



Decentralized Finance (DeFi): Disrupting Traditional Banking Systems and Their Regulatory Challenges

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Abstract

Decentralized Finance (DeFi) is among the most revolutionary blockchain technology applications that changes how financial systems operate globally by eliminating the middlemen and allowing peer-to-peer transactions via smart contracts. DeFi platforms built on decentralized networks recreate core banking services (e.g., lending, borrowing, trading, and asset management) in a transparent, borderless, and programmable setting.

This paper looks at the ways in which DeFi is disrupting conventional banking and the regulation issues that have emerged due to the phenomenon. It discusses the technical foundations of DeFi, its benefits of inclusiveness, efficiency, and innovation and its risks of volatility, security, and systemic vulnerability.

Among the major regulatory issues identified in the paper are jurisdictional ambiguity, anti-money laundering (AML) and Know-Your-Customer (KYC) compliance, investor protection, and financial stability. Applications like Uniswap, Aave as well as MakerDAO example opportunities and threats. The same problem has dominated the United States, European Union and the emerging economies, as has been described in the comparison analysis of the response in regulation; tension of stimulation of innovation and protection of the financial structure.

Research indicates that although DeFi has a revolutionary potential in relation to open finance, its decentralized form makes it difficult to regulate. It needs to be a middle ground between international coordination, hybrid sandboxes and technology neutral policy to not just promote resilience and consumer protection, but also creativity.

Keywords: Decentralized Finance (DeFi); Blockchain; Traditional Banking; Financial Regulation; FinTech.

1. Introduction

Centralized intermediaries, including banks, stock exchanges and payment processors, have traditionally controlled the global financial system. Although these institutions are vital to the populations exposed to them, they have been accused of inefficiency, lack of transparency, high prices, and marginalization of the populations (Allen, Gu, and Jagtiani, 2022). The fundamentals of decentralized financial applications, without the median, became realized in 2009 with the advent of blockchain technology, and the publication of Bitcoin (Schär, 2021).

DeFi is the evolution of the current financial innovation, with the purpose of replicating the work of the traditional finance (lending, trading, asset management, etc.) on the decentralized blockchain networks. With smart contracts, DeFi also facilitates non-intermediated peer-to-peer transactions at lower costs and with greater accessibility (Harvey, Ramachandran, & Santoro, 2021). By 2022 total value locked (TVL) in DeFi protocols had topped 200 billion and the market volatility narrative had become systemic risk (DeFi Pulse, 2022).

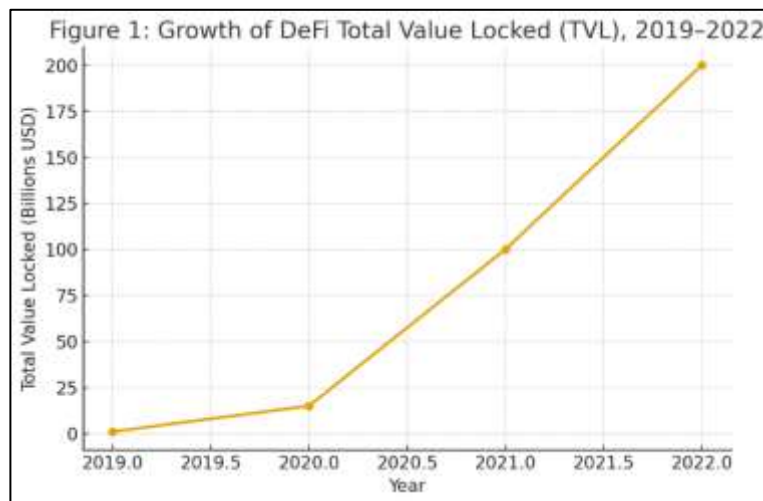


Figure 1: Growth of DeFi Total Value Locked (TVL), 2019–2022

The emergence of the DeFi, however, has raised serious regulatory issues. However, unlike traditional banking where the activity of these institutions is closely controlled, DeFi is governed in a decentralized form, where no one can be named in relation to compliance. The regulators are concerned about money laundering, consumer fraud, systemic risk, or circumventing monetary policies (Zetsche, Buckley, and Arner, 2020). This two-sided reality: innovation and risk, is the main controversy surrounding DeFi.

This paper will discuss the disruptive nature of DeFi to the traditional banking industry and examine the regulatory issues that need to be resolved in order to achieve a sustainable financial future.

2. Background of the Study

Traditionally, financial innovation has been a cyclical phenomenon where disruptive technologies always change the world. Every wave has made accessing and using credit cards, online banking, or any other form of technology more accessible and efficient (Allen, Gu, and Jagtiani, 2022). The latest trend is blockchain and decentralized finance (DeFi), which will supposedly decentralize finance at the lowest level (Schär, 2021).

With the introduction of Ethereum in 2015, the growth of DeFi was jump-started, as it provided the ability to create smart contracts, or self-executable code that could enforce contracts without intermediaries (Harvey, Ramachandran, and Santoro, 2021). MakerDAO protocols to lend to and borrow stablecoins, Uniswap to trade through a decentralized exchange, and Compound to lend and borrow soon became popular, cumulatively drawing billions of dollars of user assets (DeFi Pulse, 2022). DeFi would bring greater financial access to the unbanked, reduce costs and enhance transparency with open-source code (Zetsche, Buckley, and Arner, 2020).

Nonetheless, lack of centralized regulation has created gaps that include hacks, rug pulls, speculative bubbles, and systemic failure. Technical weakness in DeFi would be replicated at a scale on a global basis and would pose a regulatory problem in its own right, as the loosely stable TerraUSD (UST) stablecoin debacle in 2022 also demonstrated (Allen et al., 2022).

3. Justification

Research in DeFi is important because of a number of reasons. To begin with, the essence of DeFi is financial disruption because it asserts the very basis of banking by replicating the functions historically controlled by institutions (Harvey et al., 2021). Second, inclusivity is a significant advantage: of all adult unbanked persons in the world (estimated at 1.7 billion), DeFi provides a new way to engage in finance (Schär, 2021). Third, the threats and risks of DeFi, including fraud, volatility or systemic risk, justify the need to study this sphere in particular (Allen et al., 2022). Finally, a regulatory tensions section is provided as policy makers must address the following aspects: how to encourage innovation and consumer and financial security (Zetsche et al., 2020).

In light of these dynamics, the study of the effects of DeFi on banking and regulation is critical to researchers, regulators, and financial institutions.

4. Objectives of the Study

This study seeks to:

1. Discuss the way DeFi is disrupting the role of banks.
2. Point out the technology changes behind DeFi use.

3. Talk about the threats and challenges of DeFi platforms.
4. Assess regulatory risk of DeFi in different jurisdictions.
5. Recommend options on how to strike the balance between innovation and regulation.

5. Literature Review

The scholarly literature on decentralized finance (DeFi) is growing quickly. According to Schär (2021), the term DeFi is described as an open, permissionless, and highly interoperable protocol stack based on public blockchains, which may democratize access to financial services and yet also highlights vulnerabilities at the systemic level. Similar to Harvey, Ramachandran, and Santoro (2021), the authors note that DeFi is efficient, programmable, and innovative, but when not regulated, it can be a major threat to financial stability. Along these lines, Zetzsche, Buckley, and Arner (2020) posit that DeFi exists within relatively loose regulations, which form gray areas that make it harder to oversee and enforce.

The weaknesses and strengths are highlighted by comparison with traditional banking. Although banks tend to be slow in their innovation, they offer consumer protection, systemic stability, and compliance. By contrast, DeFi promotes speedy experimentation and innovation with no safety parameters in place, including deposit insurance, centralized responsibility, or crisis management devices.

These debates have been aggravated by the recent events. The risk of algorithmic stablecoins like TerraUSD in 2022 may define the opportunities and the risks of DeFi, where the systemic risks of a decentralized system will be transmissible to other financial systems (Allen, Gu, and Jagtiani, 2022).

6. . Material and Methodology

The research presented here uses a qualitative and exploratory research design to understand the disruptive impact of decentralized finance (DeFi) on conventional banking and regulatory issues. The analysis is organized in terms of four elements. To determine the theoretical and empirical basis of DeFi, first, peer-reviewed journal articles, financial reports, and regulatory publications have been reviewed as secondary sources. Second, the case studies have been selected to reflect real-life applications, risks, and opportunities by including case studies of the largest DeFi platforms, including UniSwap, Aave, and MakerDAO. Third, the difference or similarity between the financial functions of DeFi lending, payments, or trading in comparison with traditional banks was assessed through a comparative framework. Lastly, a regulatory review was done to look at policy response in major jurisdictions such as the United States, the European Union, and some regions of Asia. In order to generalize the results thematic coding was used to derive common themes in the adoption of technologies, financial risks, and regulatory discussions.

7. Results and Discussion

7.1 Breaking up of Traditional Banking functions

Financial intermediation via DeFi has been disrupted to a considerable degree. Within the lending and borrowing sector, protocols like Aave enable users to either lend or borrow directly out of liquidity pools without banks acting as middlemen. In payment, stablecoins like USDC and DAI help in performing cross-border transactions faster and more cheaply than the traditional payment systems. Decentralized exchanges (DEXs) such as Uniswap are liquidity pools and automated market-making systems that can compete with the efficiency of traditional stock exchanges in trading.

Table 1 — Map DeFi Functions to Banking Roles, Risks, and Regulation

Traditional Banking Function	DeFi Analogue (Example)	What It Replaces	Key Risks	Main Regulatory Focus
Lending & Borrowing	Aave, Compound	Bank credit intermediation	Smart-contract bugs, liquidity crunch, oracle risk	Investor protection, prudential risk
Payments & Transfers	Stablecoins (USDC, DAI)	Card networks/correspondent banking	De-pegs, sanctions exposure	AML/KYC, sanctions compliance, payment oversight
Trading & Market Making	Uniswap (DEX, AMM)	Exchanges & market makers	Impermanent loss, rug pulls, market manipulation	Market integrity, disclosure, custody rules

Traditional Banking Function	DeFi Analogue (Example)	What It Replaces	Key Risks	Main Regulatory Focus
Asset Management/Yield	Vaults, liquidity mining	Funds & structured products	Leverage, complexity, opacity	Suitability, disclosures, advertising rules
Stable Value/Settlement	MakerDAO (DAI)	Cash-like instruments	Collateral risk, liquidation spirals	Monetary policy & financial stability

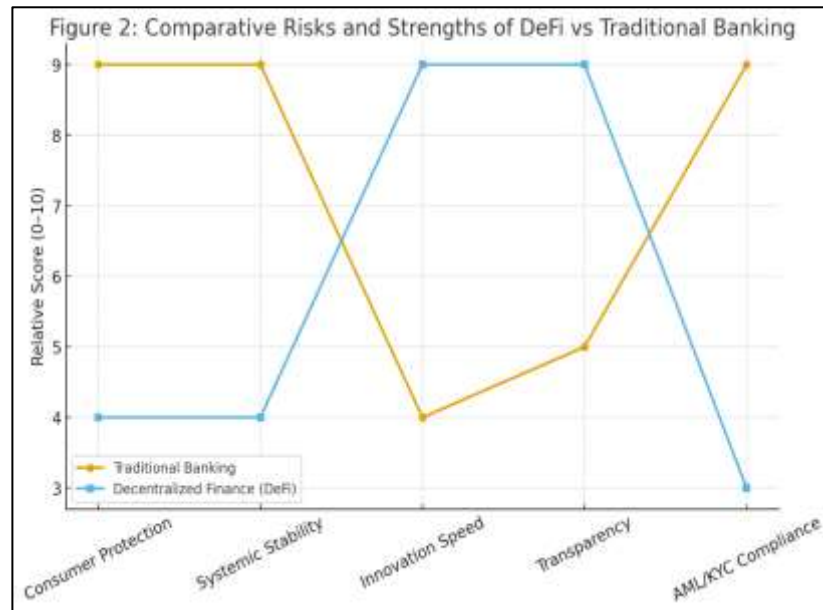


Figure 2: Comparative Risks and Strengths of DeFi vs. Traditional Banking

7.2 Advantages of DeFi

The benefits of DeFi are also well recognized. The greatest advantage of it is accessibility because everyone is free to join in as long as they have access to the internet. Another strength is transparency, as the majority of DeFi protocols are open source and thus users can read code and review operations. Any smart contract has the advantage of automatizing and reducing delays and intermediate cost. Also, tokenization and programmable asset innovation have allowed the development of completely new financial product classes.

7.3 Risks and Challenges

Despite these benefits, there is a real threat to DeFi. The most common and overwhelming problem is security vulnerability, and even the large ones, including the Poly Network attacks that took place in 2021, cost in the billions of money. The other important problem is the volatility of cryptocurrencies in which the value of the tokens drops and increases by a large percentage making it unstable. A very straightforward example of the manifestation of systemic risks is the algorithmic stablecoin collapse that throws light on the vulnerability of certain protocols. Furthermore, there is no central control, and as such, there is no accountability, nor is there is an apparent way in which a user can avail redress in the event of defrauding or failure.

7.4 Regulatory Challenges

Decentralized protocols can have distinctive jurisdictional ambiguities, since the globalization of DeFi may be an activity that crosses borders without a definite legal domicile. This complicates the process of regular regulation. Blockchain wallets are pseudonymous and thus harder to comply with the anti-money laundering (AML) and know-your-customer (KYC) regulations. The other challenge is investor protection where retail participants can be subjected to scams, rug pulls, and opaque governance. Lastly, by creating and issuing stablecoins, DeFi could also present monetary policy risks, as it could give central banks less control over the circulation of currency and financial stability.

7.5 Case Studies

Case studies are the best way to explain the dynamics of DeFi. The first project to offer decentralized stable coins is MakerDAO that has already launched its DAI program that offers transparency but has been criticized as highly overcollateralized and carrying high liquidity risk. Dexes such as Uniswap have provided liquidity in an automated fashion, hence democratizing trade, but their approach to listing tokens that are not registered by a regulator is a source of regulatory uncertainty. One example of how credit markets make decentralized lending a workable and efficient solution is Aave but it remains vulnerable to liquidity crises and flash loan attacks. Combined, these illustrations highlight the opportunities and threats that the DeFi ecosystem presents.

8. Limitations of the Study

There are a few limitations to this study that must be mentioned. To begin with, it is based on secondary data sources in the vast majority of cases and, thus, excludes the possibility of empirical validation and, potentially, ignores user experience on the user-level (Harvey, Ramachandran, and Santoro, 2021). Second, the dynamism of DeFi technologies and protocols makes it likely that the current results mentioned here will become obsolete as other platforms, forms of governance, and financial instruments appear (Schär, 2021). Third, the analyzed case studies are informative but do not reflect the scope and range of DeFi applications in the global markets (Zetsche, Buckley, and Arner, 2020). Lastly, there is no quantitative risk modeling, which prevents quantifying systemic vulnerabilities and estimating the macroeconomic impact of mass DeFi uptake (Allen, Gu, and Jagtiani, 2022).

9. Future Scope

Future studies should discuss the constraints to learn more about the future of DeFi. The second option could be that compliance systems can be run by the AI; to create more transparency and trust, RegTech is presented as smart contracts (Harvey et al., 2021). It will also be essential to have worldwide coordination systems to regulate the inherently cross-border nature of DeFi operations (Zetsche et al., 2020). Besides, the advent of central bank digital currencies (CBDCs) is another opportunity to consider synergies between state-subsidised digital currencies and decentralised ecosystems (Allen et al., 2022). More balanced solutions to the trade-off between decentralized protocol innovation and centralized regulation stability are also available with hybrid designs such as CeDeFi (centralized-decentralized finance) (Schär, 2021). Finally, quantitative resilience studies that simulate systemic shocks to identify the risk of contagion in DeFi markets might be of value to regulators, policymakers, and financial institutions (Allen et al., 2022).

10. Conclusion

DeFi is a revolution in the world of finance, disrupting the role of banks by providing alternatives that are decentralized, transparent, and programmable. One potential disruptor is that finance is democratized, but the lack of regulation in its development is a significant danger. Regulations are to be more creative and consistent with the traditional frames.

At the end of the paper, there is a statement of the hypothesis based on which the future of DeFi will be grounded in the hybrid solutions that will combine the principles of decentralized management and adaptive regulation. DeFi will only become a viable substitute to the global financial system by mitigating the risks without suffocating innovate

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