

The Mediating Effect of Cryptocurrency Investment on the Association Between Macroeconomic Factors and Economic Growth

Hafinaz Hasniyanti Hassan¹, Vikneswaran Manual²

Asia Pacific University of Technology and Innovation^{1,2}

Email: hafinaz.hasniyanti@apu.edu.my¹

vikneswaran.manual@apu.edu.my²

To Link this Article: <http://dx.doi.org/10.6007/IJARAFMS/v13-i3/19420> DOI:10.6007/IJARAFMS/v13-i3/19420

Published Online: 24 September, 2023

Abstract

The emergence of cryptocurrencies and blockchain technologies has spawned a global phenomenon that extends well beyond the niche enthusiast community. These potent technologies have the potential to revolutionize contemporary economies, generating a great deal of interest and investigation. This study explores the multifaceted connections between cryptocurrencies and macroeconomic variables in five Asian countries. The significant contribution of this study is the introduction of the mediating effect of cryptocurrency investment between macroeconomic indicators and economic growth which is a lack of studies available in the past. By analyzing monthly data from January 2017 to December 2022, the study aims to provide a comprehensive understanding of both short- and long-term correlations between cryptocurrencies and key economic indicators such as the exchange rate, inflation rate, and interest rate proxies.

Keywords: Cryptocurrency, Economic growth, Exchange rate, Inflation, Interest rate

Introduction

Cryptocurrencies are no longer just a phenomenon and researching them is no longer the exclusive domain of a small group of enthusiasts. Blockchain and cryptocurrencies have the potential to revolutionize modern economies, so this study aims to contribute knowledge of such powerful technologies that continue to develop and grow in popularity. Cryptocurrencies are digital currencies that are based on cryptographic concepts. The prices of cryptocurrencies are rising. Blockchain technologies can be used to trade or use centralized virtual or digital tokens. With varying degrees of success, these types of digital currencies aim to improve privacy and anonymity (Said et al., 2018). While privacy is optional with some of these currencies, all transactions are fully disclosed to others. Because they are not backed by the government and instead depend on the activities of investors, who determine the value of the currency through supply and demand, cryptocurrencies are intended not only to

replace fiat currencies but also to complement them (Al-Khazali et al., 2018; Rayhi, 2020; Sam, 2019).

Since Satoshi Nakamoto initially proposed the concept in his white paper in 2008, bitcoin has gained significant attention as a subject of research and discussion. This is due to the global distribution of academics, professionals, and investors. Though it is a young market, it has taken off like wildfire around the world. Bitcoin's market capitalization alone is expected to exceed that of Malaysia's most valuable company (Miraz et al., 2021). Therefore, it becomes crucial to comprehend whether Bitcoin, the first cryptocurrency, is similarly impacted by a nation's economic indicators, just as traditional investment assets like stocks, shares, etc. It's critical for investors, researchers, and policymakers to comprehend that Bitcoin adheres to the same fundamental economic principles as other traded investments (Mara et al., 2016; Yhlas Sovbetov, 2018).

Many studies have been conducted to determine the relationship between macroeconomic factors and share prices (Duy & Hau, 2017; Gopinathan & Durai, 2019; Karagöz et al., 2009; Ligocká et al., 2016; Sindhu et al., 2014). However, few studies have been conducted to determine the relationship with cryptocurrency (Rayhi, 2020 and Mužić and Gržeta, 2022). Furthermore, most of the research focuses only on one country and uses time series data analysis (Mara et al., 2016; Said et al., 2018; Sam, 2019; Yhlas Sovbetov, 2018). Only a few studies have used panel data analysis to examine cointegration relationships between macroeconomic variables (Havidz et al., 2021). There are many macroeconomic variables have been used to find the relationship with cryptocurrency. But this study focuses on the exchange, interest, and inflation rates. There are many reasons why these three variables have been selected specifically in this study.

Cryptocurrencies are based on blockchain, a distributed public ledger that keeps track of all transactions that are updated and held by currency holders. Mining is a process that uses computing power to solve complex mathematical problems that generate coins to create cryptocurrency units. Users can also purchase the currencies from brokers and use cryptographic wallets to store and spend them. There are thousands of cryptocurrencies. Some of the best-known include Bitcoin (founded in 2009), Ripple (found in 2012), Ethereum (developed in 2015), and many more. The dependent variable of this study is the price of the cryptocurrency, which is measured by the average price of Bitcoin, Ethereum, XRP, and Litecoin (Sam, 2019; Ismail and Ali Basah, 2021).

Literature Review

Cryptocurrency has evolved from being a strange product to one of the most contentious topics on TV, social media, and academic forums. Participants were able to make quick gains because there was no regulatory structure in place and the activity was speculative. This story held some truth up until December 15, 2017, when Bitcoin experienced a 50% price decline in less than two weeks. On November 12, 2021, three years later, it reached its pinnacle when one bitcoin was traded for US\$64,400. Investors from all ages, religions, political ideologies, and continents were captivated by this truth. State officials started to become concerned about this market's ongoing growth, but researchers' curiosity was also maintained. The risk-return tradeoff between BTC and other financial products has been a popular subject of study for academics from a variety of fields.

In the past five years, there has been a substantial evolution in the empirical literature on cryptocurrencies, particularly bitcoin (BTC). In their thorough analysis of the existing cryptocurrency research, (Abdul-Majid et al., 2018; Kouhizadeh et al., 2022; Southerton,

2014) explore the categorization of cryptocurrencies as a medium of exchange and speculative instrument. On the other hand, according to Havidz et al. (2021), BTC's limited supply and mining process make it act like money and serve as a store of value. Similar results are reached by (Metawa et al., 2022; Rayhi, 2020), who characterizes Bitcoin as a hedging-capable hybrid asset that straddles the line between a currency and a commodity. According to Al-Khazali et al. (2018), BTC can be used as a hedge against the unpredictability of economic policy, but its effectiveness is constrained by speculative bubbles and price stability issues.

Underpinning theory

According to the quantity theory of money, the level of prices is determined by the supply and demand for money. Kjaerland et al. (2018) emphasized how the forces of supply and demand are the primary drivers determining the price of Bitcoin using this paradigm. Buchholz et al. (2012) emphasized the relationship between macro-financial indicators and Bitcoin prices using the Keynesian theory of speculative demand for money framework. The idea is that consumers engage in currency trading to avoid suffering a loss on their bond and other financial asset investments. A rise in interest rates reduces the value of economic assets, which causes financial assets to lose money when invested (Havidz et al., 2021). The research was expanded upon by García-Monleón et al. (2023) to examine how certain macroeconomic indicators affected the forecasting of the price of bitcoin. He discovered that if Bitcoin is used more for trade, or non-exchange transactions, it will appreciate over time.

Macroeconomic Factors and Cryptocurrency

This part aims to put out a theory that will be tested to respond to the study's research question. The literature on macroeconomics and stock prices that were already covered in the previous part is the foundation for the formulation of the hypothesis. According to Ozyesil (2019), the risk rises as Bitcoin's price becomes more volatile. The higher exchange rate will encourage investors to invest in real money when Bitcoin's price volatility rises. Therefore, bitcoin's revenue does not depend on changes in foreign exchange rates. Thus, bitcoin's value is not affected by exchange rate fluctuations. Meanwhile, Pieters (2016) and Corelli (2018) stated that Bitcoin will be partially affected by fluctuations in the exchange rate. Astuti and Fazira (2018) found that countries can enact temporary capital controls and that there is no permanent Granger causal relationship between unofficial rates and official rates when Bitcoin is used to assess exchange rates. This suggests that the results of the earlier studies were ambiguous.

Recently, Bitcoin's market capitalization surpassed one trillion dollars. Some experts and practitioners have proposed that Bitcoin can serve as a reliable inflation hedge (Auer et al., 2022). A theoretical outline of the interplay between Bitcoin and a more conventional currency that is supplied by a central bank is given by Conlon et al. (2021). The authors demonstrate that Bitcoin can be regarded as a viable, if volatile, medium of a trade by allowing the supply to expand deterministically. Bitcoin can fend off price increases because of its high demand, scarcity, and monetization, which makes it a good candidate for an inflation hedge. Different economists contend that Bitcoin is only a speculative funding that bears no resemblance to conventional financial contraptions, in comparison to the hedging reasons previously made (Blau et al., 2021). The reality that Bitcoin is uncorrelated with a conventional properties like equities, bonds, or commodities, in keeping with Erdas and Caglar (2018), indicates that it's miles on the whole employed as a speculative investment. Furthermore, Conlon et al., (2021) also make the case that Bitcoin is not always a transaction

of foreign money due to a range of things, which includes its high problem degree, loss of intrinsic price, and small transaction extent. Research of both Bitcoin and anticipated inflation appears critical given the divergent views on Bitcoin's capacity as an inflation hedge.

The most fundamental economic relationships covered in international economics suggest that the trend of interest rates and currencies is strongly tied. This is why traders pay close attention to central bank meetings where decisions are made on interest rates and the amount of money in circulation (Tijn & S, 2022). It is common knowledge that interest rates and currencies correlate; recent empirical research has proven this. Fiat currencies, however, are affected by all of this. Given that cryptocurrencies do not adhere to the same regulations as conventional currencies, it is more challenging to grasp the relationship between interest rates and these variables (Atmander, 2021; Auer et al., 2022). In particular, cryptocurrencies would have to react like other safe-haven assets, like gold, after decisions by central banks if the hypothesis that they are a "safe haven" was accurate. Previous studies have established a negative link between investments in bitcoin and interest rates (Mužić & Gržeta, 2022; Yhlas Sovbetov, 2018). Bitcoin is also sometimes utilized as a safe investment strategy during periods of anticipated high inflation, though this is not always the case. Havidz et al. (2021) indicate that Bitcoin is not affected by announcements of a change in the federal funds rate, indicating that when monetary policy tackles high inflation with an increase in interest rates, this will reduce the predicted future inflation and subsequently reduce Bitcoin investments.

Macroeconomic Factors and Economic growth

Exchange rate has a favorable effect on output growth, per a number of research (Biswas et al., 2023; Hunjra et al., 2022; Long et al., 2022). If exchange rate is permitted to function through channels of aggregate supply rather than aggregate demand, output growth would be encouraged. However, exchange rate instability breeds fear and apprehension about investing, which in turn stunts an economy's potential to expand and flourish (Polyzos, 2022). According to Palazzo & Rapetti (2023) and Arsić et al. (2022), one of the key factors affecting the rate of return on investment and capital is the uncertainty brought on by a high and erratic unforeseen inflation. However, even properly predicted inflation may lower the rate of return on investment due to nonneutralities incorporated into the tax systems of the majority of industrialised nations Mensi et al. (2023) and (Hunjra et al., 2022). Furthermore, unstable and excessive inflation erodes foreign investors' faith in the future direction of monetary policy. de Mendonça & Díaz (2023), Čapek et al. (2022), and Pradhan et al. (2015) all point out a poor correlation between interest rates and investment. Foroni et al. (2023), on the other hand, note that the interest rate has little bearing on the choice of investment. They look into the patterns of 21 Muslim emerging nations' investments between 1970 and 2002. Using the fixed effect model, they come to the conclusion that only lagged investment, the growth rate of real GDP per capita, domestic saving, institutional development, and trade openness have a positive impact on investment. Although foreign aid and private sector loans have favourable, considerable effects, the outcomes are not reliable.

Mediating effect of Cryptocurrency

The global community has emphasised the emergence of cryptocurrencies as a problem for future growth. The researchers Chiu & Koepl (2022) and Wolff (2018) agreed that cryptocurrencies would drive future economic expansion. Studies also shown that the growth of cryptocurrencies sparked an increase in greenhouse gas emissions. As a result, this might make it more difficult to achieve the Sustainable Development Goals and Green Deal Policy's

objectives of a decarbonized economy and climate mitigation. The development of blockchain technologies and the transformation of the economy (Chiu & Koepl, 2022), education (Miśkiewicz et al., 2022), and financial market (Le, 2023) were sparked by the industrial revolution, which accelerated economic expansion. Consequently, it sparked the creation of cryptocurrencies. The drop in contractual costs was made possible by digital currency, which also changed the institutional foundation for economic expansion (Conrad, 2005). Ammous (2018) defended the beneficial contribution of cryptocurrencies to economic growth. They also came to the conclusion that the financial market needed appropriate government reregulation. According to the study Sharma et al. (2021), bitcoin had a favourable impact on economic expansion. The steady traditional market was wrecked by the bitcoin market shocks at the same time, which also had an impact on investment choices and decreased macroeconomic indicators. As they can be seen as a medium to support the growth process in developing countries by increasing financial inclusion, providing a better traceability of funds, and helping people to escape poverty (Havidz et al., 2021), cryptocurrencies could offer a significant benefit by overcoming the lack of social trust and by increasing access to financial services (Kouhizadeh et al., 2022).

The following is a summary of the study's hypothesis, as stated by the author in light of earlier research studies:

H1: Exchange rate has a significant impact on cryptocurrency among ASEAN- 5 countries.

H2: Inflation has a significant impact on cryptocurrency among ASEAN- 5 countries.

H3: Interest Rate has a significant impact on cryptocurrency among ASEAN- 5 countries.

H4: Exchange rate has a significant impact on economic growth among ASEAN- 5 countries.

H5: Inflation has a significant impact on economic growth among ASEAN- 5 countries.

H6: Interest Rate has a significant impact on economic growth among ASEAN- 5 countries.

H7: Cryptocurrency investment mediates the relationship macroeconomic factor and economic growth among ASEAN- 5 countries.

Conceptual Model

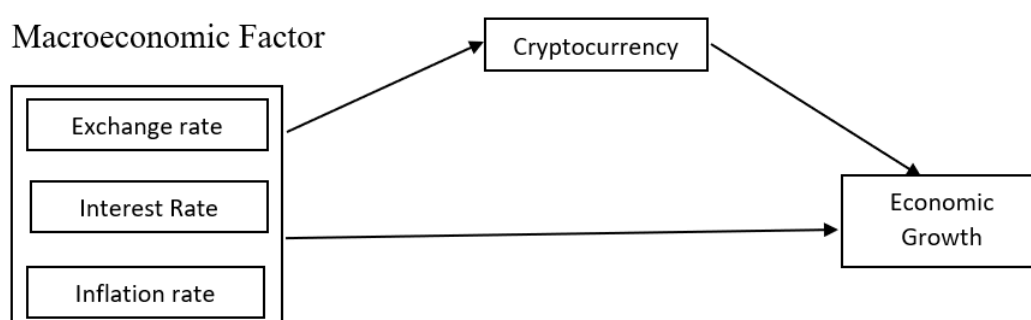


Figure 1:
Conceptual Model

Proposed Methodology

This study aims to better understand the long- and short-term relationships between cryptocurrencies and macroeconomic variables such as the exchange rate, inflation rate, and

interest rate proxies in five Asian countries. To this end, monthly observations of cryptocurrency prices and macro indicators are extracted for the five Asian markets from a variety of trusted sources for the period from January 2017 to December 2022. Bitcoin can be bought and sold on various exchanges and in various currencies (bitcoincharts.com, an aggregated website, provides data from 72 exchanges trading 31 different currencies). We will only look at exchanges in Asia that settle transactions in at least five different currencies in order to conduct a comparable cross-country study. The information will be collected from www.investing.com and <https://data.worldbank.org/>. Augmented Dickey-Fuller, Johansen cointegration analysis, and Granger causality econometric approaches will be used to assess the relationship and direction of causality. This will provide factual evidence of the panel data cointegration and long-run correlation of cryptocurrency with key economic indicators in five Asian countries. The generalized method of moments (GMM) is a statistical method based on a regression analysis that combines observed economic data with information about the moment conditions of the population to produce estimates of the unknown parameters of this economic model. GMM estimators make assumptions about variable moments to determine an objective function that population moment conditions give us. We use the data to calculate the analogous sample moment conditions. In the generalized method of moments (GMM), we have more sample moment conditions than parameters (Wooldridge, 1999). In addition, structural equation modeling (SEM) is used to examine the mediating effect of cryptocurrency investments between macroeconomic factors and economic growth. STATA 18 is used to run the model and regression analysis proposed in this study.

Conclusion

The study suggests a conceptual framework for using the quantity theory of money and Keynesian theory to analyse macroeconomic factors influencing economic growth. A significant contribution to the field of cryptocurrency studies is the mediating effect of cryptocurrency investment. Once the research data has been collected and analysed, the model fit will be confirmed. Fundamentally, it is anticipated that this research will shed light on the dynamic interactions between cryptocurrencies and macroeconomic variables in the context of five Asian countries, contributing valuable insights to the fields of finance, economics, and cryptocurrency studies. The findings may have significant implications for policymakers, investors, and researchers seeking to understand the complexities of cryptocurrency markets and their interplay with broader economic trends.

References

- Abdul-Majid, M., Hons, B., & Econ, M. (2018). *Exploring the Impact and Challenges of Digital Currency: the Literature Review (Funding From The Faculty Of Economics And Management Suzana Muhamad Said Fathin Faizah Said)*. 14–22.
- Al-Khazali, O., Bouri, E., & Roubaud, D. (2018). The impact of positive and negative macroeconomic news surprises: Gold versus Bitcoin. *Economics Bulletin*, 38(1), 373–382.
- Ammous, S. (2018). Can cryptocurrencies fulfil the functions of money? *Quarterly Review of Economics and Finance*, 70(92), 38–51. <https://doi.org/10.1016/j.qref.2018.05.010>
- Arsić, M., Mladenović, Z., & Nojković, A. (2022). Macroeconomic performance of inflation targeting in European and Asian emerging economies. *Journal of Policy Modeling*, 44(3), 675–700. <https://doi.org/10.1016/j.jpolmod.2022.06.002>
- Biswas, R., Li, X., & Piccotti, L. R. (2023). Do macroeconomic variables drive exchange rates independently? *Finance Research Letters*, 52(September 2022), 103524.

- <https://doi.org/10.1016/j.frl.2022.103524>
- Buchholz, M., Delaney, J., Warren, J., & Parker, J. (2012). Bits and bets, information, price volatility, and demand for Bitcoin. *Economics*, 312, 2–48.
- Čapek, J., Crespo Cuaresma, J., Hauzenberger, N., & Reichel, V. (2022). Macroeconomic forecasting in the euro area using predictive combinations of DSGE models. *International Journal of Forecasting*, xxxx. <https://doi.org/10.1016/j.ijforecast.2022.09.002>
- Chiu, J., & Koeppl, T. V. (2022). The economics of cryptocurrency: Bitcoin and beyond. *Canadian Journal of Economics*, 55(4), 1762–1798. <https://doi.org/10.1111/caje.12625>
- Conrad, J. (2005). New opportunities for surprise. *Physica Scripta T*, T121(0), 39–45. <https://doi.org/10.1088/0031-8949/2005/T121/005>
- de Mendonça, H. F., & Díaz, R. R. R. (2023). Can ignorance about the interest rate and macroeconomic surprises affect the stock market return? Evidence from a large emerging economy. *North American Journal of Economics and Finance*, 64(September 2022), 101868. <https://doi.org/10.1016/j.najef.2022.101868>
- Foroni, C., Ravazzolo, F., & Rossini, L. (2023). Are low frequency macroeconomic variables important for high frequency electricity prices? *Economic Modelling*, 120(May 2022), 106160. <https://doi.org/10.1016/j.econmod.2022.106160>
- García-Monleón, F., Erdmann, A., & Arilla, R. (2023). A value-based approach to the adoption of cryptocurrencies. *Journal of Innovation and Knowledge*, 8(2). <https://doi.org/10.1016/j.jik.2023.100342>
- Havidz, S. A. H., Karman, V. E., & Mambua, I. Y. (2021). Is Bitcoin Price Driven by Macro-financial Factors and Liquidity? A Global Consumer Survey Empirical Study. *Organizations and Markets in Emerging Economies*, 12(2), 399–414. <https://doi.org/10.15388/omee.2021.12.62>
- Hunjra, A. I., Azam, M., Bruna, M. G., Verhoeven, P., & Al-Faryan, M. A. S. (2022). Sustainable development: The impact of political risk, macroeconomic policy uncertainty and ethnic conflict. *International Review of Financial Analysis*, 84(April), 102370. <https://doi.org/10.1016/j.irfa.2022.102370>
- Kjaerland, F., Meland, M., Oust, A., & Øyen, V. (2018). International Journal of Economics and Financial Issues How can Bitcoin Price Fluctuations be Explained? *International Journal of Economics and Financial Issues*, 8(3), 323–332. <http://www.econjournals.com>
- Kouhizadeh, M., Zhu, Q., Alkhuzaim, L., & Sarkis, J. (2022). Blockchain Technology and the Circular Economy: An Exploration. *Circular Economy Supply Chains: From Chains to Systems*, 189–213. <https://doi.org/10.1108/978-1-83982-544-620221010>
- Le, P. N. (2023). *The Impact of Cryptocurrencies on the Financial Market*. 16, 85–117. <https://doi.org/10.4018/978-1-6684-8368-8.ch004>
- Long, H., Zaremba, A., Zhou, W., & Bouri, E. (2022). Macroeconomics matter: Leading economic indicators and the cross-section of global stock returns. *Journal of Financial Markets*, 61(April), 100736. <https://doi.org/10.1016/j.finmar.2022.100736>
- Mensi, W., Rehman, M. U., Hammoudeh, S., Vo, X. V., & Kim, W. J. (2023). How macroeconomic factors drive the linkages between inflation and oil markets in global economies? A multiscale analysis. *International Economics*, 173(December 2022), 212–232. <https://doi.org/10.1016/j.inteco.2022.12.003>
- Metawa, N., Dogan, E., & Taskin, D. (2022). Analyzing the nexus of green economy, clean and financial technology. *Economic Analysis and Policy*, 76, 385–396. <https://doi.org/10.1016/j.eap.2022.08.023>
- Miśkiewicz, R., Matan, K., & Karnowski, J. (2022). The Role of Crypto Trading in the Economy,

- Renewable Energy Consumption and Ecological Degradation. *Energies*, 15(10).
<https://doi.org/10.3390/en15103805>
- Palazzo, G., & Rapetti, M. (2023). From macro to micro and macro back: Macroeconomic trade elasticities in a developing economy. *Structural Change and Economic Dynamics*, 65(March), 223–252. <https://doi.org/10.1016/j.strueco.2023.02.015>
- Polyzos, E. (2022). Examining the asymmetric impact of macroeconomic policy in the UAE: Evidence from quartile impulse responses and machine learning. *Journal of Economic Asymmetries*, 26(August), e00267. <https://doi.org/10.1016/j.jeca.2022.e00267>
- Pradhan, R. P., Arvin, M. B., & Ghoshray, A. (2015). The dynamics of economic growth, oil prices, stock market depth, and other macroeconomic variables: Evidence from the G-20 countries. *International Review of Financial Analysis*, 39, 84–95. <https://doi.org/10.1016/j.irfa.2015.03.006>
- Rayhi, N. Al. (2020). *Cryptocurrency Exchange Market Prediction and Analysis Using Data Mining and Artificial Intelligence*. May, 59. <https://bspace.buid.ac.ae/bitstream/handle/1234/1628/2016128088.pdf>
- Sharma, D., Verma, R., & Sam, S. (2021). Adoption of cryptocurrency: an international perspective. *International Journal of Technology Transfer and Commercialisation*, 18(3), 247. <https://doi.org/10.1504/ijttc.2021.118863>
- Southerton, D. (2014). Measuring the Environmental Impact of Consumption. *Encyclopedia of Consumer Culture*, March. <https://doi.org/10.4135/9781412994248.n352>
- Wolff, G. B. (2018). *Maria Demertzis (maria.demertzis@bruegel.org) is Deputy Director of Bruegel*. September. <https://www.bruegel.org/press-releases/maria-demertzis-is-deputy-director-of-bruegel>