International Journal of Social and Education (INJOSEDU) e-ISSN: 3047-6151
Vol. 2 No. 7 August 2025, hal., 2321-2335

DECENTRALIZED FINANCE (DeFi) AND ITS IMPLICATIONS FOR MONETARY POLICY EFFECTIVENESS IN DEVELOPING COUNTRIES

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Abstract

This study aims to examine the impact of Decentralized Finance (DeFi) on the effectiveness of monetary policy in developing countries through a literature review approach. DeFi, as a blockchain-based financial system that operates without traditional intermediaries, is increasingly demonstrating its potential to disrupt conventional monetary policy transmission mechanisms. Through an analysis of various academic studies, reports from international financial institutions, and recent publications on DeFi dynamics, this study identifies the key challenges faced by central banks in maintaining price stability, managing liquidity, and regulating the financial system amidst the widespread use of digital assets and DeFi protocols. Furthermore, DeFi also offers opportunities to increase financial inclusion and payment system efficiency, particularly in developing countries facing limitations in traditional financial infrastructure. The study's findings suggest that the success of monetary policy in the digital era depends heavily on the ability of monetary authorities to respond to technological innovation through policy adaptation, dynamic regulation, and cross-sector collaboration. This study provides a conceptual contribution to understanding the interaction between decentralized financial innovation and traditional macroeconomic instruments in the context of developing countries.
Keywords: Decentralized Finance, monetary policy, developing countries, blockchain, economic stability

INTRODUCTION

Over the past decade, the development of blockchain technology has given rise to a new financial innovation known as Decentralized Finance (DeFi). DeFi offers an alternative financial system independent of traditional financial institutions such as central banks, commercial banks, and other regulatory bodies. Operating on blockchain networks, particularly Ethereum, DeFi allows users to conduct various financial activities such as lending and borrowing,

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asset trading, and investing without going through intermediaries (Ozili, 2022b). This phenomenon marks a major transformation in the structure and mechanisms of the global financial system, where trust in institutions is replaced by transparent and open automated algorithms and protocols.

The emergence of DeFi raises significant challenges and questions about the effectiveness of monetary policy currently implemented by central banks, particularly in developing countries. Monetary policy instruments such as interest rates, open market operations, and money supply control have traditionally operated through the conventional banking system (Makarov & Schoar, 2022). However, as financial activity shifts to a decentralized ecosystem, the transmission channels of monetary policy can become disconnected or disrupted. This creates new uncertainties for monetary authorities in managing price stability, exchange rates, and overall economic growth.

In developing countries, these challenges are further complicated by the fact that formal financial systems are often not fully inclusive and stable. Many residents in these countries lack access to traditional financial services, making DeFi an innovative solution for increasing financial inclusion. However, the lack of adequate regulation and institutional capacity in developing countries also opens up opportunities for systemic risk, exchange rate instability, and potential money laundering within the DeFi ecosystem. This phenomenon can weaken the already limited control and effectiveness of monetary policy in these countries.

The emergence of stablecoins, asset tokenization, and smart contracts within the DeFi framework further complicates the situation. Stablecoins pegged to fiat currencies can provide a widely used alternative medium of exchange without the involvement of local monetary authorities (Wronka, 2021). In this context, demand for local currencies could decline, which in turn disrupts monetary policy transmission. Meanwhile, asset tokenization and crypto-based derivative products can create parallel markets untouched by national fiscal and monetary policies. If not handled properly, this development risks creating a false sense of monetary sovereignty and reducing the government's control over the economy (Ozili, 2022a).

Research on DeFi in the context of developing countries is becoming increasingly important given the rapid growth of crypto and DeFi users in regions such as Southeast Asia, Sub-Saharan Africa, and Latin America. Many of these users access DeFi services not because of an ideological preference for decentralization, but because of limited formal financial services, high inflation,

and political instability. In other words, DeFi adoption in developing countries is more pragmatic than ideological (Kurniawan et al., 2025a). This situation demands a deeper analysis of how the DeFi ecosystem can contribute to improving the efficiency of national financial systems while maintaining the effectiveness of monetary policy.

Furthermore, there are also positive aspects of DeFi that deserve consideration within a public policy framework (Metelski & Sobieraj, 2022). For example, DeFi can improve the efficiency of cross-border transactions, reduce remittance costs, and provide a cheaper and faster microfinance alternative for small businesses. This can support inclusive economic development if managed appropriately. However, this positive potential can only be realized if there is a regulatory framework that bridges innovation with the protection of macroeconomic stability.

Globally, several developed countries have begun exploring ways to respond to the challenges of DeFi, including through the development of Central Bank Digital Currencies (CBDCs) and technology-based regulations. However, developing countries often face limited resources, unequal digital infrastructure, and weak legal systems in designing and enforcing policies regarding this new financial technology (Ngozi Samuel Uzougbo et al., 2024a). Therefore, a thorough understanding of the implications of DeFi on the effectiveness of monetary policy in developing countries is crucial for designing appropriate adaptation strategies. This research aims to analyze the impact of the existence and growth of DeFi on the effectiveness of monetary policy in developing countries. The approach used is a literature review to identify common patterns, challenges, and opportunities posed by the interaction between the DeFi ecosystem and monetary policy instruments. This approach is expected to provide a conceptual framework that will assist monetary authorities and policymakers in developing countries in understanding the new dynamics of the financial system and responding strategically. This research is also expected to provide theoretical and practical contributions to the growing literature on the digital economy and monetary policy in the era of decentralized finance.

Through a comprehensive understanding of DeFi dynamics, developing countries can anticipate potential disruptions to macroeconomic stability and explore innovative ways to strengthen the capacity of monetary institutions. This is crucial given that the future of global finance is shifting toward digital and decentralized governance, and developing countries cannot avoid this reality. Instead, they need to adapt, build regulatory capacity, and create

synergies between technological innovation and economic stability to ensure sustainable development.

RESEARCH METHOD

This study uses a literature review method to analyze the implications of Decentralized Finance (DeFi) on the effectiveness of monetary policy in developing countries. This method was chosen because it provides a comprehensive understanding of the concept, development, and dynamics of DeFi based on the latest scientific and policy sources. The literature search was conducted systematically through academic journals, reports from international financial institutions such as the IMF and World Bank, and official publications from monetary authorities in developing countries. The study's primary focus is to explore how blockchain technology and DeFi protocols affect monetary policy transmission, financial system stability, and the effectiveness of instruments such as interest rates, reserve requirements, and open market operations.

The literature analysis was conducted using a thematic approach, grouping findings from various sources into key themes such as regulatory challenges, banking system disintermediation, and the integration of digital technology into the financial ecosystem. By combining monetary economics theories with empirical studies of DeFi developments in various regions, this study seeks to identify patterns and potential risks that could hinder or support the effectiveness of monetary policy. The results of this study are expected to provide a conceptual basis for policymakers in developing countries to formulate adaptive strategies in facing DeFi disruption, while also providing an academic contribution to the growing literature in the fields of decentralized finance and digital macroeconomics.

RESULT AND DISCUSSION

The Impact of DeFi on Monetary Policy Effectiveness

In recent years, the rapid development of blockchain technology has given rise to a new financial ecosystem known as Decentralized Finance (DeFi). This ecosystem allows individuals and institutions to conduct financial activities such as lending and borrowing, asset trading, and investment management without the involvement of traditional intermediaries like banks or other formal financial institutions. This phenomenon has not only impacted the financial sector at a micro level but also has profound implications for the effectiveness of monetary policy, particularly in developing countries whose financial

structures are still under development ("THE EFFECT OF FINANCIAL INCLUSION AND FINANCIAL TECHNOLOGY ON THE EFFECTIVENESS OF THE INDONESIAN MONETARY POLICY," 2020). Amid the rapid adoption of DeFi, significant challenges have emerged for central banks, particularly in maintaining control over the money supply and setting interest rates, which have long been key instruments for regulating economic stability.

The potential for a reduction in central bank control over the money supply and interest rates is a major concern in this context. Traditionally, central banks regulate the money supply through conventional monetary policies such as open market operations, setting benchmark interest rates, and setting reserve ratios for banks. However, with the advent of DeFi, which enables the creation and circulation of digital assets independent of the conventional financial system, central banks are beginning to lose visibility and control over money flows that occur outside the radar of formal financial institutions (Kyriazis et al., 2023). If DeFi becomes increasingly widely used in real economic transactions, the interest rate policy set by monetary authorities could lose its effectiveness because economic actors no longer use bank interest rates as the primary reference for financial decision-making. This situation could lead to a fragmented monetary system, where various financial entities are not directly connected to central policy, making it difficult for authorities to respond to economic conditions comprehensively.

Furthermore, the issue of monetary policy transmission through credit channels and money markets arises. In the conventional framework, monetary policy transmission occurs through the banking system, where changes in benchmark interest rates impact lending and savings rates, ultimately influencing consumption and investment (Ozili, 2023). However, when lending and borrowing activities begin to shift to DeFi platforms that are not directly linked to central bank policies, the effectiveness of policy transmission can be distorted. For example, interest rates in DeFi protocols are determined by algorithm-based market mechanisms and token supply and demand, rather than by macroeconomic policy. As a result, fluctuations in liquidity and loan demand in DeFi can create interest rate dynamics that are out of sync with monetary policy direction. This poses a particular challenge for developing countries that still rely heavily on the banking system as the primary medium for transmitting macroeconomic policy.

Another equally significant risk is the potential for digital dollarization and the increasing use of foreign stablecoins (Kallianiotis, 2021). In many cases, stablecoins such as USDT and USDC, pegged to the US dollar, have become

popular means of exchange and stores of value in the DeFi ecosystem. In developing countries facing inflationary pressures and domestic currency depreciation, people tend to place greater trust in digital assets whose value is stable against the dollar. This has the potential to accelerate the phenomenon of digital dollarization, where people prefer using dollar-based stablecoins over local currencies in everyday transactions. If this phenomenon is not addressed strategically, the role of central banks in managing domestic money demand will be further weakened. Reliance on foreign stablecoins also opens up external vulnerabilities, where domestic economic and monetary policies can easily be influenced by the decisions or policies of foreign financial authorities governing the issuance of these stablecoins.

Furthermore, the uncertainty and volatility of crypto assets pose significant challenges to macroeconomic stability in general. Crypto assets, the foundation of DeFi, are known for experiencing extreme price fluctuations within short periods. In the context of developing countries whose economies remain vulnerable to external shocks, this volatility can exacerbate systemic risk, particularly if public exposure to digital assets increases. When crypto asset values suddenly plummet, the impact can resemble a microfinance crisis that spills over into the real sector, for example through defaults on digital asset-based loans or massive withdrawals from DeFi protocols. This uncertainty creates additional challenges for central banks in formulating economic stabilization policies, as shocks no longer originate solely from the real or traditional financial sector, but also from virtual spaces that are not fully under the oversight of national authorities (Berger et al., 2021).

Thus, DeFi has created structural challenges to the effectiveness of monetary policy, both in terms of money supply control, interest rate transmission, foreign exchange fluctuations, and macrofinancial stability. For developing countries, this situation demands policy innovation and a more adaptive and collaborative regulatory approach. Central banks need to build capacity to understand and monitor the DeFi ecosystem, and develop regulatory frameworks capable of protecting financial system stability without stifling technological innovation. In the long term, the potential integration of monetary policy with digital technologies, such as Central Bank Digital Currency (CBDC), could be a strategic solution to bridge the gap between traditional and decentralized financial systems. However, the success of such a move depends heavily on political will, the readiness of digital infrastructure, and public literacy in rapidly evolving financial technologies.

Challenges and Risks of DeFi in Developing Countries

In developing countries, the emergence of Decentralized Finance (DeFi) brings with it enormous potential for innovation in providing inclusive and efficient financial services. However, along with these opportunities, there are significant challenges and risks that require serious attention. These challenges relate not only to technical aspects but also to the readiness of economic, social, and political systems to embrace and manage the transformations offered by decentralized financial technology. One major challenge is the lack of adequate digital infrastructure (Ozili, 2022c). In many developing countries, access to fast internet, adequate technological devices, and robust digital identity systems remains limited. This digital divide creates a significant barrier to the widespread adoption of DeFi, as the system is entirely online and requires reliable connectivity and devices to function effectively. Without robust infrastructure, the communities most in need of alternative financial services remain marginalized from this new digital financial system.

Limited financial and digital literacy among the public also exacerbates the situation. While DeFi promises easier and more intermediary-free access to various financial services such as lending, savings, and investments, using DeFi platforms requires a thorough understanding of digital assets, market risks, cybersecurity, and how smart contracts work. In developing countries, most people lack the necessary skills to navigate these complexities. Traditional financial literacy alone remains a significant challenge, let alone understanding the crypto ecosystem and blockchain technology (Ngozi Samuel Uzougbo et al., 2024b). This situation creates the potential for abuse and significant financial loss for unprepared individuals, which can exacerbate economic inequality and foster distrust of financial technology in general.

In terms of regulation, many developing countries are still lagging behind in developing legal frameworks that adapt to DeFi technology. This regulatory weakness creates two major problems. First, investors and users lack adequate legal protection in the event of losses, fraud, or data breaches. Second, DeFi service providers operate in a gray area, allowing them to operate without strict oversight. The lack of clear regulations also hinders collaboration between the public and private sectors in developing safe and inclusive financial technology. On the other hand, efforts to implement overly strict regulations can actually stifle innovation and push DeFi development outside national jurisdictions, ultimately strengthening the difficult-to-monitor informal financial ecosystem.

One major concern in the context of DeFi in developing countries is its potential misuse for illegal activities such as money laundering, tax evasion, or

financing illicit activities (Kurniawan et al., 2025b). The permissionless, anonymous, and cross-border nature of DeFi makes it an attractive platform for malicious actors to disguise the origins of funds and evade detection by financial authorities. Without robust Know Your Customer (KYC) and Anti-Money Laundering (AML) mechanisms, DeFi systems are open to abuse, particularly in countries with weak oversight. This risk not only impacts national economic stability but also has the potential to create international pressure on developing countries perceived as incapable of controlling illicit financial activity.

Systemic risks resulting from technical vulnerabilities and market volatility also cannot be ignored. DeFi operates in a highly volatile environment, where the value of crypto assets can change drastically in a short period of time. In developing countries with unstable financial systems, this volatility can lead to greater economic turmoil (Olawale Adisa et al., 2024). Furthermore, the absence of traditional financial institutions acting as lenders of last resort makes DeFi systems highly vulnerable to liquidity shocks. In the event of a crisis or a major cyberattack, no authority can intervene to stabilize the system, which could ultimately have a domino effect on the real economy, especially if DeFi adoption becomes widespread and touches vital sectors such as payments, lending, and public investment.

On the other hand, reliance on immature technology also creates serious security risks. Many DeFi platforms are still in the experimental stage and have not undergone rigorous security testing. Weaknesses in smart contracts, code exploits, and interoperability failures between platforms provide entry points for hackers to steal large sums of user assets. Security incidents like this have occurred repeatedly in the global DeFi ecosystem, and their impact is even more devastating when they occur in developing countries that lack robust compensation systems, digital asset insurance, or cyber law enforcement agencies.

Opportunities and Positive Potential of DeFi for Developing Countries

Decentralized Finance (DeFi) presents a new paradigm in the global financial system that is fundamentally different from the traditional centralized system. For developing countries, the adoption of DeFi holds significant opportunities and positive potential, particularly in expanding financial access, improving the efficiency of cross-border payment systems, and enriching economic data infrastructure (Ali et al., 2024). In countries with limited

conventional financial infrastructure, DeFi can be a catalyst for inclusive and empowering transformation.

One of DeFi's key potentials lies in its ability to significantly drive financial inclusion, particularly for unbanked and underbanked populations (Ryabov et al., 2022). In many developing countries, millions of people still lack access to bank accounts, loans, or other basic financial instruments due to various factors such as high service fees, limited banking infrastructure, lack of official documentation, and distrust of financial institutions. DeFi, with its blockchain-based technology and smart contracts, offers a solution that eliminates the need for intermediaries. Through digital wallets and internet access, individuals can directly access a variety of financial services such as savings, loans, investments, and insurance. This not only expands financial reach but also creates financial independence for communities previously marginalized from the formal economic system.

Furthermore, DeFi holds tremendous potential to improve the efficiency of cross-border transactions, a major challenge for developing countries that rely heavily on remittances from migrant workers (Adamyk et al., 2025). In traditional financial systems, remittances between countries are often time-consuming, costly, and involve numerous intermediaries such as correspondent banks and remittance agencies. With DeFi, this process can be streamlined through blockchain protocols, allowing cross-border transactions to occur within minutes at significantly lower costs. This efficiency not only benefits individual recipients of remittances but can also strengthen local liquidity, support household consumption, and indirectly stimulate economic growth at the grassroots level. Furthermore, the transparency and immutable transaction trail provide greater security and accountability than conventional systems.

Another important opportunity is the increased access to capital and alternative financial services through DeFi. Many small and medium-sized enterprises (MSMEs) in developing countries struggle to obtain funding due to limited collateral, credit history, or access to financial institutions (Harvey & Rabetti, 2024). With DeFi platforms, MSMEs can access financing through peer-to-peer lending schemes, liquidity pools, or even token-based crowdfunding. This access allows businesses to expand operations, increase productivity, and grow their business networks without relying on banks or conventional financing institutions. Furthermore, the use of digital assets as collateral or as a medium for transactions opens up new flexibility that was previously unavailable, particularly for the informal sector and digital economy players.

Furthermore, DeFi also opens up the possibility of collecting and utilizing valuable alternative data for economic analysis, particularly in the context of developing countries that often face limitations in conventional statistical data (Harvey & Rabetti, 2024). Every transaction in the DeFi ecosystem is transparently recorded on the blockchain, creating a real-time, verified, and publicly accessible data source. This data can be used to understand consumer behavior patterns, cash flows, micro-investment trends, and market dynamics at a high level of granularity. For governments, academics, and market players, this information can provide the basis for formulating economic policies, designing financial inclusion strategies, or developing products and services that are more responsive to community needs. By leveraging sophisticated analytics and artificial intelligence, data from DeFi can enrich currently limited national statistical systems and improve the accuracy of economic decision-making.

While DeFi's potential is promising, its utilization in developing countries must be accompanied by strengthening digital infrastructure, improving financial literacy, and developing adaptive regulations. Without an appropriate policy framework, these opportunities could turn into risks, such as fraud, uncontrolled volatility, or misuse of the system for illicit purposes. Therefore, the role of governments, regulators, and the technology community is crucial in creating a safe, inclusive, and sustainable DeFi ecosystem. Cross-sector collaboration to develop interoperability standards, consumer protection, and public education should be a priority in developing decentralized finance ecosystems in developing countries.

Central Bank Adaptation Policies and Strategies

In the face of the dynamics and disruptions brought about by the emergence of Decentralized Finance (DeFi), central banks in various countries, including those in developing countries, are faced with the need to formulate policies and adaptation strategies that are not only responsive but also proactive. One important approach that is starting to be widely implemented is the shift from rules-based regulation to principles-based regulation. This approach provides regulators with greater flexibility in overseeing rapidly changing innovations, without the need to constantly update rigid technical regulations. General principles such as transparency, fairness, systemic risk mitigation, and consumer protection serve as the basic framework for assessing the compliance of DeFi players (Boneva et al., 2022). This allows

authorities to maintain financial system stability while still providing space for the healthy growth of digital innovation.

In addition to regulatory reform, the design and development of central bank digital currencies (CBDCs) is a key strategic step being considered and even starting to be implemented in various jurisdictions. CBDCs are not merely digital versions of fiat money, but can also serve as new monetary policy instruments that can address the challenges posed by DeFi (Svartzman et al., 2021). By issuing CBDCs, central banks can maintain their relevant role in the payment system and monetary policy transmission, while providing a formal alternative to stablecoins widely used in the DeFi ecosystem. Effective CBDC design needs to consider aspects such as interoperability, cybersecurity, user privacy, and the ability to integrate programmability principles without losing regulatory control. Through CBDCs, central banks have the potential to provide an efficient, inclusive, and more easily monitored payment infrastructure, while simultaneously narrowing the scope for financial activities that could potentially harm macroeconomic stability.

Amidst the increasingly fragmented and complex digital financial landscape, strengthening coordination between central banks and other financial authorities is increasingly crucial (Durrani et al., 2020). DeFi operates across jurisdictional and institutional boundaries, making it impossible to address it in a sectoral and siloed manner. In this context, synergy between the central bank, financial services authority, financial intelligence unit, consumer protection agency, and relevant ministries is crucial to ensure comprehensive, consistent, and non-overlapping policies. This coordination can take the form of establishing a cross-institutional forum to share information and establish common supervisory standards, as well as implementing integrated policies to prevent digital financial crimes such as money laundering and terrorism financing. Without strong coordination, DeFi risk control efforts could weaken and create loopholes exploited by speculative or opportunistic actors (Lane, 2021).

To complement this strategy, central banks are also required to innovate their financial supervision systems, particularly by adopting advanced technologies through RegTech (Regulatory Technology) and SupTech (Supervisory Technology) approaches. RegTech can help financial institutions fulfill reporting and compliance obligations more efficiently and automatically, while SupTech enables authorities to analyze data in real time and detect anomalies or systemic risks early (Vyshnevskyi & Sohn, n.d.). The use of artificial intelligence, machine learning, and big data analytics allows central banks to

gain sharper insights in monitoring market activity, assessing financial stability, and anticipating potential crises. This supervisory transformation is particularly crucial given the decentralized and pseudonymous nature of DeFi, which renders traditional supervisory methods less effective (Dikau & Volz, 2021). Therefore, strengthening the institutional capacity and technological infrastructure of central banks is an integral part of strategic reforms in response to this disruptive evolution of digital finance (Hansen, 2022).

Overall, central banks' policies and strategies for adapting to DeFi cannot be implemented in isolation but must be systemic and long-term. Principles-based regulation provides a legal framework that is adaptive to innovation. CBDCs are a strategic tool that not only safeguards monetary sovereignty but also expands digital financial inclusion. Cross-institutional coordination strengthens the integrity of the national financial system, while the adoption of RegTech and SupTech enables more effective oversight in the face of new complexities. All these steps are part of a fundamental institutional transformation that will determine the extent to which central banks can maintain the effectiveness of their monetary policies in an increasingly digitalized financial era.

CONCLUSION

The conclusion of the study on Decentralized Finance (DeFi) and its implications for the effectiveness of monetary policy in developing countries indicates that DeFi is a financial technology innovation that is fundamentally changing the landscape of the traditional financial system. By utilizing blockchain technology and smart contracts, DeFi creates an open financial ecosystem that operates without centralized intermediaries such as banks or other financial institutions. This creates more inclusive access to financial services, especially for populations underserved by the formal financial system in developing countries.

However, the existence of DeFi also poses significant challenges to the effectiveness of monetary policy. As more financial transactions and value storage move to decentralized networks outside the control of national monetary authorities, the transmission of interest rate policy and money supply control becomes increasingly difficult. Furthermore, the volatility of the crypto assets underlying many DeFi platforms adds instability to the monetary system, especially in countries whose financial systems remain fragile and rely on conventional monetary policy to maintain price and exchange rate stability.

Therefore, an adaptive and collaborative policy approach is needed between regulators, central banks, and technology developers. Developing countries need to develop regulatory frameworks that are responsive to the development of DeFi technology without stifling innovation, while simultaneously maintaining monetary stability and consumer protection. Future monetary policy must consider the dynamics of financial digitalization as a crucial factor in designing new instruments and strategies appropriate to the digital economy era.

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