CHAPTER 9

THE NEXUS OF DEFI AND CEFI: A LOOK AT THE FUTURE MONETARY SYSTEM

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ABSTRACT

In this study, we explore the multifaceted blockchain technology in terms of economics and finance. Detecting the literature gap in this field, we analyze the nexus of centralized finance (CeFi) and decentralized finance (DeFi). We question the relationship between DeFi and stablecoins and ask whether the next global financial crisis might be triggered by the stablecoins. We search whether DeFi and CeFi be complementaries or substitutes of one another in the following years. We review the progress of CBDCs that evolve at warp speed. Through our research, we take a look at the future monetary system, the position of central banks within this system, and the global cooperation possibilities.

Our study shed light on the literature by covering both theoretical and practical aspects of this complex issue. We believe it will be the first attempt to cover the critical dimensions of the subject with an integrated view. We conduct our study by analyzing the recent articles on the WoS database. We select the studies by applying several inclusion and exclusion criteria. Finally, we present the results and limitations of the study.

Keywords: Blockchain, Ce-Fi, De-Fi, stablecoins, CBDCs

1. Introduction

Improvements in computer and telecommunication technology have been transforming the financial sector since the 1960s. The evolution of the economic environment has changed the demand dynamics of financial markets since the 1960s. Advanced information technology has accompanied this change by transforming supply conditions. Financial institutions realized that they could be out of business by performing solely their traditional asset transformation function. So they embraced the innovation of new products and services which can be called financial engineering.

The banking sector of the United States turned out to be a heavily regulated industry due to increasing inflation and interest rates from the late 1960s to the 1980s. This conjuncture led the sector to find ways to overcome the restrictions on the sector to access yield. The recipe was found through financial innovation in the name of securitization. As a crucial financial innovation, securitization has enabled asset transformation by bringing a group of different financial institutions working together. These institutions constituted the shadow banking system which distinguished them from traditional banking, especially in terms of regulation. The subprime mortgage is a financial output of securitization and the shadow banking system. Although it offered borrowers a new and easy way of lending, it also became one of the most important reasons for the global financial crisis of 2007-2008 (Mishkin, 2019, p. 286-315).

In the aftermath of the global financial crisis, central banks of advanced economies have taken the leading role in solving the subprime mortgage-backed problems. They have pursued several non-conventional monetary policies to stimulate their economies. These policies took the form of liquidity provision, asset purchases, forward guidance, and negative interest rates. As a result of several quantitive easing operations, the balance sheet of the four biggest central banks (the Federal Reserve (the Fed), European Central Bank (ECB), Bank of Japan (BOJ), and People's Bank of China (PBoC)) skyrocketed by an increase of almost 250% (Yardeni, 2017).

Pre-global financial crisis factors (adverse selection, moral hazard, and conflicts of interest) together with the post-global financial crisis environment (enormously expanded central bank balance sheets, eroded confidence in the financial system, loss of trust in the financial institutions and financial tools) led savers to look for alternative investment instruments. This setting has accelerated the popularity of Bitcoin and the foundation of blockchain technology (Atici, 2022).

The invention of Bitcoin has enabled the peer-to-peer transfer of Bitcoins by eliminating the need for third-party involvement, in a permissionless network of nodes by solving the famous double-spending problem. In order to keep the record of transactions in a secure, immutable, transparent, and irreversible manner, Bitcoin has employed time stamps to ensure the transactions have existed at that point in time (Nakamoto, 2009).

As a further step, smart-contract-enabled blockchains have facilitated the configuration of an array of flexible financial products where the rules and conditions of execution are warranted by the network itself. As it becomes successful in attracting the attention of a vast audience, the notion of DeFi started to take the stage by generating an economy above 100 billion USD.

It will be quite correct if we say that DeFi owes its existence to the success of Ethereum, in particular. The reason is that Ethereum has provided the necessary framework for the execution of transactions, by addressing the deployment of computer codes. This is the point where the decentralized system has started to segregate from the traditional system that assigns intermediary third parties a leading role.

As a crucial facilitator of DeFi, stablecoins (a type of crypto asset whose price is mainly pegged to the value of an underlying reserve currency or currencies) have started to be preferred by investors. Stablecoins have started to be preferred as a protection against the volatility of "not-stable" crypto assets, as a hedge against inflationary fiat currencies, as an alternative to Bitcoin, and as a tool that allows fast conversion and low fees in the exchange of crypto assets. Nevertheless, the governance issue that is the Achilles heel of DeFi seems to be overlooked by the supporters of stablecoins. Furthermore, In the absence of efficient regulations, stablecoins may threaten the global economy.

This study aims to shed light on the multifaceted blockchain technology in regard to economics and finance. We analyze the nexus of CeFi and DeFi. We question the relationship between DeFi and stablecoins and ask whether the next global financial crisis might be triggered by the stablecoins or if we overplay it. We search whether DeFi and CeFi can be complementaries. We review the progress of CBDCs which becomes more of an issue that evolves at warp speed. Through our research, we take a look at the future monetary system and the position of central banks within this system.

Our study contributes to the growing literature by covering the theoretical and practical aspects of this complex issue. We believe it will be the first attempt to cover several dimensions of the subject from the lens of economics and finance in an integrated manner. We believe

this is a valuable effort where the digital economy and blockchain are still tried to be ignored by a group of academics. The study proceeds as follows: Section 2 provides the evolution of the digital economy, Section 3 introduces the research methodology, Section 4 presents the literature review, and Section 5 shares the discussion and concludes the study.

2. Evolution of the Digital Economy

The goldsmith bankers-based problems of the 17th century led to the authorization of central banks throughout the world by the beginning of the mid-19th century. Although their establishment differs across countries, today central banks are responsible for monetary policies and these institutions are among the most powerful players in the financial markets (Atici, 2023).

Because centralization is the distinguishing feature of today's traditional financial system, we opt to refer to it as CeFi. With the accelerating effect of the COVID-19 pandemic, CeFi has forged ahead through the corridor of the new digital economy. While this new digital economy requires a transformation in the traditional processes, there is also an increasing controversy over the future outlook.

Although the kick-off was made by Bitcoin, it could not succeed in preserving its popularity as it could not get the title of digital currency but a commodity. Moreover, it comes with several other problematic issues such as the Ponzi scheme, cyber theft, balloons, limited supply, etc. Nevertheless, it has inspired its successors by the logic behind it and by its underlying technology, blockchain in particular (Atici, 2018).

DeFi, built-on blockchain, offers a wide array of services such as lending, borrowing, flash loans, insurance, yield farming, etc. In this study, instead of analyzing the products that are offered under DeFi, we opt to focus on the nexus of DeFi and CeFi plus the future of the monetary system.

DeFi and CeFi decouple in terms of several factors. First of all, in contrast to CeFi, a user in DeFi can monitor the workflow of transactions and verify their orderly execution which is enabled by transparency. Another difference comes with the custody. In contrast to CeFi, users can control their assets directly at any time. But it is not riskless. An overwhelming number of users choose to store their crypto assets at centralized crypto exchanges which is not parallel to the logic of decentralization.

Another factor that differs between DeFi and CeFi is privacy. Know Your Customer (KYC) and Anti-Money Laundering (AML) practices are valid for centralized exchanges.

Although there is not one hundred percent anonymity in the DeFi network, traceability still is a question of debate.

Fees that will be charged for transactions are announced in CeFi networks by regulatory bodies beforehand. This is not the same in DeFi where there is no authority that can declare such a fee and congestion may lead to a transaction bidding contest. Transaction fees are also important in terms of preventing spam. In CeFi, this cost is minimized as a result of economies of scale.

Unlike CeFi, DeFi markets operate 24/7. This point increases the liquidity in favor of DeFi. However, in a crisis environment, there will be no authority to interfere such as a circuit breaker.

DeFi projects are generally structured by anonymous project teams. Users do not have access to a front-end but to a smart contract. This is another factor that differs from the functioning of CeFi (Quin, Zhou, &Afonin, 2021).

Stablecoins are fuels of DeFi transactions. There are different forms of stablecoins like the ones that pegged their value to different assets such as one fiat currency, a group of fiat currencies, a crypto asset, a group of crypto assets, commodities, etc. As another type, algorithmic stablecoins use maths and incentive mechanisms to maintain their fiat peg. Following the fall of Terra (an algorithmic stablecoin), the need for regulation and the importance of governance is boldly underlined by the authorities of several countries.

Tether, which is the most popular stablecoin claims to keep 1 U.S. dollar for each Tether issued. With the highest capitalization among stablecoins, it is preferred especially for hedging or for risk management. It is also preferred by the parties that have no access to banking services for several reasons. Along with the other crypto assets, Tether is strongly affected by the crypto winter of 2022. It is questioned by its investors as to whether it really has the dollar reserves backing the Tethers issued. Following an audit process, it is fined by regulators for having insufficient transparency and a lack of reserves (Atici, 2023).

If some researchers suggest that stablecoins will be the digital money of the future, then it will be fair to ask whether stablecoins are that stable. Being the most popular stablecoin, Tether is backed by U.S. dollars which means that Tether borrows credibility from the fiat money of the centralized system. Then how can Tether be stable without the existence of that central bank fiat money?

Another question is whether stablecoins can generate a social consensus for their existence. Central banks, as trusted institutions, guarantee the stability of the currency that they are responsible for. Besides they also guarantee the safety, irreversibility and settlement of each transaction. However, stablecoins seem to lack these features.

Contrary to what is believed there is not just one blockchain. Ethereum blockchain is widely used (more than 50 percent) for DeFi applications. When transactions increase and come to the limit it may create congestion, an increase in fees, and inefficiency. Such a situation may cause users to shift to other blockchains. Besides other factors, this fact may also affect the use of DeFi and the widespread use of stablecoins.

By pointing out these factors, one can conclude that stablecoins are not that stable. They are not too efficient, trustable, or scalable. Last but not least, they are not currencies.

Nevertheless, the capitalization of stablecoins that have reached around 150 billion U.S. dollars makes them nonignorable factors in economics and finance. Their popularity keeps increasing despite the crypto winter of 2022, the fall of Terra, the case of FTX, and Celcius, etc. This increasing interest might cause a run-on crypto asset which might invite a run-on bank in the CeFi ecosystem in the absence of global and country-based regulations, and governance codes. Briefly, a contagion risk might arise from the DeFi network.

In such a case, preparation for CBDCs is a wise counter-action to overcome the potential threat from stablecoins which is the current case.

In the leadership of the Bank for International Settlements, which is a supranational organization, central banks cooperate to find new ways to adapt to the new digital economy and to eliminate potential threats to their monetary system and financial stability.

E-CNY of China has already been introduced and tested in several pilot regions. ECB and the Fed are still working on the project. But almost all central banks are working on the issue one way or the other. Besides, there are several international projects that proceed among central banks such as Mcbdc, Jura, Dunbar, and, mBridge under the coordination of the BIS.

3. Research Methodology

We structure the study based on recent studies on WoS databases. The period of the study covers the last five years. In order to see the balance of studies made by disciplines we first make a search based on keywords covering “blockchain”, “decentralized finance”, “centralized finance”, “stablecoins”, and “CBDCs”.

Following the search, we accessed 26,328 publications from the Web of Science (WoS) database. Among them, 16%, 20%, 24%, and 29% of studies were published in 2019, 2020, 2021, and 2022 respectively. For the first half of 2023, the ratio is around 11%. The trend for full-year data proves the increasing interest in this field. Nevertheless, the increasing interest differs in terms of academic disciplines.

According to Web of Science Categories, 37% of studies were conducted under computer science information systems. Almost 25% of the studies were made in the discipline of engineering electrical electronics. The ratio of studies made under the category of computer science theory methods is %23. So we can see that an overwhelming amount of study is conducted by the disciplines with a technical perspective. Only 3% of studies are done in the field of economics.

According to document types, 60% of the total number is written as articles. The second biggest share (33%) belongs to proceeding papers. The ratio of books is less than 1%. The Figure 1 below aggregates research results in terms of disciplines.

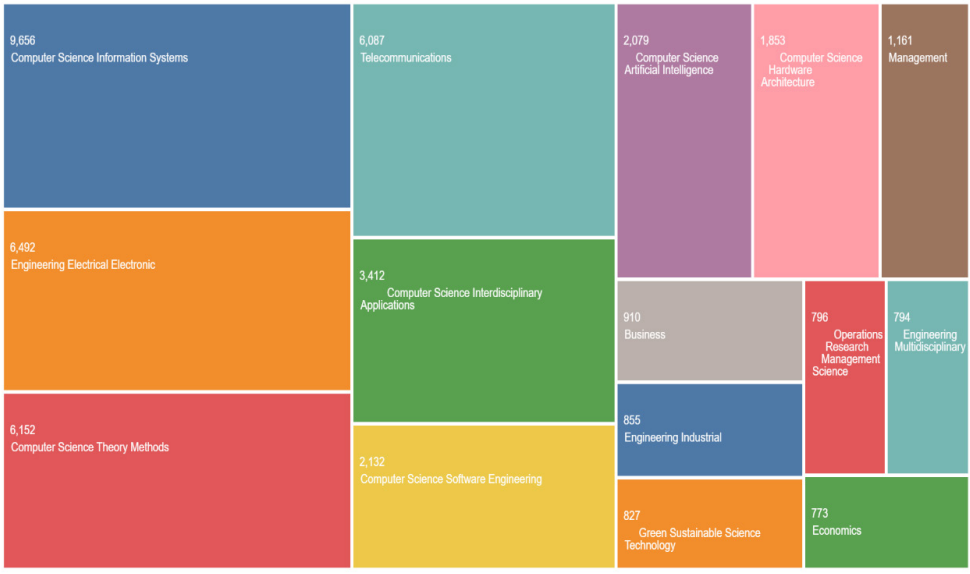


Figure 1: Number of results in terms of discipline

Following the general methodology implemented in the literature, we employ a strategy to eliminate studies focusing only on the technical features of blockchain and studies that are not written in English. We also eliminate the studies that focus on business and management. We include studies in the field of economics that are written in article form. At the end of the inclusion and exclusion process, we are left with twenty-five articles.

4. Literature Review

The literature review presents also a taxonomy of cryptocurrencies for the selected period. Fry and Ibiloye (2023) made a classification of cryptocurrencies by using a time series analysis. They report that their results are in parallel with the excessive volatility of stablecoins. The authors state that cryptocurrencies continue to be more of a speculative asset than a real currency (Baek & Elbeck, 2015; Selgin, 2015). Stablecoins seem to share the weaknesses associated with other crypto assets (Briola Vidal-Tomas, & Wang, 2023). Their results suggest that although Bitcoin seems to have achieved a degree of traction, crypto investors should still be careful.

Galanti and Özsoy (2023), questioned whether blockchain can be a panacea to the financial inclusion problem of poor populations and/or refugees. By using social network activity as a proxy of the failure or success they find that the project will likely fail. They highlight the discrepancy between the needs of populations of low socioeconomic status and the proposed services. The cost of energy-intensive services is also denoted as a negative factor that will lead to failure.

Trebat (2023), analyzes stateless money, cryptocurrency, and digital banking in Brazil. The author formulates the difference between fiat money and privately issued digital money as “trust in government” and “trust in code” in principle. Although the use of crypto assets has increased, cryptocurrencies are not widely accepted as a popular means of payment. On the contrary, digital banking and electronic money have been widely used throughout the economy with a solid legal and institutional framework. The author gives emphasis on the importance of money as a cultural asset and the first step through CBDC. He underlines this fact, especially in terms of the financial inclusion of low-income groups in the country. The author also addresses a radical issue of whether central bank digital money would enable citizens to access loans directly from the central bank which will provide a higher benefit than cryptocurrencies.

Siu (2023), argues that the progress of the CBDCs is a reaction of government to society’s needs in the digital age. The author studies the progress that goes through the development of China’s e-CNY. Besides, he asserts that an overwhelming number of Chinese users accept the e-CNY as an alternative form of digital fiat currency that provides higher security and protection in the progressing digital economy. The author notes that the e-CNY will be subject to an upcoming competition of CBDCs from the Fed and the ECB.

Spithoven (2023) handles blockchain from the angle of governance. He argues that contrary to the libertarian promise neither governance of cryptocurrency nor cryptocurrency's use in DeFi is decentralized and trustless. After analyzing types of blockchain the author concludes that permissioned blockchain and its promises might be noteworthy.

Schroeder (2023) directs her focus to environmental issues and monetary policy. According to the study, the author notes that ecological transition can not be managed through conventional monetary policy tools since conventional tools can be a solution for short-term demand issues. However, climate is a long-term phenomenon that will affect long-term supply. Here, she argues that CBDCs can be potential new tools to address developmental activities since their key goal is financial inclusiveness and equitability. But CBDCs bring forward some questions in terms of their possible negative effects on the money market and the bond market.

Temperini and Corsi (2023), make a systematic analysis covering a group of crypto assets. They focus their interest on financial inclusion as a proxy of democratization. They conclude that not crypto assets but CBDCs are the only assets that can truly pursue the goal of financial inclusion. They argue that it might not be necessary to make the currency more democratic, but it might be sufficient to make the role played by the central bank more democratic and people-oriented.

Zhang, Chen, & Li (2023), analyze how blockchain can contribute to corporate innovation in the age of globalization. According to The Difference in Difference in Difference model, they find that firms that utilize blockchain increase their innovation output by 36.17% compared to those that do not.

In her study, Savona (2022) expresses that in the aftermath of the global financial crisis, monetary policy shifted its focus from monetary stability to financial stability which has created risky dependence between money and financial assets. Besides, she argues that the finance industry operates for itself. The author suggests a new regulation of money and she suggests preventing protections for crypto-users. She suggests that implicit and explicit protection provided by public authorities will be risky and should be avoided. She concludes that crypto-assets could be free to use, but the DeFi should be monitored and regulated.

Kumhof and Noone (2021), study if a possible large-scale run out of bank deposits occurs when CBDCs are introduced. The authors assert that if a set of principles could be implemented then there would not be a run-on bank. They suggest the core principles as: (i) CBDC pays an adjustable interest rate; (ii) CBDC and reserves are distinct, not guaranteed to be directly convertible into each other (iii) no guaranteed convertibility of bank deposits

into CBDC (iv) the central bank guarantee to issue CBDC only against eligible securities. These core principles are criticized by Tong, Yunsong, & Jiaqi (2020) for being unnecessary and contradicting. Tong and Jiayou (2021), study the economic impact of China's issuance of CBDC based on a four-sector model. Their results suggest that the impact of CBDC in its use as a substitute for bank deposits is limited, the overall economic impact is positive and it reduces the leverage ratio to a certain degree. The authors suggest that Chinese authorities accelerate the R&D of CBDCs and actively participate in the drafting of international regulations for digital currencies.

Li and Huang (2021), underline that e-CNY will have a profound influence on the Chinese payment system, commercial banking system, and even the operation of the capital market. The authors expect that e-CNY will contribute to the internationalization of RMB (Chinese Renminbi), making it more competitive as an international and reserve currency. They conclude that e-CNY's impact on the analyses of big data in the Fintech sector could be major.

Finally, Iwashita (2020) analyses the case of Libra and concludes that it is far from broad acceptance as a worldwide currency. While Libra aims to increase the financial inclusion rates in developing countries it is far from this objective because it is not decentralized and bound to a central authority.

5. Discussion and Conclusion

As an example of creative destruction, blockchain technology, and its heterogenous feature requires the involvement of several interrelated fields of study such as engineering, economics, finance, etc. However, we realize that there is not an equal distribution in terms of the studies of various disciplines.

In this study, we focus our attention on the relationship between CeFi and DeFi. We analyze connected concepts such as blockchain, stablecoins, and CBDCs in order to take an integrated look at the future monetary system. We reviewed recent articles and WoS database. We select studies according to several criteria.

According to our study, we realize that the global monetary system is on an irreversible path intensively influenced by distributed ledgers, particularly blockchain technology.

As another fact, in parallel to the warp speed of technology, it is quite clear that DeFi swiftly keeps copying the products and offering more than what is currently served by CeFi to its audience.

DeFi is not subject fully to the standards, laws, regulations, and audit processes of CeFi. Although this enables time efficiency, cost minimization, product variety, and financial inclusion to some extent, the DeFi system is not exempt from malicious attacks/hacks/fraud, etc. Competing interests of stakeholders may lead to another crypto winter or even worse such as a run-on bank. Authorities could not let another financial crisis be rooted as in the case of shadow banking.

As a game-changer, Bitcoin has influenced all other crypto assets, alternative currencies, and stablecoins, in particular. However, according to our review, stablecoins are far from keeping their existing popularity, especially with the challenge of being the digital currency of the future, in the aftermath of the crypto winter. Stablecoins have the potential to jeopardize not only a country or DeFi ecosystem but also the traditional economic and financial system and the global economy.

Moreover, a possible crisis rooted in DeFi and/or stablecoins may create a contagion effect that will shock the real economy, as well. To keep the bridge between the monetary and financial system strong, central banks seem to work hard by employing the opportunities of distributed ledgers and blockchain.

As stated by Carstens, Frost, & Shin (2022), we can see the monetary system as a tree and the central bank as a solid trunk. The branches are banks and other institutions that serve the society. Besides other factors, when considering the externality effect, the healthiest way seems to be provided by central banks in terms of supporting innovative services to fulfill the expectations of society and the requirements of the new digital economy. Therefore, central banks are working to structure the monetary system of the future and its money. In such a conjuncture, DeFi and CeFi can not be substitutes. DeFi and especially stablecoins should progress in a regulated environment. It is crucial for the integrity of the monetary and financial system and also for the protection of investors. The literature review confirms this fact. Studies made in the last five years overwhelmingly concentrate on CBDCs and the future of the monetary system by labeling crypto assets as speculative digital assets but not as money.

Our study has some limitations. The first is the fast-changing ecosystem and emerging stakeholders, complicated concepts, tools, and practices specific to blockchain technology. The second is the swiftly changing technology that makes the previous studies almost old-fashioned. The third is the literature that lags behind the practice. The final is the scarce case studies on the newest concepts.

Despite these limitations, we believe this paper contributes to the literature by providing an integrated view from the lens of economics and finance and the emerging new digital economy and finance which should be complementary.

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