CRYPTO ECONOMICS AND DECENTRALISED FINANCE (DEFI): REVOLUTION OR BUBBLE?

Yogitha Sunkara, Symbiosis Law School, Hyderabad

INTRODUCTION

Crypto-economics uses cryptography to manage and operate decentralized systems by employing economic incentives. However, Decentralized Finance (DeFi) is a subset of such crypto-economics involving smart contracts to offer financial services like lending, borrowing, trading, and investments without intermediaries such as banks.

Crypto economics and DeFi are revolutionary concepts operating on blockchain technology. The platforms based on these concepts are leading sectors in cryptocurrency. They are a boon for expanding financial products and services based on digital assets into fiat currency and stablecoins to earn interest. Smart contracts are used to streamline these supply chain transactions, payments, lending, and repayment processes.

DeFi functions as a decentralized lending platform that deploys blockchain mechanisms to facilitate exchanges without the involvement of central intermediaries in the transaction through automated processes. It acts as a leverage that transforms the old traditional financial structure into transparent protocols and has expanded the scope of the tech market from simple value exchanges to complicated financial applications.

Over time, it has out-pushed its boundaries by growing exponentially in the financial world with millions of funds stacked across various protocols. It has upraised a revolution to democratize financial systems by removing gatekeepers and enabling greater access for the unbanked population. However, this hype is labelled as overrated by critics who are highly speculative about this new innovation, thus raising concerns about the possibility of it becoming a bubble similar to the dot-com bust.

Through this study, we aim to assess whether DeFi represents a true financial revolution or if it is a speculative bubble that may burst. In order to truly understand DeFi, we need to explore the opportunities, risks, and long-term viability associated with DeFi within the broader

financial ecosystem.

SCOPE AND LIMITATIONS OF THE STUDY

This paper analyses Decentralized Finance (DeFi) through the lens of crypto-economics by understanding how cryptographic mechanisms and microeconomic theories combine to create decentralized systems and the use of incentives as a method to ensure network security and efficiency by deploying Proof-of-Work (PoW) and Proof-of-Stake (PoS). Through a detailed examination, this paper tries to understand how incentive structures invoke interest in DeFi participants, along with the governance mechanisms that give users control over protocol decisions through tokens, which also function as digital assets within DeFi, especially in transaction fees, staking, and liquidity pools.

It also discusses how DeFi has reduced transaction costs and enhanced network efficiency by addressing centralization concerns, smart contract vulnerabilities, and regulatory uncertainties. It also analyses the speculative nature of Defi to check whether it is a bubble or not by paralleling its characteristics with those of previous financial bubbles.

However, as DeFi being a relatively new field lacks the long-term data required to definitively assess its sustainability coupled with its spontaneous growth in the infrastructure of its ecosystem which could have given rise to new risks and innovations although not discussed in this paper. This paper hasn't delved into any specific jurisdictional regulatory framework given the global nature of DeFi, which makes it highly challenging to provide an in-depth legal analysis of each region.

OBJECTIVES OF THE STUDY

Through this paper, we try to understand the core principles behind the evolution of Decentralized Finance (DeFi) by analyzing them through the prism of crypto-economics, in order to gain a thorough understanding of how cryptography and microeconomic theory combine to create decentralized financial systems that forms the base of investigation undergoing in this paper as to understand how DeFi employs incentives such as tokens and staking to promote network security, efficiency, and fairness. This study also seeks to understand the governance mechanisms employed in DeFi platforms, which provide users with access to influence protocol decisions. This paper evaluates the potential of DeFi to check

whether it possesses the sustainability to revolutionize traditional financial systems by disintermediating banking services and offering decentralized alternatives for lending, borrowing, and trading.

In order to understand whether DeFi is a speculative bubble or not, this paper assesses the potential risks inherent in DeFi systems, including smart contract vulnerabilities, operational risks, scalability challenges, and regulatory uncertainties, and it also intends to draw parallels between DeFi's current state and past financial bubbles as to check whether its current path of evolution would devolve into bubble phase by focusing on speculative investment, market volatility, and over-optimistic projections observed in it.

ANALYSIS

Crypto economics is a new and developing field of crypto assets that provides a framework for the integration of cryptography and microeconomics theory to create decentralized financial systems like DeFi. Crypto economics principles make decentralized networks efficient to work even when devoid of trust between participants by creating a framework that ensures that individuals behave in such a way as to benefit both themselves and the system. These principles include a combination of mechanisms like game theory and microeconomic theory to design incentives to ensure network security, efficiency, and fairness.

ECONOMIC INCENTIVES IN DEFI

The core of crypto-economics lies in the use of incentives to align the interests of consumers in decentralized proto-type systems like Proof-of-Work (POW) and Proof-of-Stake (POS), where the participants invest resources in order to validate transactions. In return, they are compensated with newly created tokens. However, Defi employs incentives to inculcate trust by promoting honest behaviour, involving a reward system for miners or validators to secure the network. This type of game-theoretic approach is used to ensure that participants act in their self-interest while maintaining the network's secure environment. Economic incentives are used in Defi platforms as governance tokens to allow users to vote on protocol upgrades and policy changes in network development by creating a system of collective decision-making to allow them to act in their self-interest by making decisions that will increase the value of their holdings via-a-via improving the network.

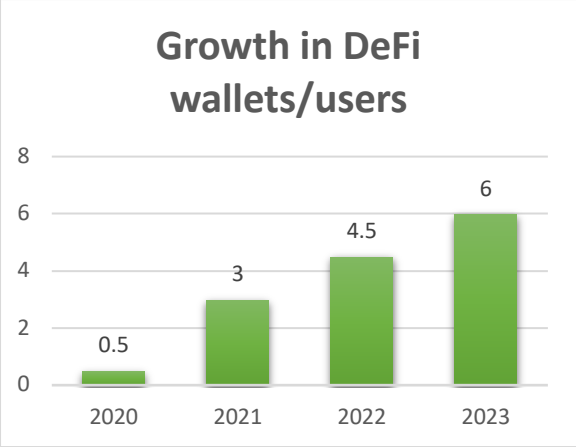
Tokens serve as digital currencies that allow Defi systems to operate both within ("on-chain") and outside ("off-chain") blockchain environments. The value of these tokens depends on the supply and demand dynamics within the ecosystem. These tokens can also be used as transaction fees and staking locked in smart contracts to earn interest on them, thus contributing to the liquidity pool of the network. The primary aim of crypto-economics is the reduction of transaction costs by eliminating intermediaries, while costs in the form of gas fees on Ethereum are still incurred by participants on Defi platforms. In order to achieve this goal, these platforms rely upon crypto-economics to tokenize rewards and fee structures by improving their efficiency. Therefore, Defi creates decentralized financial systems by combining cryptography with economic theories, where trust is embedded in the protocol itself to enable users to transact without relying upon centralized authorities[1].

EVOLUTION OF DEFI

The growth of DeFi has been a pragmatic series of practical evolution of technologies that have succeeded in replacing the traditional centralized structure seen in traditional markets. In recent years, Decentralized Finance (DeFi) has deployed a total value locked (TVL) mechanism across its platforms like Aave, Compound, and Uniswap in an attempt to make them the major players in this space by advancing the features of these platforms by offering decentralized lending, borrowing, and trading services as alternatives to traditional financial services and enabling peer-to-peer transactions without intermediaries.

However, this development was halted despite the rapid growth as the market is heavily concentrated within a few protocols, which has caused concerns about the possible risk of centralization as most of the market's liquidity is funnelled through a limited number of platforms, which could lead to systemic vulnerabilities if any of them experiences technical failures, governance issues, or attacks leading to the collapse of the network's security in totality.

[1] Dimitropoulos, Georgios. (2020). The law of blockchain. *Washington Law Review, 95(3),* 1117-1192.



CHALLENGES AND RISKS IN DEFI

DeFi platforms base their transactions on smart contracts that use self-executing codes, making them more susceptible to bugs in the code, which can ultimately lead to catastrophic failures. In recent times, the Poly Network hack in 2021, where over $600 million worth of crypto assets were stolen, should be taken as a depiction of the possible risks inherent in DeFi. In addition to this, regulatory uncertainties are another substantial challenge. In an attempt to overcome this, the governments are beginning to scrutinize DeFi regarding its compliance with anti-money laundering law using know-your-customer (KYC) regulations. However, adhering to such stringent regulatory measures could lead to stifling innovation, thereby slowing the growth of DeFi platforms, especially those that operate across borders without centralized control.

Inculcating smart contracts in Decentralized Finance systems creates an increasingly complex financial phenomenon known as "composability," which is the result of the continuous interaction of smart contracts; such facility renders the system vulnerable by creating interdependencies across contracts and protocols it makes the system fragile by creating a "house of cards" effect, where failure in one component could cascade through the entire system.

Defi poses a heightened risk of increasing indebtedness by producing infinite tokens, which may result in excessive borrowing and lending. This type of leverage eventually caused the global financial crisis of 2008, wherein financial derivatives like credit default were swapped with unsustainable levels of risk. Therefore, in DeFi, the manufacturing of more tokens than demanded could generate an even higher degree of leverage, increasing the possibility of

systemic dangers inside the ecosystem.

It is also to be noted that once a smart contract is enforced, it becomes impossible to alter its terms; this inflexibility is seen in the mortgage-backed securities during the 2008 crisis, where the rigid contractual obligations led to systemic risks such as automated liquidation in volatile market conditions. Moreover, in this autonomous code execution, any errors in the contract's logic expose the users to substantial financial losses, especially in high-profile DeFi hacks where the hacker leverages such errors to override the safety net of the system.

The policy of extreme transparency followed by the decentralized finance (DeFi) systems is creating a loophole for unauthorized access where anyone with access to the internet and the necessary tokens can engage with and deploy smart contracts in this ecosystem. Although this method enables the removal of traditional financial intermediaries in the process of transaction by making the domain of financial services automated and facilitating access to these portals, along with allowing the developers to work without the constraints of traditional institutions in an attempt to achieve greater financial experimentation, it also leads to permissionless access which comes with risks, particularly as there are no professional qualifications or regulatory checks on who can interact with these systems.

DeFi continues to rely on human discretion in matters like deployment, governance, and upgrades despite the hardcore efforts to minimize human intervention so as to fully automatize financial contracts. Most of the DeFi systems are powered by public blockchain systems like Ethereum, which occasionally require manual interference to address issues related to the security of the system and to de-bug the system. Sometimes, such manual intervention gives rise to possibilities where the system might compromise if those responsible for managing these systems act maliciously.

The inherent risks in DeFi can be broadly classified into five categories:

1. The potential systemic risks arising from the interaction between the DeFi platforms and traditional finance structures, as there is a high probability that these systems will become more intertwined, leading to complications.

2. The operational risks associated with the infrastructure of blockchain mechanism, especially in networks like Ethereum, where the user is faced with high transaction

costs alongside scalability issues.

3. The exposed nature of smart contracts which makes DeFi platforms vulnerable to security threats as there are no standard safeguards like those found in conventional financial systems.

4. The persistent human involvement in decentralized systems raises regulatory challenges in the governance of the platforms or applications.

5. The rapid growth of DeFi has exposed scalability issues, particularly concerning transaction costs and network congestion.

IS DEFI A BUBBLE?

The exponential growth of Decentralized Finance (DeFi) is often associated with the overhype around it in the financial world, but this also makes us question whether the DeFi platforms are experiencing a speculative bubble. In a comparative study of DeFi's components with that of historical financial bubbles, one can observe many similarities, such as speculative investment, extreme market volatility, and overly optimistic projections between the DeFi systems and previously recorded financial bubbles.

Speculative Investment

DeFi is no exception from other financial bubbles, as most of the capital flowing into the DeFi is driven by speculative investments like yield farming, liquidity, mining, and token speculation, thus making it fall prey to an influx of speculative capital. These practices are often driven by short-term gains rather than long-term sustainability, where rapid appreciation of DeFi tokens without considering growth in terms of real-world utility mirrors the speculative fervor seen during the dot-com bubble. Such phenomenon leads to projects being valued based on potential future applications causing inflated valuations not supported by present-day fundamentals.

Extreme Market Volatility

Extreme market volatility, another hallmark of speculative bubbles, is also observed in DeFi, due to which DeFi tokens and assets are often wildly fluctuating by the influence of factors

such as market sentiment, liquidity, and even regulatory developments. For instance, the tokens built on Ethereum have been experiencing both meteoric rises and sharp declines in value. Although such volatility is not entirely unexpected in a nascent industry, the extent and frequency of these price movements raise a concern regarding the level of instability, as such fluctuations can create an unsustainable market environment where assets are rapidly overvalued before experiencing significant downfalls.

Over-Optimistic Projections

Even though the adherent supporters of DeFi claim that it will revolutionize traditional financial systems by disintermediating banking services alongside providing enhanced financial tools with greater accessibility through smart contracts. While these goals are laudable, the current state of DeFi depicts otherwise as the infrastructure required for global adoption, including scalability solutions, security protocols, and regulatory frameworks, which are still under development. This gap between these ambitious projections and the present reality is reminiscent of past bubbles, where early-stage technologies were expected to deliver more than they were technologically or structurally capable of achieving at that time.

While DeFi represents genuine innovation with the potential to transform the financial landscape, its current status suggests that it may be in a speculative bubble phase. In order to overcome this bubble, the similarities observed must undergo significant correction before reaching a more stable and mature phase of development.

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