gold price was influenced by global uncertainty

and exchange rate fluctuations. Bank Indonesia maintained monetary stability, which helped control domestic fluctuations. Research conducted by Aisyah and Haryanto in 2023 showed that gold prices were heavily influenced by exchange rates and global risks, further strengthening their role as a hedge. Since 2019, the legalization of cryptocurrency trading under the supervision of the Commodity Futures Trading Regulatory Agency has encouraged more domestic investors to participate. Research by Rahmat and Iswardhani (2025) emphasized that Bitcoin's price is more influenced by global liquidity and market sentiment than domestic macroeconomic factors. Thus, gold tends to offer stability as a safe haven for investment, while Bitcoin tends to be speculative and highly affected by changes in liquidity.

Portfolio rebalancing theory states that investors adjust their portfolio composition in response to changes in risk and expected returns. When discussing the relationship between gold and Bitcoin, both can serve as alternative hedges, though they also compete under normal market conditions (Ghorbel, Loukil, and Bahloul, 2026). A paper in the Journal of Financial Markets stated

that the relationship between gold and Bitcoin tends to fluctuate. The relationship increases during global crises but decreases when the economy stabilizes. This supports the idea that gold prices can influence Bitcoin prices through

risk offsetting. Global crude oil prices impact our country's economy and people's outlook on the future. This is because they can influence the cost of goods and people's economic expectations.

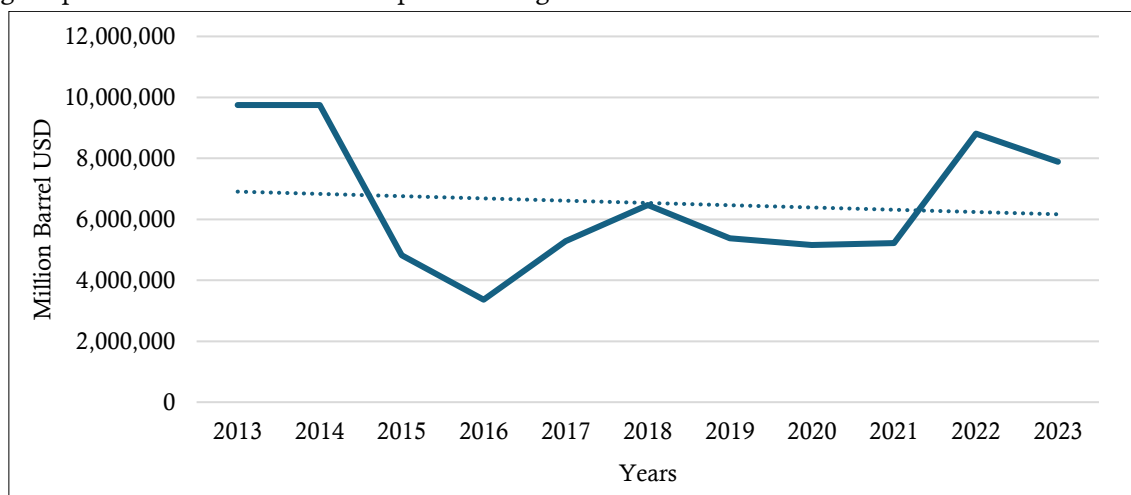


Figure 5. Crude Oil Price Developments

Source: Investing, 2023

This graph shows the change in value in barrels per million per USD from 2013 to 2023, with a fairly unstable pattern. In 2013 and 2014, the value peaked at around 10 million barrels per million USD, indicating a strong and stable situation at the beginning of the period. However, from 2015 to 2016, there was a sharp decline, with the figure falling to around 3.5 million. After that, the value began to recover slowly from 2017, reaching a peak of around 6.5 million in 2018, though it weakened slightly again in 2019. In 2020 and 2021, the value remained relatively stagnant at around 5 million, indicating a relatively flat condition. Entering 2022, the number of cases rebounded significantly, approaching 9 million, the largest increase since 2014, before experiencing a moderate decline again in 2023 to around 8 million. Despite some recovery phases and surges, the trend shows a long-term decline from 2013 to 2023.

A recent study by Rahmat and Iswardhani (2025) found that oil price fluctuations can also affect the cryptocurrency market, particularly during periods of geopolitical tension. Rising oil prices increase the likelihood of economic instability and global price fluctuations, which may, in turn, affect Bitcoin prices. For countries

such as Indonesia, which are highly exposed to global energy price fluctuations, changes in oil prices can contribute to inflationary pressures and exchange rate volatility. These conditions may also influence investors' willingness to invest in cryptocurrencies. Crude oil prices affect Bitcoin prices through two main channels: global inflation and mining production costs. First, rising oil prices increase production and distribution costs, contributing to inflation in many countries. Higher inflation may alter global monetary policy and liquidity conditions, ultimately affecting risk assets such as Bitcoin.

Furthermore, energy costs are theoretically linked to the Bitcoin mining process. Bitcoin mining requires substantial energy, and rising energy prices increase operational costs. According to Pagnotta (2023), electricity costs influence Bitcoin prices by affecting the supply of newly mined Bitcoin. In Indonesia, rising global crude oil prices can intensify domestic inflationary pressures while also altering expectations regarding monetary policy and investor risk preferences. These changes may indirectly affect Bitcoin prices through inflation, liquidity conditions, and shifts in market risk perception.

Understanding the macroeconomic factors that influence Bitcoin price dynamics is increasingly important as cryptocurrency adoption expands in Indonesia. As an open economy, Indonesia is vulnerable to changes in commodity prices and global liquidity flows, which may influence investment decisions. Bitcoin prices are linked to inflation, money supply, gold prices, and crude oil prices through channels such as liquidity, inflation expectations, and global uncertainty. This interaction can be interpreted from the perspective proposed by Yano (2020). The currency cost structure curve in Figure 7 suggests that currency choice depends on currency costs

and trust levels, both of which are influenced by macroeconomic conditions. Inflation and monetary expansion alter the cost of holding money, while gold prices reflect the global distribution of trust in financial assets. In addition, Bitcoin's value is influenced by oil prices and the resulting energy costs. From this perspective, Bitcoin price movements reflect changes in currency costs driven by liquidity conditions and risk perceptions. Therefore, Bitcoin can be understood as part of a broader monetary decision-making process shaped by macroeconomic factors, rather than merely as a speculative asset.

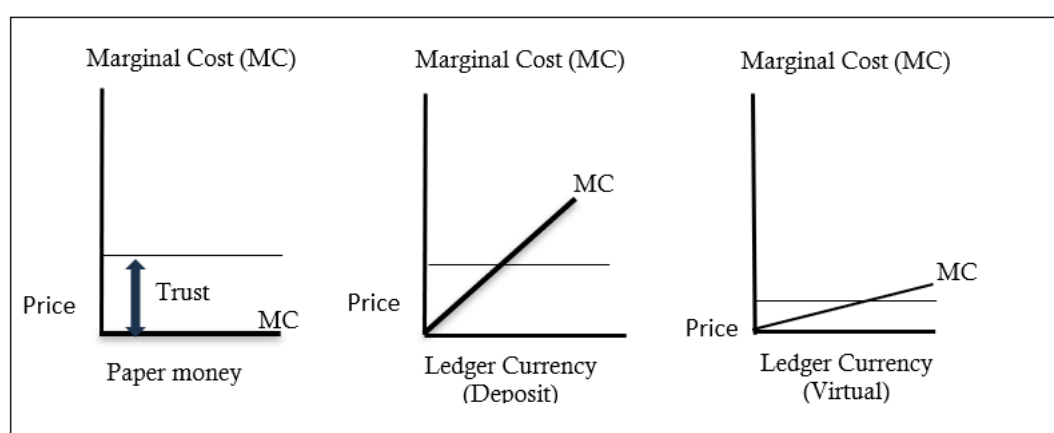


Figure 6. Curve Currency Cost Structure

Source: Blockchain and Cryptocurrency Books

The literature discusses the shift from traditional deposit money to digital, technology-based forms of value within the financial system. This transformation enhances monetary circulation through technological innovation, making payment systems more efficient and transparent through the use of digital currencies. Yano (2020) notes that these innovations aim to reduce transaction costs and improve financial security. The growing demand for digital currencies is further highlighted by Benigno (2023), who identifies digitalization as a key factor influencing monetary policy and shaping a new financial equilibrium in the digital economy.

Modern Monetary Theory (MMT) is important in understanding government legitimacy, monetary policy, and public trust, all of which contribute to maintaining stability in the digital economy. MMT argues that governments

with sovereign currencies have full control over their monetary systems and can spend without facing insolvency, provided that obligations are denominated in their own currency. Unlike households and firms, governments can create money before generating revenue. Although MMT offers an alternative perspective on fiscal constraints, it does not imply that governments can create money without limit and without consequences. According to Kelton (2020b), the primary constraint is the availability of real resources, which is closely related to inflation. Therefore, MMT views the primary objective of monetary policy as maintaining price stability through inflation control. In contrast, fiscal policy plays a central role in regulating aggregate demand, generating employment, and stimulating economic growth (Wray, 2015).

In the same vein, Torres, Lima, and da Silveira (2024) state that fiscal credibility and digital transparency are key factors in maintaining public trust in the monetary system in the contemporary era. These studies suggest that currency stability depends more on institutional trust and the government's ability to utilize technology than on the quantity of money in circulation. Such issues are central to both MMT and contemporary digital economies. Modern Monetary Theory further argues that countries issuing sovereign currencies, such as the United States, are not primarily constrained by the risk of running out of money, but rather by the risk of excessive inflation resulting from limited productive capacity (Mitchell, Watts, and Wray, 2019). From this perspective, government deficits may support the broader economy by increasing private sector financial balances. Kelton (2020) further explains that government expenditure effectively creates financial assets for households and businesses.

According to the Modern Monetary Theory perspective on inflation, prices rise when aggregate spending exceeds the economy's productive capacity. Garzón Espinosa (2026) argues that large-scale government spending, combined with production constraints, can generate inflationary pressures, particularly in post-pandemic conditions. Investors pay close attention to inflation expectations because they influence decision-making in uncertain economic environments. When investors expect rising inflation or currency depreciation due to excessive government spending, they may allocate funds to alternative assets, such as cryptocurrencies, to diversify and protect against risk.

However, this relationship is not linear. Stock-flow simulations in an open economy conducted by Losurdo and colleagues (2024) show that monetary base expansion within the MMT framework may generate inflationary pressures under certain conditions. In this context, the response of cryptocurrencies to fiscal policy may occur in two phases. In the initial liquidity phase, cryptocurrency prices may rise as private-sector financial surpluses grow. However, as inflationary pressures intensify and macroeconomic

constraints become more pronounced, cryptocurrency volatility may also rise as risk perceptions shift.

Criticism of Modern Monetary Theory has been expressed by several scholars, including Skousen (2020) and Coats (2019), who raise concerns regarding inflation risks and threats to fiscal sustainability. This perspective suggests that cryptocurrencies may serve as highly responsive assets to perceptions of fiscal risk and the credibility of a country's currency. In a highly interconnected global financial system, changes in perceptions regarding fiscal stability may encourage capital flows toward digital assets that any particular government does not directly control.

Bank Indonesia (2023) notes that the rise of digital assets may undermine the effectiveness of monetary policy, as people increasingly use cryptocurrencies for wealth storage and investment. In response, Bank Indonesia plans to introduce the Digital Rupiah to strengthen monetary control in line with the principles of Modern Monetary Theory (MMT). This initiative is intended to provide an official digital currency with greater stability and liquidity than cryptocurrencies. Understanding the relationship between MMT and digital finance is therefore important for maintaining the value of the rupiah, public trust, and the effectiveness of interest rate policy.

In theory, cryptocurrencies can function as response variables that are highly dependent on three key factors within the macroeconomic system under the MMT framework: (1) private sector financial surpluses arising from fiscal deficits, (2) interest rate policy as a monetary policy instrument, and (3) inflation expectations resulting from constraints in the economy's real productive capacity. This structure is highly dynamic because cryptocurrency responses depend on the liquidity cycle phase, perceptions of risk, and the state of the economy. Thus, integrating MMT with digital asset research enables the development of empirical models that position cryptocurrencies as indicators of sensitivity to modern fiscal and monetary policies.

Friedman's concept of wealth extends beyond money; it also includes assets that can be converted into money, as well as the present value of future income derived from labor. Wealth is essentially defined as the present value of the expected income stream generated by all owned assets. Each type of asset provides distinct benefits that influence the proportion in which it is held. Friedman identifies five forms of wealth: cash (M), bonds (B), stocks (E), non-human physical goods (G), and human capital (H).

According to Friedman, the demand for money is not independent; rather, it is influenced by various components of an individual's wealth. Total wealth, denoted by W , is the key variable in this framework. Total wealth includes all assets capable of generating income, such as cash, bonds, stocks, physical goods, and human capital. Each component of wealth provides a different rate of return, which influences an individual's decision regarding how much money to hold. Furthermore, several additional factors affect these decisions, including interest rates, permanent income, and price fluctuations. Individuals allocate their wealth between money and other assets based on these considerations.

Thus, Friedman's framework emphasizes that several factors determine the demand for money. First, wealth levels affect the demand for money. Second, income expectations also influence money demand. Third, the risk level associated with different assets plays an important role. Finally, the relative returns on various forms of wealth also affect money demand. Therefore, the demand for money results from the interaction of these factors.

Several research gaps have been identified in the literature. First, there is a contextual gap: much of the existing research has been conducted in developed countries, while evidence from developing countries, such as Indonesia, remains limited, particularly regarding the development of digital assets and digital financial systems. Second, there is a theoretical gap regarding the limited application of Friedman's classical demand-for-money theory to digital currencies. Key elements of this theory, including money demand, liquidity preference,

and the value of money, may operate differently in digital financial systems than in traditional ones. Consequently, further empirical research is needed to understand the behavior of cryptocurrencies, which are not issued by central authorities and do not primarily function as means of payment. Third, there is a methodological gap: most previous studies have examined macroeconomic variables separately rather than within an integrated framework, as highlighted by Beneki et al. (2019). Research exploring a comprehensive macroeconomic framework to analyze inflation, money supply, commodity prices, and cryptocurrency prices simultaneously remains limited. To address these gaps, this study employs a Vector Autoregressive (VAR) model to examine the dynamic relationships among inflation, money supply, gold prices, oil prices, and cryptocurrency prices, thereby providing a more comprehensive macroeconomic analysis.

RESEARCH METHODS

Using the Vector Autoregression (VAR) framework, this study analyzes the dynamic relationships among Bitcoin prices, inflation, money supply (M2), gold prices, and crude oil prices using a quantitative approach. The VAR method is appropriate because it treats all variables as endogenous and captures the transmission of macro-financial shocks within a multivariate system. The suitability of VAR models for analyzing the relationships between cryptocurrencies and macroeconomic variables is further supported by recent empirical studies conducted by Rodriguez and Colombo (2025) and Vuković and others (2025), which demonstrate the effectiveness of VAR in examining the dynamic interactions between crypto assets and macro-financial variables.

Monthly data for all variables are obtained from reputable sources: Bitcoin, gold, and crude oil prices from Investing.com; the Consumer Price Index (CPI) from Statistics Indonesia; and money supply (M2) from Bank Indonesia. To stabilize variance and facilitate elasticity interpretation, all series are transformed into natural logarithms. The variables used in this

study are LnBTC, LnINF, LnM2, LnGOLD, and LnOIL.

To ensure the econometric adequacy of the specification, standard VAR procedures are employed, including unit root testing, optimal lag selection using information criteria, model stability evaluation, and residual diagnostic testing. After establishing a stable and reliable model, dynamic relationships are analyzed using the Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD). These methods enable the analysis of how shocks in one variable are transmitted to other variables over time. All estimations are conducted using EViews 12, following the procedures described in Time Series Econometrics by Neusser (2025).

Despite variations across time periods and market conditions, studies examining macroeconomic variables and cryptocurrency markets reveal several consistent patterns. The following hypotheses are developed based on these findings. The literature on digital assets and inflation suggests that higher inflation is often associated with weaker cryptocurrency performance, particularly for Bitcoin, because inflationary pressures increase macroeconomic uncertainty and reduce demand for high-risk assets (Wang et al., 2022; Conlon et al., 2020). Although some studies emphasize Bitcoin's role as a store of value, most empirical evidence

indicates that inflationary shocks tend to exert downward pressure on cryptocurrency prices.

An increase in the money supply reflects higher liquidity in financial markets. Studies by Umar and Gubareva (2021) and Apergis et al. (2021) show that increased liquidity, particularly through M2 growth, encourages investors to allocate more funds to speculative and alternative assets, thereby increasing cryptocurrency valuations. Liquidity-driven market conditions tend to stimulate capital flows into digital assets.

Because Bitcoin is often considered a hedge and safe-haven asset, it is frequently analyzed alongside gold. Empirical evidence (Tiwari et al., 2019, 2021; Selmi et al., 2021; Shahzad et al., 2022) indicates that Bitcoin and gold exhibit positive co-movement, particularly during periods of financial instability. Although the strength of this relationship varies, most findings suggest complementary behavior as investors diversify across assets.

Crude oil prices are commonly used as indicators of global economic conditions. Declining oil prices are often associated with a risk-off sentiment and pessimistic economic expectations, both of which tend to reduce demand for cryptocurrencies. Evidence from Demirer et al. (2020) and Naeem et al. (2022) suggests that developments in the energy market negatively affect cryptocurrency markets, indicating that higher oil price volatility may exert downward pressure on digital asset prices.

Table 1. Variables And Data Source

Variable Name	Definition	Unit of Measurement	Data Source
Bitcoin price (BTC)	As an indicator of the value of the cryptocurrency market, the monthly closing price of Bitcoin.	USD (in Ln)	CoinMarketCap
Inflation (INF)	The Consumer Price Index (CPI) is used to calculate the monthly inflation rate.	Percentage	Central Bureau of Statistics (BPS)
Money supply (M2)	Broad money supply indicates the domestic liquidity position	Billion Rupiah (in Ln)	Bank Indonesia
Gold Price (GOLD)	The worldwide gold price reflects the traditional safe-haven nature of the commodity.	USD Per Troy Ons (in Ln)	Investing.com
Crude Oil Prices (OIL)	The worldwide price of crude oil mirrors the state of the international energy market.	USD Per Barel (in Ln)	Investing.com

The stationarity hypothesis must be met before model estimation because this research uses quantitative time series variables. The main research question is stated as follows, according to the data structure:

$$BTC_t = f(INF_t, M2_t, GOLD_t, OIL_t) \dots\dots\dots(1)$$

After establishing the model's stability, the next step was to use the Augmented Dickey-Fuller (ADF) test to assess the stationarity of the time-series variables and determine the optimal lag length. The ADF specification is expressed as follows, in accordance with Lutkepohl and Krätzig (2004):

$$\Delta Y_t = \alpha + \beta Y_{t-1} + \sum \gamma_i \Delta Y_{t-i} + \epsilon_t \dots\dots\dots(2)$$

The ideal lag duration for VAR(p) is determined by minimizing conventional information criteria:

$$\begin{aligned} AIC(p) &= \ln|\Sigma(p)| + \frac{2}{T}pn^2 \\ BIC(p) &= \ln|\Sigma(p)| + \frac{\ln T}{T}pn^2 \\ HQ(p) &= \ln|\Sigma(p)| + \frac{2 \ln(\ln T)}{T}pn^2 \dots\dots\dots(3) \end{aligned}$$

In a cointegration test, the third stage uses Johansen's Vector Autoregressions (VAR) approach. If the vector Y_t is an endogenous variable vector in VAR with a lag length p , then:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + A_p Y_{t-p} + B X_t + \epsilon_t \dots\dots\dots(4)$$

The calculated VAR model underwent stability and diagnostic testing to guarantee empirical validity. The AR root test in EViews 12 was used to evaluate stability, and it showed that all characteristic roots lie within the unit circle. The remaining diagnostic tests also indicated that the model complies with the typical assumptions of homoscedasticity and the absence of serial correlation. These findings show that the estimated VAR specification is dynamically

stable and appropriate for shock analysis. After that, the dynamic relationships between variables were assessed using Forecast Error Variance Decomposition (FEVD) and Impulse Response Functions (IRF). By tracing the temporal course of Bitcoin prices after a one-standard-deviation shock to each macroeconomic variable, the IRF enables evaluation of the direction, size, and duration of the responses. The FEVD measures the relative contribution of each shock to the forecast error variance of Bitcoin prices at various time horizons. These methods adhere to the conventional VAR framework first proposed by Sims (1980) and used in current empirical research (e.g., Zhang & Chen, 2024; Hossain & Lee, 2025).

RESULTS AND DISCUSSION

The Augmented Dickey-Fuller test shows that none of the variables are stable at the beginning, but they become stable after the change. This means that inflation, the money supply, the price of gold, the price of oil, and Bitcoin all have term patterns. However, their ups and downs are affected by short-term events. From this point of view, this pattern means that how easily things are bought and sold, and how much they go up and down, are the main ways in which variables are connected. This is like what Francis X. Diebold and Kamil Yilmaz said in 2021, and Elie Bouri and others said in 2022. They said that when there are problems with how easily goods are bought and sold, it affects. Also, Rahardja said something similar, and Walid Mensi and others said in 2023 that greater volatility in commodities can slowly affect the financial system.

Table 1. Unit Root Test

Variable	ADF (Level)	Prob	ADF*(1 st Diff)	Prob*
Inflation	-1.924803	0.3200	-11.30202	0.0000
Money Supply	-1.609143	0.4748	-10.74974	0.0000
Gold Price	-2.283306	0.1791	-10.90072	0.0000
Oil Price	-2.032515	0.2727	-10.57271	0.0000
Bitcoin Price	-2.631841	0.0894	-11.13955	0.0000

All variables are non-stationary at the level form, as they fail the ADF unit root test. However, they become stationary after first differencing at the 5% level, suggesting that the variables are integrated of order one (I(1)). Trend and shock dynamics are the main drivers of the fluctuations in the variables, according to this pattern. The inflation variable shows an upward trend, consistent with Pinchuk's (2023) research, which finds that higher inflation in developing nations tends to discourage investment in risky assets like Bitcoin. In the meantime, the money supply (M2) continues to expand, aligning with

Hassanah et al. (2025), who claim that rising liquidity is encouraging investors to allocate funds to digital and alternative assets. Furthermore, as Rahman et al. (2025) found, changes in oil and gold prices indicate structural shocks in the world's commodity markets, suggesting that portfolio risk and financial market instability are exacerbated by commodity volatility. Overall, these findings support the notion that macroeconomic and commodity shocks significantly affect short-term financial market behavior.

Table 2. Optimum Lag Length Selection Based on VAR Information Criteria

Lag	Logl	LR	FPE	AIC	SC	HQ
0	-1006.102	NA	29.81481	17.58439	17.70373	17.63283
1	-526.8676	908.4623	0.011062*	9.684655*	10.40072*	9.975304*
2	-503.9982	41.36388*	0.011508	9.721708	11.03450	10.25456
3	-494.0149	17.18871	0.015034	9.982867	11.89239	10.75793
4	-486.8634	11.69103	0.015034	10.29328	12.79952	11.31055
5	-472.8673	21.66358	0.020746	10.48465	13.58762	11.74413
6	-463.9788	12.98496	0.034866	10.76485	14.46454	12.26653
7	-421.2748	11.08769	0.039395	10.83378	15.22761	12.61623
8	-411.7472	12.01682	0.055377	11.11256	16.11665	13.14257
9	-400.2247	13.49478	0.076625	11.35540	16.96974	13.63297
10	-390.4246	10.59472	0.112090	11.62927	17.85387	14.15441

Source: Processed Data, 2025

The optimal lag length in the VAR model indicates that the interaction between inflation, M2, gold prices, and oil prices is very strong in the short term. This means that macroeconomic shocks, particularly those stemming from liquidity, inflation, and global commodity prices, are immediately reflected in the market. This makes the reaction of assets like Bitcoin tend to be rapid and based on expectations. These results align with research by Iyer and Popescu (2023), Foroutan and Lahmiri (2024), and Alamaren et al. (2024). They demonstrated the relationship between financial markets and commodities through a short-term information spillover mechanism. From an economic perspective, these findings indicate that markets in developing countries are more responsive to external shocks.

This occurs due to slow policy adjustments. Therefore, a rapid response from monetary and fiscal policies is crucial to maintaining financial system stability. The results of the stability test for the VAR model are shown in Table 3.

Table 3. Stability Test

Root	Modulus
0.950261 - 0.023188 i	0.950544
0.950261 - 0.023188 i	0.950544
0.880202	0.880202
0.704785 - 0.096593i	0.711373
0.704785 - 0.096593i	0.711373

Source: Processed Data, 2025

The VAR stability test results indicate that the model is stable, as all moduli are less than 1 and lie within the unit circle. This finding suggests that shocks to inflation, M2, gold prices,

and oil prices do not generate explosive effects within the system. Therefore, the system dynamics remain stable and under control. Economically, these results indicate that the effects of macroeconomic shocks are temporary, driven by short-term adjustment mechanisms that pull the economy back toward equilibrium.

These findings are consistent with studies conducted by Khan (2024), Santos (2023), Wei (2024), and Rahimi (2025), which show that macroeconomic and commodity variables generally fluctuate around a short-term equilibrium path. Therefore, the VAR's stability suggests that Indonesia's financial and digital asset markets are relatively capable of absorbing short-term shocks without causing systemic instability.

Table 4. Contegration Test

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
Trace	No Trend	No Trend	No Trend	Trend	Trend
Max-	0	0	0	0	0
Eig	0	0	0	0	0

Source: Processed Data, 2025

The results of the cointegration test on the variables bitcoin, inflation, money supply, gold price, and crude oil price level then indicated no cointegration (symbol: *). Thus, in this study, the VAR analysis was applied. OLS estimation results from the parameters of each variable, with the following equation:

$$BTC = 0.7524BTC(-1) - 64.0157Gold(-1) - 418.9824Inflation(-1) + 0.5794JUB(-1) + 54.4523 * Oil(-1) - 288.9626$$

$$Inflation = -0.0000BTC(-1) - 0.0051Gold(-1) + 0.8761Inflation(-1) + 0.0000JUB(-1) + 0.0046 * Oil(-1) - 0.0088$$

$$JUB = 0.0026BTC(-1) - 4.5364Gold(-1) + 2.2417Inflation(-1) + 0.9839JUB(-1) + 3.9406 * Oil(-1) + 16.7293$$

$$Gold = -0.0022BTC(-1) - 13.7341Gold(-1) - 18.3702Inflation(-1) + 0.0046JUB(-1) + 12.4983 * Oil(-1) + 4.5876$$

$$Oil = -0.0024BTC(-1) - 16.8063Gold(-1) - 20.6207Inflation(-1) + 0.0049JUB(-1) + 15.2528 * Oil(-1) + 5.4453$$

This confirms an independent movement of these variables, with the short-run exerting an overriding influence. This typifies Indonesia's macroeconomic features: inflation and the money supply respond to short-run policy interventions, while external factors predominantly determine gold and oil prices. Following Hamada (2024), Suroso (2025), and Lee (2024), these findings show that developing nations are characterized by temporary rather than sustained economic shocks. Further, the OLS findings show Bitcoin responds negatively to inflation and gold prices, and

positively to M2. This indicates that high inflation and high commodity prices lead to a low risk appetite, whereas high liquidity supports speculative investments. This shows that short-run policy changes and external shocks influence Indonesia's digital and financial asset markets. The lack of co-integration underscores the importance of macroeconomic policies aimed at future stability, in line with Murakami (2025), who states that, in developing countries, digital markets are more affected by expectations and sentiment than by fundamental factors. These findings validate the use of the Impulse Response Function (IRF) to assess the shock's effects on the direction, intensity, and duration of relationships among inflation, liquidity, global commodity prices, and other variables.

Table 5. Impulse Response Function

Accumulated Response of BTC:					
Period	Btc	Inflasi	Jub	Gold	Oil
1	0.715730	0.000000	0.000000	0.000000	0.000000
2	1.092694	-0.003940	0.132275	0.069261	-0.112615
3	1.413108	-0.031348	0.251197	0.168514	-0.250531
4	1.683047	-0.075747	0.367940	0.277971	-0.410644
5	1.927256	-0.129193	0.473562	0.389922	-0.579208
6	2.154601	-0.186513	0.569232	0.500385	-0.750996
7	2.369996	-0.243985	0.656085	0.607796	-0.922326
8	2.575792	-0.299499	0.735577	0.711576	-1.091102
9	2.773182	-0.351959	0.808912	0.811609	-1.256030
10	2.962796	-0.400922	0.877032	0.907961	-1.416328

Source: Processed Data, 2025

The response to an impulse indicates Bitcoin's reaction to changes in macroeconomic indicators, especially in monetary and commodity markets. The most responsive and positive answer in this case would be due to an increase in the money supply (M2). This indicates that the Bitcoin market in Indonesia is built more on speculation than on the asset's fundamental value, driven by prevailing market liquidity. On the other hand, inflation and oil price increases are market shocks for which the response is most negative and not permanent. It shows that market confidence declines due to

purchasing power and market instability. The changes in gold prices show a negligible positive response, suggesting that Bitcoin might be an alternative to market speculation, especially when market speculation is low and commodity prices are uncertain. The findings indicate that, from a macroeconomic perspective, liquidity of an asset primarily mitigates inflation/commodity risks rather than serving as a reliable hedge against commodity prices. This is similar to the behavior of speculative assets in developing economies.

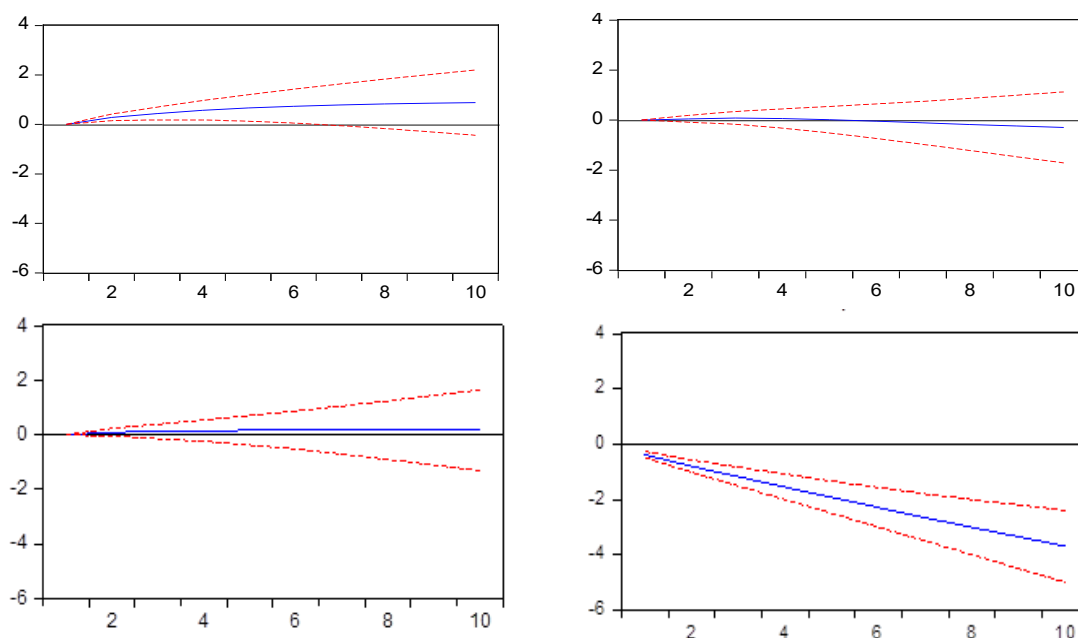


Figure 7. Bitcoin's Impulse Responses in Relation to Macroeconomic Variables and Commodities
Source: Source: Processed Data, 2025

The results of the Impulse Response Function (IRF) indicate that Bitcoin price changes are primarily influenced by liquidity and commodity risk channels. The response to inflation shocks is negative and sustained, indicating increased macroeconomic uncertainty and decreased interest in speculative assets; thus, Bitcoin does not yet function as a hedge against inflation, consistent with Ashraf (2025). Conversely, shocks to the money supply (M2) elicit a positive, sustained response, confirming the dominance of liquidity in Bitcoin demand. Regarding commodities, oil price shocks generate the largest negative response through the commodity risk channel, consistent with the findings of Köse (2025) and Zeinedini (2024), as

well as the asset-pricing frameworks of Rudd (2025) and Porter (2025). Gold price shocks show a positive, albeit weak, response, supporting the portfolio substitution theory and the inelastic nature of Bitcoin supply, according to Podhorsky (2024).

The asymmetric transmission pattern between macro and financial markets is also consistent with the work of Choi (2020) and Shin (2020). It reinforces the Bitcoin paradox identified by Schilling (2019) and Uhlig (2019), corroborated by Hansen (2024) and Williams (2024). Overall, the IRF emphasizes that liquidity is the primary factor, while inflation and commodity prices act as short-term risk shocks, thereby furthering the analysis using the FEVD.

Table 7. The Variance Decomposition Test

Variance decomposition of Btc:						
period	S.e.	Btc	Inflasi	Jub	Gold	Oil
1	0.715730	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.830278	94.92412	0.002252	2.538078	0.695867	1.839687
3	0.914217	90.57694	0.091737	3.785530	1.752628	3.793161
4	0.980754	86.27951	0.284643	4.706215	2.768447	5.961180
5	1.037533	82.63466	0.519704	5.241557	3.637999	7.966077
6	1.087342	79.60902	0.751077	5.546490	4.344382	9.749033
7	1.131567	77.13118	0.951468	5.710529	4.912462	11.29436
8	1.171091	75.10092	1.113045	5.792341	5.371794	12.62190
9	1.206546	73.42841	1.237635	5.826345	5.748103	13.75951
10	1.238436	72.03971	1.331028	5.832698	6.061186	14.73538

Overall, the IRF and FEVD analyses indicate that Bitcoin does not function as an effective hedge against inflation, as its response to inflationary shocks is weak and unsustainable. This finding implies that Bitcoin prices in Indonesia are more influenced by liquidity conditions and market sentiment, consistent with Zhou and Su (2024). Shocks to the money supply (M2) generate a positive response of approximately 2–6%, indicating that the liquidity transmission channel plays a dominant role, in line with the findings of Cheng, Li, and Zhang (2025). The FEVD analysis further shows that, in the short term (more than 90%), Bitcoin price fluctuations are largely driven by internal or speculative shocks. In the medium to long term, however, external influences become more significant, particularly through shocks to oil

prices (approximately 14%) and gold prices (approximately 6%). In comparison, the contribution of inflation remains relatively small (approximately 1.3%). Recent studies by Corbet et al. (2024) also suggest that, in developing economies, digitally based assets are characterized by high volatility generated primarily within the cryptocurrency market itself and only weakly connected to traditional macroeconomic indicators.

This study contributes to the literature by combining IRF and FEVD analyses to identify the macroeconomic transmission mechanisms affecting Bitcoin, thereby systematically demonstrating patterns of short-term and long-term dominance rather than relying solely on the VAR model. The FEVD findings indicate that the speculative nature of the cryptocurrency

market is reflected in the dominance of Bitcoin's own shocks in explaining short-term fluctuations. Over the medium to long term, however, the most significant external effects arise through the commodity risk channel and financial cycle effects associated with global commodity shocks, particularly those related to oil and gold prices. Quantitative shock responses peak during periods 2–3 before gradually declining in periods 6–8, suggesting that most shocks are temporary rather than persistent. Meanwhile, liquidity (M2) shocks persist longer than inflation shocks, highlighting the importance of monetary liquidity transmission within digital asset markets.

This interpretation is supported by recent studies showing that cryptocurrency dynamics in emerging economies are influenced more by global liquidity cycles than by domestic macroeconomic fundamentals (Jin Liu et al., 2025; Enrique Fernandez-Perez et al., 2025). Furthermore, Hamed Al-Yahyaee et al. (2025) argue that the dominance of short-term shocks in cryptocurrency markets results from market structures driven by momentum and investor expectations. Similarly, Walid Mensi et al. (2025) emphasize the growing importance of commodity channels, particularly energy-related factors, in explaining Bitcoin volatility through global risk transmission mechanisms.

From a policy perspective, these findings suggest that Indonesia's cryptocurrency market is more vulnerable to fluctuations in global liquidity and commodity cycles than to domestic inflationary conditions. This implies that monetary policy affects digital assets indirectly through liquidity conditions and risk sentiment rather than directly through the conventional inflation channel. Consequently, policies aimed at strengthening the digital financial system's stability and macroprudential supervision may be more effective at addressing cryptocurrency volatility than traditional monetary policy instruments.

The IRF and FEVD findings also clarify the direction, magnitude, and persistence of macroeconomic shocks affecting Bitcoin prices. In the short term (periods 1–2), Bitcoin is

overwhelmingly influenced by its own shocks (70–90%), indicating that price fluctuations are primarily driven by speculation and internal market momentum. Money supply (M2) shocks generate a modest positive response that peaks during periods 2–3, confirming the liquidity transmission mechanism, whereas inflation shocks produce a small negative and temporary response that dissipates by periods 3–4.

In the medium to long term (periods 4–6), oil prices become the largest external contributor, followed by gold prices, reflecting the commodity risk and portfolio rebalancing channels. These effects gradually weaken over time, indicating that macroeconomic shocks are temporary rather than permanent. This framework supports the argument that cryptocurrency price movements are predominantly endogenous. Research by Sergio Da Silva (2025) further confirms that structural uncertainty intensifies speculative dynamics in emerging markets, while studies by Dirk G. Baur and Nicholas Kyriazis demonstrate that macroeconomic transmission to Bitcoin remains relatively weak.

Overall, the FEVD analysis identifies three primary mechanisms: speculative dominance in the short term, liquidity effects in the medium term, and commodity transmission channels in the long term. These findings suggest that macroeconomic shocks exert only temporary effects on Bitcoin prices rather than shaping their long-term fundamentals.

Therefore, these findings imply that without stronger regulation, improved financial literacy, and greater integration with the formal financial system, the cryptocurrency market may not effectively contribute to sustainable financial development and could instead create economic vulnerabilities that hinder long-term economic stability.

CONCLUSION

The findings of this study support the idea that cryptocurrency prices exhibit asymmetric responses to macroeconomic factors in

Indonesia. Bitcoin prices are negatively affected by inflation, suggesting it is not an effective inflation hedge. Conversely, increases in the money supply (M2) exert a positive effect, demonstrating that liquidity, rather than intrinsic valuation, is the primary driver of speculative demand. These findings support the argument that the Indonesian cryptocurrency market is influenced more by liquidity conditions than by macroeconomic fundamentals.

The combined results of the VAR, IRF, and FEVD analyses demonstrate that Bitcoin price behavior is largely self-driven in the short term. In contrast, external commodity shocks, particularly those related to oil and gold prices, increasingly influence prices over the medium to long term. This pattern indicates that global risks are transmitted primarily through commodity channels, whereas monetary transmission remains relatively weak. From an economic perspective, Bitcoin behaves more as a high-risk speculative asset than as a safe-haven or hedging instrument, underscoring the importance of monitoring global risk sentiment and liquidity cycles to maintain financial stability.

This study contributes to the existing literature by employing FEVD analysis to identify the dominance structure of macroeconomic transmission and by distinguishing between short-term speculative dynamics and medium-term commodity-driven effects in the Indonesian cryptocurrency market. Therefore, the contribution of this study lies not in the use of the VAR framework itself, but in its explanation of the transmission channels, persistence patterns, and dominance hierarchy of macroeconomic shocks affecting Bitcoin prices.

However, this study has several limitations. First, the high volatility of cryptocurrency markets may reduce the stability of linear VAR estimations. Second, the analysis primarily focuses on domestic macroeconomic variables and does not fully account for geopolitical risk or global monetary policy conditions. Third, the study is limited to Bitcoin and does not compare its dynamics with those of other cryptocurrencies that may exhibit different transmission mechanisms. Future research is

therefore encouraged to apply nonlinear approaches, such as TVP-VAR, Regime-Switching VAR, or GARCH models, and to incorporate broader global financial factors to capture better volatility dynamics and structural changes in digital asset markets..

REFERENCES

- Adelopo, I. (2025) "Central bank digital currency adoption and its systemic implications," *Journal of Financial Regulation Studies*, 12(1), pp. 44–59.
- Andrikopoulos, A. *et al.* (2018) "Cryptocurrencies and the theory of inflation," *SSRN Electronic Journal* [41, 112–127].
- Andrikopoulos, A., Kallinterakis, V. and Wang, Y. (2018) "Cryptocurrency market dynamics and volatility patterns," *Journal of Financial Markets*, 41, pp. 112–127.
- Arifin, M., Nugroho, A., and Rahmawati, L. (2024) "Safe-haven behavior of gold and the emerging role of digital assets in developing economies," *Resources Policy*, 87, p. 104123.
- Aysan, A. F., Demir, E., Gozgor, G., & Lau, C. K. M. (2019). *Effects of the geopolitical risks on Bitcoin returns and volatility. Research in International Business and Finance*, 47, 511–518.
- Agestiani, A. and Sutanto, H. A. (2019) *Pengaruh indikator makro dan harga emas dunia terhadap Indeks Harga Saham Syariah (Jakarta Islamic Index)*, ECONBANK: Journal of Economics and Banking, 1(1), pp. 26–38.
- Adrian, T. and Mancini-Griffoli, T. (2019) *The rise of digital money*, FinTech Notes No. 2019/001, International Monetary Fund, Washington, D.C.
- Andolfatto, D. (2022). *Assessing the impact of centralized bank digital currencies on private money*, *Journal of Financial Stability*, 58, 100963.
- Balaski, E., Morgan, J. and Patel, S. (2020) "Blockchain-based assets and macroeconomic uncertainty," *Journal of Economic Behavior & Organization*, 180, pp. 937–951.
- Balcilar, M. and Ozdemir, Z. (2021) "Asymmetric volatility spillovers between cryptocurrencies and global financial markets," *Finance Research Letters*, 39, p. 101122.
- Beneki, C., Gkillas, K. and Papapetrou, E. (2022) "Causality and volatility dynamics in cryptocurrency portfolios," *Journal of Risk Finance*, 23(2), pp. 134–152.
- Benigno, P. (2023) *Inflation dynamics in the era of digital money*. International Monetary Fund WP/23/71..
- Bixuan, L. (2025) "Stability diagnostics in vector autoregression models," *Applied Econometrics Review*, 17(1), pp. 91–110.
- Buthlezi, E.M. (2025) "Cryptocurrency responses to U.S. monetary policy shocks: Evidence on

- price and volatility dynamics," *The American Economist*.
- Budiarso, N. and Pontoh, W. (2023) The contrarians: Are they really the winner?, *The Contrarian : Finance, Accounting, and Business Research*, 2(1), pp. 23–27
- Bouri, E., Gupta, R., Lahiani, A., & Shahbaz, M., 2018. Testing for asymmetric nonlinear short- and long-run relationships between bitcoin, aggregate commodity and gold prices. *Resources Policy*.
- Baur, D.G. and Hoang, L.T. (2021) "A crypto safe haven against Bitcoin," *Finance Research Letters*, 38, p. 101431. Available at: <https://doi.org/10.1016/j.frl.2020.101431>.
- Corbet, S. *et al.* (2024) "Cryptocurrency risk spillovers since COVID-19," *International Review of Financial Analysis*, 88, pp. 102–132.
- Cosimo Magazzino, Tulia Gattone, F.H. (2025) "International Review of Financial Analysis Economic and financial development as determinants of crypto adoption," *International Review of Financial Analysis*, 103(October 2024), p. 104217. Available at: <https://doi.org/10.1016/j.irfa.2025.104217>.
- Baur, D.G. and Hoang, L.T. (2021) "A crypto safe haven against Bitcoin," *Finance Research Letters*, 38, p. 101431. Available at: <https://doi.org/10.1016/j.frl.2020.101431>.
- Corbet, S. *et al.* (2024) "Cryptocurrency risk spillovers since COVID-19," *International Review of Financial Analysis*, 88, pp. 102–132.
- Cosimo Magazzino, Tulia Gattone, F.H. (2025) "International Review of Financial Analysis Economic and financial development as determinants of crypto adoption," *International Review of Financial Analysis*, 103(October 2024), p. 104217. Available at: <https://doi.org/10.1016/j.irfa.2025.104217>.
- Ekawati, D. and Suriaatmadja, T.T. (2024) "Analysis Of Virtual Currency Trading Cryptocurrency As A Transaction Tool In Indonesia," *International Journal Of Innovative Science And Research Technology*, 9(3), Pp. 1–6. Available At: <https://doi.org/10.38124/Ijsrt/IJISRT24MAR502>.
- Jiang, X., Rodríguez Jr., I.M. And Zhang, Q. (2022) "Macroeconomic Fundamentals And Cryptocurrency Prices: A Common Trend Approach," *Financial Management*, 52(1), Pp. 181–198.
- Palupi Lindiasari Samputra, S.Z.P. (2020) "Bitcoin And Blockchain T O Indonesia's Economic Resilience: A Business Intelligence Analysis," *Economics And Policy*, 13(4), Pp. 188–202.
- Purwanto, S. (2025) "The Impact Of Bitcoin On Financial Stability In Indonesia," *Financial Engineering*, 3(28), Pp. 320–332. Available At: <https://doi.org/10.37394/232032.2025.3.28>.
- Rahardja, U. (2023) "The Economic Impact Of Cryptocurrencies In Indonesia," *ADI Journal On Recent Innovation (AJRI)*, 4(2), Pp. 194–200.
- Ramadhani, I. (2022) "Analisis Faktor-Faktor Yang Mempengaruhi Harga Cryptocurrency (Mata Uang Kripto) Di Indonesia: Studi Pada Bitcoin," *Jurnal Ekonomi, Manajemen, Akuntansi*, 2(1), Pp. 46–54.
- Ekawati, D. and Suriaatmadja, T.T. (2024) "Analysis Of Virtual Currency Trading Cryptocurrency As A Transaction Tool In Indonesia," *International Journal Of Innovative Science And Research Technology*, 9(3), Pp. 1–6. Available At: <https://doi.org/10.38124/Ijsrt/IJISRT24MAR502>.
- Chen, Z. (2025) "From disruption to integration: Cryptocurrency prices, financial fluctuations and the macroeconomy," *Journal of Risk and Financial Management*, 18(7), p. 360.
- Cheng, L. and Morales, D. (2025) "Energy market volatility, inflation transmission and digital asset dynamics," *Finance Research Letters*, 68, p. 105002.
- Cheng, S., Li, J. and Zhang, H. (2025) "Money supply shocks and cryptocurrency volatility: Global liquidity transmission," *Finance Research Letters*, 62, p. 104512.
- Ciaian, P., Rajcaniova, M. and Kancs, D. (2018) "Virtual relationships: Short- and long-term evidence from Bitcoin and altcoin markets," *Journal of International Financial Markets, Institutions & Money*, 52, pp. 173–195.
- CoinMarketCap (2023) "Cryptocurrency market data."
- Corbet, S., Goodell, J.W., Gunay, S., *et al.* (2024) "Cryptocurrency risk spillovers since COVID-19," *International Review of Financial Analysis*, 88, pp. 102–132.
- Corbet, S., Goodell, J.W., Katsiampa, P., *et al.* (2024) "Endogenous volatility and weak macroeconomic linkages in emerging cryptocurrency markets," *International Review of Financial Analysis*, 93, p. 103234.
- Dai, Z., Zhang, T. and Wang, Y. (2020) "Do cryptocurrencies hedge global economic uncertainty?," *Finance Research Letters*, 35, p. 101255.
- Dyhrberg, A.H. (2015) "Bitcoin, gold and the dollar: A GARCH volatility analysis," *Finance Research Letters*, 16, pp. 85–92.
- Farid, A., Nugraha, H. and Lim, S. (2024) "Energy price instability and the rise of cryptocurrency investments in emerging markets," *Resources Policy*, 86, p. 104227.
- Fay, P. (2025) *Price dynamics of cryptocurrency and its determinants*. HAL Open Science.
- Foroutan, P., Rezazadeh, M. and Hosseini, S.M. (2024) "Oil market uncertainty and cryptocurrency connectedness," *Financial Innovation*, 10(1), pp. 37–54.

- Franco, P. (2015) *Understanding Bitcoin: Cryptography, engineering and economics*. Chichester: Wiley.
- Fund, I.M. (2023) *World economic outlook: Countering inflation pressures*. Washington, DC: IMF.
- Ghazani, M.M. and Jafari, M.A. (2021) "Market efficiency of cryptocurrencies, gold and WTI crude oil," *Financial Innovation*, 7(29), pp. 1–26.
- Hassan, M. and Wu, L. (2025) "Global monetary shocks and endogenous volatility in cryptocurrency markets," *Economic Modelling*, 136, p. 106387.
- Hossain, M., Khan, S. and Akhter, T. (2025) "Inflation uncertainty and cryptocurrency demand in emerging markets," *Finance Research Letters*, 67, p. 104952.
- Iglesias, M. and Rahman, K. (2025) "The isolation of digital assets from macroeconomic transmission in developing economies," *Emerging Markets Finance and Trade*, 61(3), pp. 411–430.
- Ilgin, K.S. (2024) "Can major cryptocurrencies be used as a portfolio diversifier?," *Ekonomski Vjesnik / Econviews*, 37(1), pp. 91–104.
- Indonesia, B. (2023) *Indonesian economic report*. Jakarta: Bank Indonesia.
- Juhro, S.M. (2021) *Introduction to central banking: Theory and policy*. Jakarta: PT RajaGrafindo Persada.
- Kim, J. and Park, S. (2025) "Liquidity expansion, monetary credibility and cryptocurrency demand," *Finance Research Letters*, 68, p. 104972.
- Kusumastuty, C.A., Wulandari, D. and Narmaditya, B.S. (2019) "Do monetary variables affect cryptocurrency prices? Evidence from Indonesia," *Journal of Economics and Development Studies*, 11(2), pp. 1–12.
- Lakilaki, E. (2025) *The Pandemic and Performance Index Accounting: Reflections on Islamicity in Dual Nation Islamic Banking*, *International Journal of Economics and Management Research*, 4(1), pp. 669–680.
- Lin, D. (2025) "Monetary tightening and crypto-asset volatility," *Global Finance Journal*, 62, pp. 201–219.
- Liu, Q. and Tan, J. (2025) "Gold, inflation and digital assets," *Finance Research Letters*, 68, p. 104994.
- Lütkepohl, H. and Krätzig, M. (2004) *Applied time series econometrics*. Cambridge: Cambridge University Press.
- Lyócsa, Š. (2020) *Bitcoin and safe haven properties: A review of literature and empirical evidence*, *Finance Research Letters*, 35, pp. 101–123.
- Meiryani, M. and Hendriana, A. A. (2024) *Analisis determinan financial reporting timelines di Indonesia pada perusahaan non-keuangan yang terdaftar di Bursa Efek Indonesia*, *Kompartemen: Jurnal Ilmiah Akuntansi*, 22(1), pp. 34–50.
- Narayan, P.K. et al. (2018) "Bitcoin price growth and the Indonesian monetary system," *Emerging Markets Review*, 38, pp. 1–37.
- Pan, Y. and Sun, L. (2025) "Does U.S. monetary policy sway global crypto investment demand?," *Finance Research Letters*, 80, p. 107408.
- Rahim, M., Hassan, F. and Widodo, T. (2024) "Oil prices, inflation and digital asset adoption," *Energy Economics*, 124, p. 107342.
- Rakhmat, A. and Sucipto, E. (2024) *Bagaimana sektor energi mempengaruhi Bitcoin?*, *IKRAITH-EKONOMIKA*, 7(2), pp. 268–272.
- Rehbein-Sathler, A. (2025) *Money as information: Economical and philosophical implications for the quantity theory of money*, *International Journal of Economics and Finance*, 17(2), pp. 99–115.
- Sarkar, S. (2025) "Bitcoin price dynamics," *SSRN Electronic Journal* [Preprint].
- Selmi, R. et al. (2018) "Is Bitcoin a hedge or safe haven for oil price movements?," *Energy Economics*, 74, pp. 1–45.
- Settlements, B. for I. (2025) *Annual economic report 2025*. Basel: BIS.
- Setiawan, G. and Oktavia, T. (2025) Understanding the drivers of millennial adoption of cryptocurrency investment applications in Indonesia. *Journal of Information Systems Engineering and Management*, 10(42s).
- Sukamulja, S. and Sikora, C.O. (2018) *The new era of financial innovation: The determinants of Bitcoin's price*, *Journal of Indonesian Economy and Business*, 33(1), pp. 46–64.
- Ullah, M. (2025) "Risk and return dynamics between digital and conventional financial assets," *Digital Finance* [Preprint].
- Wang, Y. and Li, J. (2025) "Inflation, money supply and the rise of crypto adoption," *Economic Modelling*, 129, p. 106401.
- Yousaf, I. and Yarovaya, L. (2024) "Self-dependence and endogenous risk in cryptocurrency markets," *Journal of Financial Markets*, 72, p. 100948.
- Yudhoyono, A. and Yudha, I. M. (2024) Pengaruh tingkat suku bunga The Fed dan suku bunga Bank Indonesia terhadap portfolio investment di Indonesia, *Jurnal Ilmiah Wahana Pendidikan*, 10(4), pp. 58–70.
- Zhou, H. and Su, C.W. (2024) "Inflation-hedging effectiveness of Bitcoin in emerging and developed markets," *Economic Modelling*, 126, p. 106537.
- Zhu, Y. (2017) *An analysis of Bitcoin's price determinants: Evidence from macroeconomic factors*, *International Journal of Financial Studies*, 5(4), pp. 1–15.
- Zashchypas, S. (2025) *Formation of money supply, taking into account the role of virtual assets*, *Oblik i finansi*, 2(108), pp. 40–49.