

The Significance, Volatility, and Investment Potential of Cryptocurrencies in the Digital Economy

PhDr. Jaroslava Gburová, PhD.*

Univerzita sv. Cyrila a Metoda v Trnave

Inštitút manažmentu

Hajdóczyho 1, 917 01 Trnava

jaroslava.gburova@ucm.sk

Ing. Andrea Vadkertiová, PhD.

Univerzita sv. Cyrila a Metoda v Trnave

Inštitút manažmentu

Hajdóczyho 1, 917 01 Trnava

andrea.vadkertiova@ucm.sk

Ing. Jozef Nemec, PhD.

Prešovská univerzita v Prešove

Fakulta manažmentu, ekonomiky a obchodu

Katedra ekonómie a ekonomiky

Konštantínova 16, 080 01 Prešov

jozef.nemec@unipo.sk

Abstract

In the era of digital technologies, cryptocurrencies have emerged as a significant phenomenon that has fundamentally reshaped traditional perceptions of finance, payment systems, and decentralized technologies. They represent not only an alternative means of payment and a store of value but also an innovative platform supporting technological solutions across various financial domains. Cryptocurrencies are a revolutionary technology with the potential to transform financial markets and the global economy. However, their effective utilization and management require a cautious approach and deep understanding. This paper focuses on analyzing the issue of cryptocurrencies through scientific abstraction, evaluating their key characteristics, and examining the price development of selected cryptocurrencies.

Key words

Cryptocurrencies, Volatility, Bitcoin, Digital Economy, Financial Market.

Information

This work was supported by the Slovak Grant Agency under Grant VEGA No. 1/0432/22 Čo ovplyvňuje volatilitu kryptomien v období pandémie? (What affects the volatility of cryptocurrencies during the pandemic?)

1. Introduction

The rise of digital finance and advancements in information technology have paved the way for transformative innovations like blockchain and cryptocurrencies. Cryptocurrencies, a form of decentralized digital currency, leverage cryptographic protocols to secure transactions and regulate the issuance of new units (Zhang et al. 2020). Since Bitcoin's introduction in 2008 by Nakamoto, the cryptocurrency landscape has expanded rapidly, bringing new financial instruments and opportunities while posing unique challenges (Narayanan et al. 2016). Blockchain technology, the backbone of cryptocurrencies, functions as a distributed ledger, enabling transparency and security across networks (Pilkington 2016). This technology continues to evolve, fostering innovation and solidifying its role in reshaping modern financial systems.

A study by Chang et al. (2019) highlights that cryptocurrencies could fundamentally transform existing monetary frameworks. Similarly, more recent insights suggest that blockchain and cryptocurrency technologies offer both promises and risks across various sectors, including finance (Celestin et al. 2024). These findings emphasize the need for further exploration to ensure cryptocurrencies are integrated into modern financial systems in a manner that fosters innovation while mitigating potential risks. The rapid evolution of these technologies continues to make them a critical subject of interdisciplinary research. Cryptocurrencies have undergone rapid growth, emerging as popular assets in global financial markets (Białkowski 2020; Fang et al., 2021). They have garnered significant attention from the media, individual and institutional investors, as well as regulators, establishing themselves as a prominent and timely subject across various fields of academic research (Angerer et al. 2020; Almeida, Gonçalves 2023).

However, one of the key characteristics of cryptocurrencies is their high volatility. The prices of digital currencies can fluctuate dramatically over short periods, which can be both an opportunity and a risk for investors. Factors such as market demand, investor sentiment, regulatory changes, and technological developments heavily influence these price swings. This volatility is particularly noticeable during market cycles, where periods of rapid growth are often followed by sharp corrections. Despite this, the volatility of cryptocurrencies has contributed to their appeal as speculative investments, attracting both institutional and retail investors looking for high returns. However, it also underscores the need for careful risk management and a thorough understanding of the market dynamics involved.

The volatility of cryptocurrencies is one of the key factors that characterizes this market and significantly impacts the behavior of investors and traders. The prices of cryptocurrencies, such as Bitcoin, Ethereum, or other altcoins, can experience dramatic fluctuations in a very short period, which is uncommon for traditional financial assets. This volatility is driven by various factors, including high demand and speculation from both retail and institutional investors, political and regulatory decisions, technological advancements, as well as macroeconomic factors such as inflation, interest rates, or global economic crises.

Two distinct perspectives have emerged in the effort to understand the interrelationship and volatility spillover among cryptocurrencies. The first perspective highlights the crypto market's alignment with the characteristics of an efficient market. Research by Stavroyiannis (2018) and Baur and Dimpfl (2018) identified the presence of a leverage effect in Bitcoin, while Dutta and Bouri (2022) found significant time-varying jumps in Bitcoin prices. Conversely, the second perspective argues that crypto markets are inherently

inefficient. Fry and Cheah (2016) analyzed the formation of bubbles within the crypto market, concluding that it exhibits speculative behavior and is highly volatile (Gupta, Chaudhary, 2022).

2. Characteristics and Key Aspects of Cryptocurrencies

Cryptocurrencies represent a peer-to-peer version of electronic cash, meaning that in online transactions, funds are transferred directly between the participating parties without the need for intermediaries such as financial institutions. This decentralization is one of the key characteristics of cryptocurrencies, allowing them to operate independently of traditional banking systems (Chuen 2015). One of the most significant advantages of cryptocurrencies is their encryption and protection through cryptographic technologies. This feature enhances transaction security and makes cryptocurrencies highly resistant to counterfeiting. Unlike traditional fiat currencies, cryptocurrencies are not issued by any central authority or government, theoretically safeguarding them from governmental interventions, regulation, or manipulation (The Investopedia Team 2024). Moreover, the decentralized nature of cryptocurrencies means their operation relies on a distributed network of nodes that collaborate to verify and record transactions in a publicly accessible blockchain. This enhances their transparency and trustworthiness, making them appealing not only as a means of payment but also as an investment tool.

Cryptocurrencies offer a range of advantages, which contribute to their growing popularity not only as a means of payment but also as an investment tool. They provide investors with the opportunity to diversify their portfolios. The cryptocurrency market, like other markets, is a place where the demand from scarce entities meets the supply from abundant ones. Specifically, it is a digital environment where one cryptocurrency unit can be exchanged for another cryptocurrency or fiat currency. Although the first cryptocurrency was created in 2009, the cryptocurrency market experienced its most significant growth in 2021. Prices began rising at the end of 2020, and in January 2021, the market capitalization of the global cryptocurrency market surpassed the \$1 trillion mark for the first time. The rest of the first quarter of 2021 saw an upward trend, with the market value exceeding \$2 trillion in May, and in November, the capitalization reached nearly \$3 trillion. In the following year, the value of most cryptocurrencies declined. In 2023, cryptocurrency values slightly increased, but this year has seen another significant rise in prices. Currently, the global market capitalization of cryptocurrencies is approximately €1.94 trillion. (CoinMarketCap 2024). The price of cryptocurrencies can be influenced by various factors, each having a different significance. Some factors are unique to specific cryptocurrencies, while others can affect the entire cryptocurrency sector. At present, there are a large number of different cryptocurrencies in the market, many of which continue to emerge and disappear. However, Bitcoin has the largest market capitalization of all cryptocurrencies, constantly maintaining its position as the "leader of cryptocurrencies." It is followed by Ethereum, and together they account for over 70% of the cryptocurrency market. Then come stablecoins, whose ranking constantly fluctuates. Cryptocurrencies are divided into Bitcoin and alternative cryptocurrencies, as well as into coins and tokens. A token does not have its own network and uses one of the platforms specifically created for this purpose.

Recent studies further emphasize that the environmental impact of cryptocurrencies, particularly Bitcoin, is a growing concern. Bitcoin's energy-intensive proof-of-work consensus mechanism has raised questions about its sustainability. Innovations in blockchain technology, such as proof-of-stake, aim to address these issues by significantly reducing energy consumption (De Vries 2022).

3. Price Development of Selected Cryptocurrencies

The price development of cryptocurrencies has become a prominent topic in recent years, drawing attention from investors, financial analysts, and policymakers alike. Cryptocurrencies, such as Bitcoin, Ethereum, and others, have experienced remarkable growth, with significant fluctuations in their value. These digital assets operate in a decentralized environment and are subject to various factors, including market demand, technological advancements, regulatory changes, and global economic conditions. As a result, the price movements of cryptocurrencies can be highly volatile, presenting both opportunities and risks for those involved. The evolving nature of the cryptocurrency market makes it a dynamic and complex area of study, with its developments continuing to shape the future of finance and investment.

The price of cryptocurrencies is heavily influenced by the level of investment from both retail and institutional investors. Retail investors may buy and sell their coins for various reasons, ranging from technical signals and rewards to the hype generated on social media. Recently, institutional investors have also begun investing in major cryptocurrencies. As Bitcoin was the first cryptocurrency and maintains a dominant position in the market, its price movements significantly affect the value of other cryptocurrencies. The most significant bullish trends in Bitcoin's history have typically occurred during the coin's halving events. A halving is an event in which the reward for mining a block is reduced by half. This process takes place approximately every four years, and many other cryptocurrencies tend to follow a similar pattern (Trader 2.0 2024). The most recent Bitcoin halving took place on April 19, 2024, and it is expected that the prices of both Bitcoin and Ethereum will rise significantly in the near future. However, it is important to consider various factors that contribute to the high volatility of cryptocurrencies.

Bitcoin has a fixed maximum supply, which makes it resistant to inflation that often affects fiat currencies. This characteristic suggests that, in the long term, Bitcoin could potentially outperform traditional currencies (Cafferra et al. 2021). However, its price frequently fluctuates in response to broader economic conditions. For example, in 2020, Bitcoin saw significant gains while many national economies were paralyzed by the COVID-19 pandemic, and governments were printing large quantities of fiat money. Bitcoin's price is also influenced by other factors, such as technological advancements and news related to cryptocurrency projects. One key factor that shapes Bitcoin's value is events known as halving. These scheduled events, which occur every four years, reduce the mining reward by half, historically leading to a temporary increase in Bitcoin's price. Another important element contributing to Bitcoin's value growth is its acceptance by large investors. In 2020 and 2021, companies like MicroStrategy, Square, and Tesla made headlines with their significant Bitcoin purchases. A substantial portion of the total Bitcoin supply is now held by both public and private companies, as well as funds similar to ETFs. These institutional investments not only reduce the available supply on the market but also increase confidence in Bitcoin, attracting more retail investors and further influencing its price (Kriptomat 2024).

As cryptocurrencies gain prominence, there is growing recognition of their role in reshaping global payment systems and investment landscapes. Studies suggest that their adoption is increasingly linked to advancements in financial infrastructure, such as the development of decentralized finance (DeFi) platforms. These platforms leverage blockchain technology to enable lending, borrowing, and trading without intermediaries, further solidifying cryptocurrencies' relevance in modern finance (Abdulhakeem, Hu 2021).



Chart 1: Distribution of cryptocurrencies by percentage size of market capitalization over time
 Source: <https://coinmarketcap.com>

History shows that the value of Bitcoin goes through recurring cycles. After periods of minimal price changes, there is a dramatic surge followed by a correction that erases a significant portion of the sudden gains. This is typically followed by a relatively rapid recovery, stabilizing at a new, more consistent price. It is evident that, in the long run, Bitcoin outperforms the stock market and major commodities, with its value consistently rising. Although Bitcoin's price has not yet reached its all-time high, it remains relatively high, with 94% of all Bitcoin holders currently in profit (Lubale 2024). When comparing Bitcoin to Ethereum, similar patterns of price growth and decline can be observed during certain periods. However, Ethereum is not just a cryptocurrency; it is also an open-source platform based on blockchain technology that is resistant to unauthorized interference. It is the second-largest cryptocurrency platform by market capitalization. Ethereum was created by Canadian programmer of Russian descent, Vitalik Buterin, who introduced the concept in late 2013 (Buterin 2014), with the network officially launching in 2015. Although Ethereum can be traded on exchanges and used as a payment method, unlike Bitcoin, it is primarily a platform for decentralized applications rather than a typical digital currency (Kriptomat 2024).



Graph 2: Ethereum price development since its launch
 Source: Kriptomat, 2024

4. Conclusion

Given the historical development and dynamics of the cryptocurrency market, it is evident that both Bitcoin and Ethereum have undergone significant cycles of price growth and decline. Bitcoin, as the first cryptocurrency, has demonstrated its ability to withstand inflation, with its value consistently rising,

© Published by Journal of Global Science.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. The moral rights of the named author(s) have been asserted.

outperforming traditional financial instruments such as stocks and commodities. Despite the periodic corrections and volatility characteristic of this market, Bitcoin remains a safe haven for long-term investors, which is reflected in the growing interest from both institutional and retail investors. Similarly, Ethereum, although primarily a platform for decentralized applications, has established a strong market position, and its price movements show patterns similar to Bitcoin. These two cryptocurrencies, along with other projects, are key players in a market still facing challenges in terms of volatility and regulation. Nevertheless, it is clear that cryptocurrencies have become an integral part of the modern financial ecosystem, and their long-term potential continues to attract the attention and interest of global investors.

List of bibliographic references

1. Abdulhakeem, S. A., Hu, Q. 2021. Powered by Blockchain technology, DeFi (Decentralized Finance) strives to increase financial inclusion of the unbanked by reshaping the world financial system. *Modern Economy*, 12(01), 1.
2. Almeida, J., Gonçalves, T. C. 2023. A systematic literature review of investor behavior in the cryptocurrency markets. *Journal of Behavioral and Experimental Finance*, 37, 100785.
3. Angerer, M., Hoffmann, C. H., Neitzert, F., & Kraus, S. 2021. Objective and subjective risks of investing into cryptocurrencies. *Finance Research Letters*, 40, 101737.
4. Baur, D. G., Dimpfl, T. (2018). Asymmetric volatility in cryptocurrencies. *Economics Letters*, 173, 148-151.
5. Białkowski, J. 2020. Cryptocurrencies in institutional investors' portfolios: Evidence from industry stop-loss rules. *Economics Letters*, 191, 108834.
6. Buterin, V. 2014. A next-generation smart contract and decentralized application platform. *white paper*, 3(37), 2-1.
7. Caferra, R., Tedeschi, G., & Morone, A. 2021. Bitcoin: Bubble that bursts or Gold that glitters?. *Economics Letters*, 205, 109942.
8. Celestin, M., Sujatha, S., Kumar, A. D., & Vasuki, M. 2024. Exploring blockchain's potential in supply chains, finance, and data security: Opportunities and challenges in business. *International Journal of Current Research and Modern Education*, 9(2), 33-42.
9. CoinMarketCap. 2024. Dominancia Bitcoinu. [online]. Dostupné z: <https://coinmarketcap.com/sk/charts/>
10. CoinMarketCap. 2024. Live svetových kryptomenových grafov a údajov o trhu. [online]. Dostupné z: <https://coinmarketcap.com/sk/charts/>
11. CoinMarketCap. 2024. Trhy: Bitcoin. [online]. Dostupné z: <https://coinmarketcap.com/sk/charts/>
12. De Vries, A., Gallersdörfer, U., Klaaßen, L., & Stoll, C. 2022. Revisiting Bitcoin's carbon footprint. *Joule*, 6(3), 498-502.
13. Dutta, A., Bouri, E. 2022. Outliers and time-varying jumps in the cryptocurrency markets. *Journal of Risk and Financial Management*, 15(3), 128.
14. Fang, F., Chung, W., Ventre, C., Basios, M., Kanthan, L., Li, L., & Wu, F. 2024. Ascertaining price formation in cryptocurrency markets with machine learning. *The European Journal of Finance*, 30(1), 78-100.
15. Fry, J., Cheah, E. T. 2016. Negative bubbles and shocks in cryptocurrency markets. *International Review of Financial Analysis*, 47, 343-352.
16. Gupta, H., Chaudhary, R. 2022. An empirical study of volatility in cryptocurrency market. *Journal of Risk and Financial Management*, 15(11), 513.

© Published by Journal of Global Science.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. The moral rights of the named author(s) have been asserted.

17. Chang, V., Baudier, P., Zhang, H., Xu, Q., Zhang, J., & Arami, M. 2020. How Blockchain can impact financial services—The overview, challenges and recommendations from expert interviewees. *Technological forecasting and social change*, 158, 120166.
18. Chuen, L. K. 2015. *Handbook of digital currency: Bitcoin, innovation, financial instruments, and big data* (No. 147850). Academic
19. Kriptomat. 2024. Bitcoin Kurz BTC. [online]. Dostupné z: <https://kriptomat.io/sk/kurzy-kryptomien/bitcoin-btc-kurz/>
20. Kriptomat. 2024. História ceny Bitcoinu. [online]. Dostupné z: <https://kriptomat.io/sk/kurzy-kryptomien/bitcoin-btc-kurz/>
21. Kriptomat. 2024. Prehľad ceny Bitcoin. [online]. Dostupné z: <https://kriptomat.io/sk/kurzy-kryptomien/bitcoin-btc-kurz/>
22. Lubale, N. (20254). 94% of all Bitcoin in profit hints that \$69K BTC price was a local top. [online]. Dostupné z: <https://coingecko.com/news/94-bitcoin-supply-in-profit-69k-btc-price-local-top>
23. Nakamoto, S. 2008. Bitcoin: A peer-to-peer electronic cash system. *Satoshi Nakamoto*.
24. Narayanan, A. 2016. *Bitcoin and cryptocurrency technologies: a comprehensive introduction*. Princeton University Press.
25. Narayanan, A., Bonneau, J., Felten, E., Miller, A., & Goldfeder, S. 2017. Bitcoin and cryptocurrency technologies: a comprehensive introduction.
26. Pilkington, M. 2016. Blockchain technology: principles and applications. In *Research handbook on digital transformations* (pp. 225-253). Edward Elgar Publishing.
27. Stavroyiannis, S. 2018. A note on the Nelson-Cao inequality constraints in the GJR-GARCH model: is there a leverage effect?. *International Journal of Economics and Business Research*, 16(4), 442-452.
28. The Investopedia Team. (2024). Satoshi in Bitcoin: What It Is and How Much It Is Worth. [online]. Dostupné z: <https://www.investopedia.com/terms/s/satoshi.asp>
29. Trader 2.0. (2024). Halving Bitcoinu: Tu je všetko, čo o ňom potrebujete vedieť. [online]. Dostupné z: <https://kryptomagazin.sk/halving-bitcoinu-tu-je-vsetko-co-o-nom-potrebujete-vediet/>
30. Zhang, R., Xue, R., & Liu, L. 2019. Security and privacy on blockchain. *ACM Computing Surveys (CSUR)*, 52(3), 1-34.