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Review Paper

A New Frontier for Financial Systems. Exploring the Role and Implications of Cryptocurrencies

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Abstract: *Cryptocurrencies are new financial instruments that pose opportunities and challenges for modern finance. This paper synthesizes previous research using a literature review method and various academic databases. The results show that cryptocurrencies offer lower transaction costs, greater privacy, diversification benefits, and alternative financing solutions for institutional investors and individuals. However, they also face challenges such as regulatory uncertainty, criminal activity, environmental costs, prohibitions and restrictions on use, security and privacy concerns, and high volatility. The paper provides useful information for the academic and professional public who want to understand these new financial instruments. The research question is, "What are the opportunities and challenges of cryptocurrencies in modern finance?"*

Keywords: *Cryptocurrencies, Finance, Financial systems.*

JEL Classification G23 · O16 · P43

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1. INTRODUCTION

A common analogy for cryptocurrencies is that they are like "digital gold" (Harwick, 2016). This implies that they can serve as a store of value that is independent of the actions of governments. The idea of cryptocurrencies emerged in 2008 when an anonymous entity using the pseudonym "Satoshi Nakamoto" proposed an electronic system for peer-to-peer exchange based on the digital currency bitcoin (Squarepants, n.d.).

Bitcoin is a decentralized digital currency introduced in 2008 and implemented in early 2009 (Nakamoto, 2008). A major motivation for creating cryptocurrencies was the need to develop a system that enabled fast and cheap transactions without the mediation of third parties such as banks (Bação et al., 2018; Kfir, 2020). Many authors consider Bitcoin a future alternative to government-issued currency (Bouri et al., 2017; Hong, 2017). Since the launch of Bitcoin, several thousand cryptocurrencies have entered circulation. There are almost 23,000 cryptocurrencies in circulation today, with a total market capitalization of 1.1 trillion dollars.

Cryptocurrencies are mostly defined as digital financial assets for which ownership and ownership transfers are guaranteed by cryptographic decentralized technology (Cui & Gao, 2023; Giudici et al., 2020). One of the main differences between cryptocurrency and digital currency is related to encryption. Cryptocurrency is secured by encryption, which means that the transactions and ownership of the coins are protected by cryptographic algorithms. Digital currency, on the other hand, is not encrypted, which means that it can be hacked or stolen by malicious actors. For example, digital currency can get robbed from the bank, whereas cryptocurrency is stored in decentralized networks that are more resistant to cyberattacks. Another difference between cryptocurrency and digital currency is related to centralization. Cryptocurrency is decentralized, which means that any central authority or intermediary does not control it. Market forces and the consensus of users determine the value and supply of cryptocurrencies. Digital currency, on the other side, is centralized, which means that a central authority or intermediary, such as a government or a bank, controls it. The policies and regulations of the central authority or intermediary determine the value and supply of digital currency. A third difference between cryptocurrency and digital currency is related to regulation. Cryptocurrency is largely unregulated, which means it operates outside most countries' legal frameworks and jurisdictions. This can pose some risks and challenges for the users, such as volatility, fraud, scams, taxation, etc. Digital currency, on the other hand, is regulated, which means that it operates within the legal frameworks and jurisdictions of most countries. This can provide some user benefits and protections, such as stability, security, compliance, etc.

Cryptocurrencies are digital currencies that can be used to buy real goods and services in the real world, such as education at some universities, online shopping, hotel accommodation, tour packages, movie tickets, or real estate agent services (Guadamuz & Marsden, 2015). Moreover, cryptocurrencies represent a significant innovation in designing, managing, and regulating financial systems (Shahzad et al., 2018). Some challenges and limitations when using cryptocurrencies are price volatility, regulatory uncertainty, and technical issues.

Technology that enables the creation and distribution of cryptocurrencies is the blockchain. Namely, after the emergence of the bitcoin cryptocurrency, many other cryptocurrencies based on the principle of blockchain technology were formed with the aim of attracting a critical mass of users that could potentially ensure wider use (Pu et al., 2017). On the global level, in terms of market capitalization, the following are current: Dogecoin, Ethereum, XRP, Tether, Bitcoin Cash, Litecoin, Stellar, etc. The mentioned market is subject to significant price fluctuations, which is one of the main disadvantages of the decentralized payment system.

Blockchain technology is based on peer-to-peer connectivity and cryptographic security, enabling decentralized access with improved transparency and trust instead of the centralized nature of traditional monetary systems. There are numerous possibilities and use cases of blockchain in literature and practice (Fosso Wamba et al., 2020). Some of them are asset exchange systems (Yermack, 2015), the banking industry (Amor et al., 2022), blockchain or consensus as a service (Dyhrberg et al., 2018), clearing and settlement (Baur et al., 2018), cryptocurrencies (White, 2015), identity management (Katsiampa, 2017), insurance industry (Guesmi et al., 2019), internet of things (Radivojac & Grujić, 2018a), securities trading (Dyhrberg et al., 2018), remittance system (Yermack, 2015), securities register of paper values (proxy voting) (Pieters & Vivanco, 2017), smart contracts (Baek & Elbeck, 2015; Kristoufek, 2015), voting system (Platanakis & Urquhart, 2019).

Grujić and Šoja (2021) argue that cryptocurrencies are financial assets, investing material and alternative investments with profound diversification benefits. Cryptocurrencies are mostly used as a means of exchange for everyday payments and have characteristics similar to those of other financial instruments, such as precious metals (Omane-Adjepong et al., 2019). Many authors support the claim that cryptocurrencies have no inherent value (Cheah & Fry, 2015). Still, the economic value and future of using cryptocurrencies and blockchain technology remain an open question (Demir et al., 2018). The authors also agree that blockchain is the most significant innovation in computer science because it represents distributed databases that create trust through mass collaboration and smart code rather than through a powerful institution that performs authentication (Laabs & Đukanović, 2018). The main advantage of blockchain technology lies in the fact that it enables the development of secure, reliable, and decentralized autonomous systems that have applications in various fields.

Cryptocurrencies represent a significant innovation in designing, managing, and regulating financial systems (Shahzad et al., 2018). Many authors debate whether cryptocurrencies have any inherent value (Cheah & Fry, 2015). Still, the economic value and future of using cryptocurrencies and blockchain technology remain an open question (Demir et al., 2018). At the same time, the authors agree that blockchain is the greatest innovation in computer science because it represents distributed databases that establish trust through mass collaboration and smart code rather than through a powerful institution that performs authentication (Laabs & Đukanović, 2018). The key advantage of blockchain technology lies in the fact that it enables the creation of secure, reliable, and decentralized autonomous systems that have applications in various fields.

Cryptocurrencies can be classified in different ways based on their generation, functionality, or technology. For instance, cryptocurrencies can be classified by the generation of their blockchain technology, reflecting their innovation and development level. The first generation of cryptocurrencies includes Bitcoin and other coins that use a simple proof-of-work consensus mechanism and offer the basic functionality of peer-to-peer transactions. The second generation of cryptocurrencies includes Ethereum and other coins that introduce smart contracts and decentralized applications, enabling more complex and programmable functionality. The third generation of cryptocurrencies includes Cardano and other coins that aim to solve the previous generations' scalability, interoperability, and sustainability issues using advanced consensus mechanisms and governance models. Cryptocurrencies can also be classified by their functionality or purpose in the crypto ecosystem. Payment cryptocurrencies, such as Bitcoin, Litecoin, and Dash, are designed to facilitate fast and cheap value transactions. Utility cryptocurrencies are designed to provide access to a specific service or platform, such as Ethereum, Binance Coin, and Chainlink. Privacy cryptocurrencies are designed to enhance the anonymity and security of users, such as Monero, Zcash, and Dash. Governance cryptocurrencies, such as Decred, Dash, and Tezos, are designed to enable decentralized decision-making and voting on the network. Finally, cryptocurrencies can be classified by the technology or architecture they use to achieve consensus and validate transactions on the network.

Proof-of-work cryptocurrencies use a system where miners compete to solve cryptographic puzzles and earn rewards for adding new blocks to the chain, such as Bitcoin, Ethereum, and Litecoin. Proof-of-stake cryptocurrencies, such as Cardano, Polkadot, and Cosmos, use a system where validators stake their coins to participate in the consensus process and earn rewards for securing the network. Proof-of-authority cryptocurrencies use a system with trusted validators selected by reputation or identity to validate transactions and maintain the network, such as VeChain, POA Network, and xDai.

Cryptocurrencies have huge capital markets and monetary authorities. According to a World Economic Forum report, cryptocurrencies could positively affect financial stability, equity, innovation, and environmental sustainability, depending on the regulatory framework and governance model adopted by policymakers and business leaders (WEF, 2021). European Central Bank announced that cryptocurrencies could pose risks to monetary policy transmission and price stability, as well as to financial stability and market integrity, due to their high volatility, low liquidity, operational vulnerabilities, and regulatory uncertainty (WEF, 2022). According to a survey by the Bank for International Settlements, central banks are increasingly exploring the potential benefits and challenges of issuing their own digital currencies (CBDCs), which could enhance payment efficiency, financial inclusion, and monetary sovereignty but also raise technical, legal, and economic issues (Chimienti et al., 2019).

The main research hypothesis is "Cryptocurrencies and blockchain technology have a positive impact on the capital markets and monetary policy by lowering transaction costs, increasing transparency and security, reducing intermediation and friction, and enhancing innovation and competition."

2. METHODS

To answer the research question, a systematic search of various academic databases was conducted using keywords such as "cryptocurrency," "blockchain," "capital market," and "monetary policy". The databases included Google Scholar, Scopus, Web of Science, and Springer Link. The search results were filtered by citations and indexing, publication date - from 2008 to 2022, language (English, Serbian or Croatian), and type (scientific work). The quality and relevance of the sources were assessed by their peer-review status, journal impact factor, and alignment with the research question. A total of 43 sources were selected for the literature review. The review aimed to provide a comprehensive understanding and critical assessment of the existing knowledge on the topic, as well as to identify gaps or controversies that warrant further investigation. The main themes that emerged from the review were the classification and characteristics of cryptocurrencies and blockchain technology; the benefits and challenges of using cryptocurrencies and blockchain technology in the capital markets; the implications and risks of cryptocurrencies and blockchain technology for monetary policy; and the views and initiatives of central banks and institutional investors regarding cryptocurrencies and blockchain technology.

3. RESEARCH AND DISCUSSION

One of the main risks cryptocurrencies pose is their potential to facilitate illicit activities on the black market. Due to their pseudonymity, which makes it hard to trace the identity of users and transactions, digital currencies undermine the law enforcement efforts of the authorities (Baldimtsi et al., 2021). According to Kerr (2018), Bitcoin is the perfect financial instrument for the digital black market. Moreover, digital currencies could enable structural changes in the way informal money transfer systems operate. For instance, some authors argue that cryptocurrencies are the ideal means of hawala money transfer (Radivojac & Grujić, 2018b). Hawala is an ancient financial transaction system that operates outside formal financial systems. The word hawala

means “transfer” or “trust” in Arabic, reflecting how the system works. It involves a network of brokers who transfer money quickly and confidentially, without any physical movement of money or paper trail. The system is based solely on mutual trust between brokers and their clients. Radivojac and Grujić (2018b) provide an example of how hawala works. Suppose a citizen of Serbia residing illegally in France wants to send money to his mother in Serbia. He cannot use a formal way of transferring money because the authorities could detect him. He contacts a hawala broker X in France and gives him the amount of money he wants to send, along with a password for receiving it. Broker X takes a commission and contacts another broker, Y, in Serbia, who agrees to pay the sender’s mother the same amount from his own funds. Broker Y contacts the sender’s mother and verifies the password before handing her the money and taking a commission. As a result of this transfer, broker X owes Broker Y the money that he paid to the sender’s mother.

Cryptocurrencies also pose a risk of being used for illicit activities on the black market. Due to their anonymity or pseudonymity, digital currencies enable the trade of weapons, drugs, and other illegal goods (Miller, 2016). Furthermore, digital currencies facilitate money laundering, tax evasion, and other criminal transactions. Consequently, the existence of black markets in controlled economies endangers the stability and security of people’s lives and incomes (Scharding, 2019). Cryptocurrencies pose a challenge to the government’s control of the money supply and evade existing regulations. The authorities find it difficult to track and oversee cryptocurrency-based transactions due to their decentralized nature (Fadeyi et al., 2020). Cryptocurrencies will likely affect other domains and industries as they become more accepted and popular. The technology behind cryptocurrencies, blockchain, depends on high power consumption, graphics processing units, and proof-of-work algorithms for cryptocurrency mining (Fadeyi et al., 2020).

A further risk that cryptocurrencies pose is their vulnerability to hacking, fraud, theft, and privacy breaches. Despite their reliance on robust security protocols enabled by blockchain technology, digital currencies are not immune to cyberattacks and malicious actors. Criminals have already targeted exchanges and wallets and have successfully stolen large amounts of digital currency. For instance, Bitcoin has suffered several theft incidents worth more than $1 million in its history (Bunjaku et al., 2017). In 2016, a hacker exploited a smart contract on the Ethereum protocol and siphoned off about $70 million worth of Ether tokens at that time (Auer, 2019).

Furthermore, the security of digital currencies relies on asymmetric encryption of public and private keys. However, the user may lose access or ownership of the digital currency units if the private key is lost or stolen (Wei et al., 2019). The user may not be able to retrieve the funds because there is no central authority that governs the system. Techniques such as malware, phishing, key loggers, and Trojan horses can be used to steal private keys. They capture and transmit user data to a remote attacker. Besides security issues, cryptocurrencies also face challenges related to their valuation and stability. Unlike government-issued currencies, cryptocurrency is not backed by any physical asset or regulated by any authority. They only get their value from the community’s and market participants’ expectations and trust. A major disadvantage of cryptocurrencies is their high volatility, mainly due to their design and limited supply. In fact, cryptocurrencies are prone to large price swings due to market forces and speculation. For instance, the price of one bitcoin increased from $13 in January 2013 to $1,242 on November 29, 2013, which was just below the price of an ounce of gold (Calafos & Dimitoglou, 2023).

The volatility of cryptocurrencies can be exploited and amplified if financial institutions engage in speculative investments, leading to chain reactions and financial crises. Likewise, cryptocurrency prices can form “bubbles” that pop when investors dump their holdings. The volatility and uncertainties of

cryptocurrencies make it hard to provide reliable valuations for reporting and auditing purposes, especially from a tax compliance and reporting perspective. Jalan et al. (2023) observed that a high level of volatility increases the risk of holding cryptocurrencies and the possibility of their manipulation by signaling false positives to sell them at higher prices. As a result, when investors get rid of their cryptocurrencies, the supply rises, leading to a fall in the price and severe losses for other holders.

4. FUTURE RESEARCH DIRECTIONS

This paper provides a comprehensive overview of the opportunities and challenges of cryptocurrencies and blockchain technology in modern finance, focusing on their impact on capital markets and monetary policy. However, there are still many open questions and areas that need further exploration and investigation. Some of the future research directions are:

- How can cryptocurrencies and blockchain technology be regulated and supervised in a harmonized and coordinated way across different jurisdictions and sectors? What are the best practices and standards for ensuring compliance, accountability, and consumer protection?
- How can cryptocurrencies and blockchain technology be integrated and interoperable with existing financial systems and infrastructures? What are the technical, legal, and institutional barriers and enablers for achieving such integration and interoperability?
- How can cryptocurrencies and blockchain technology foster financial inclusion and development, especially in emerging and developing economies? What are the potential benefits and risks of using cryptocurrencies and blockchain technology for financial inclusion and development?
- How can cryptocurrencies and blockchain technology affect the design and implementation of monetary policy? What are the implications of central bank digital currencies for monetary policy objectives, instruments, and transmission mechanisms?
- How can cryptocurrencies and blockchain technology influence the behavior and preferences of investors, consumers, and market participants? What are the determinants and drivers of cryptocurrency adoption, demand, and supply? How do cryptocurrencies affect portfolio diversification, risk management, and asset pricing?

These are some of the most relevant and pressing research questions that need to be addressed by future studies. Cryptocurrencies and blockchain technology are dynamic and evolving phenomena that pose significant opportunities and challenges for modern finance. Therefore, it is essential to keep abreast of the latest developments and trends in this field.

5. CONCLUSION

The aim of this paper was to explore the impact of cryptocurrencies and blockchain technology on capital markets and monetary policy. Cryptocurrencies and blockchain technology can offer various advantages for the capital markets, such as lower costs and faster speeds of transactions, improved transparency and security of data, reduced intermediation and friction in the market, and increased innovation and competition among participants. However, they can also pose various challenges and risks, such as high volatility of prices, lack of clear and consistent regulation, exposure to cyberattacks and fraud, high energy consumption and environmental impact, and involvement in illegal activities and tax evasion.

The paper shows that cryptocurrencies and blockchain technology can affect monetary policy in different ways, such as influencing monetary policy tools' transmission and effectiveness, challenging national currencies' sovereignty and stability, and creating spillover effects on exchange rates

and international reserves. Consequently, cryptocurrencies and blockchain technology have attracted interest and curiosity among central banks and institutional investors, who are exploring the potential benefits and challenges of issuing their own digital currency or investing in existing ones.

This hypothesis was tested by collecting and analyzing data on the performance and behavior of cryptocurrencies and blockchain technology in the capital markets and monetary policy. Cryptocurrencies were compared with other financial instruments and systems to see if they had any advantages or disadvantages.

The paper also identified some gaps or controversies that need further investigation. For example, a very important question is, "How can cryptocurrencies and blockchain technology be regulated and supervised in a harmonized and coordinated way across different jurisdictions and sectors?". Moreover, explaining how cryptocurrencies and blockchain technology can be integrated and interoperable with existing financial systems and infrastructures is very important.

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