LAB University of Applied Sciences

Money Loan Process in Centralized Finance vs. Decentralized Finance

A comparative study of Deutsche Bank, Aave and Compound

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Abstract

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Title of the thesis

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Rapid-developing DeFi landscape has presented us an alternative to traditional banking institutions. This study was conducted in order to compare Deutsche Bank, Aave and Compound loan models. The study has indicated possible benefits of using DeFi protocols over traditional banks; study has indicated possible risks of using DeFi protocols; traditional banking system is presented in a nutshell by one of the most influential banks on the current market. Data from traditional banks is considered to be rather representative, because of the bank's individual-policy of creditworthiness and conditions non-disclosure, which may be secure and normalized, however it might be ineffective and non-transparent as well. DeFi protocols offer personal control over own funds without possibility of these funds ban, the exceptions exist in stablecoins policy though.

Keywords

DeFi, Deutsche Bank, Aave, Compound, Loan, Borrow, Interest Rate

Contents

1 Introduction

The Traditional Finance model is characterized by regulatory compliance, centralized control, and often, geographical and procedural limitations. Since Traditional Finance is based on reliance on a centralized intermediaries chain, further in this report I will refer to Traditional Finance as CeFi(Centralized Finance) and regarding Decentralized Finance I will use DeFi. CeFi relies on established financial institutions like Deutsche Bank to mediate financial transactions. These institutions act as trusted intermediaries, overseeing the loan process from credit assessment to funds dispatch and repayment.

DeFi platforms oppose to CeFi institutions and aim to decentralize the lending process. Blockchain technology by its nature provides solution to replace intermediaries with smart contracts. These contracts automatically execute transactions based on conditions , that was preset by the contract deployer, offering transparency and reducing the need for trust in individual entities. DeFi platforms provide open access to financial services despite of demographics however they often require over-collateralization to mitigate risk in a trustless environment. The introduction of governance tokens in these platforms democratizes the decision-making process which allows community members to propose and vote on changes to the protocol. These communities or organizations are called DAOs(Decentralized Autonomous Organizations).

This shift from CeFi to DeFi raises concerns about the stability, efficiency, and accessibility of financial services. While DeFi protocols promise greater inclusivity and democratization, they also presents challenges in terms of regulatory compliance, security, and market stability.

1.1 Digital assets in the financial sector

Blockchain development has launched a transformation of financial sector by introducing digital assets. Digital assets represented by cryptocurrencies, governance tokens, and various forms of digitalized financial instruments have presented an alternative to traditional financial paradigms by introducing new options for investment, lending, and asset management.

Satoshi Nakamoto marked the beginning of this transformation by posting Bitcoin Whitepaper in 2008. The identity of Satoshi Nakamoto still remains unknown. A De-centralized alternative to traditional fiat currencies was intoduced. Ethereum's launch in 2015 further expanded the landscape by introducing smart contracts, that gave birth to more complex financial transactions and the development of decentralized applications (dApps). This innovation led to the creation of various decentralized finance (DeFi) protocols, such as Aave and Compound, which offer lending and borrowing services using digital assets as collateral.

Digital assets integration in the financial sector encounters challenges as well. Price volatility, regulatory uncertainty, and concerns about security and scalability continue to be areas of active research and development. However digital assets still have gained a certainly respectful level of popularity due to their potential for high returns, inclusivity, and innovation in financial services.

1.2 Research objectives and significance

The main goal of this research is conduct a comparative study of money loan processes in Centalized Finance(CeFi) agent, represented by Deutsche Bank, and Decentralized Finance (DeFi) agents, represented by Aave and Compound. The research objectives are:

- to analyze the operational mechanisms of CeFi and DeFi in the context of lending and borrowing
- to examine the role of digital assets in transforming the financial lending landscape
- to assess the risks and opportunities presented by DeFi compared to traditional banking systems.

The research question was formulated based on research objectives:

" CAN DEFI LOANS PROPOSE A VIABLE ALTERNATIVE TO CENTRALIZED BANKING LOANS?. IF YES WHAT ARE THE BENEFITS AND IMPLICATIONS RELATED? "

The significance of this research lies in its contribution to understanding the fast-evolving landscape of financial services in the digital age. It is aimed to offer insights for those who already have background in DeFi as professionals and those who are eager to delve into modern technological advancements in DeFi.

1.3 Structure of the thesis

The thesis is organized as follows:

- Introduction: Introduces the research topic, background, and objectives.
- Literature review: Provides an overview of existing research on CeFi and DeFi, highlighting the role of digital assets and exploring the technical side of DeFi money loan process.
- Methodology: Describes the data sources and analysis techniques used in the study, along with study limitations.
- Comparative analysis: Examines Deutsche Bank, Aave, and Compound in detail, focusing on their operational mechanisms, risks, and regulatory landscape.
- Hypothetical scenarios: Is aimed to provide a hypothetical example of certain people using each of the financial instruments presented in the research in order to draw the core differences for a certain customer.
- Cross-comparative discussion. Implications and future trends: Discusses similarities and differences between CeFi and DeFi, the role of digital assets, and analyzes market dynamics and user behavior. The section presents further exploration on the impact of the findings on the global financial ecosystem and potential integration of CeFi and DeFi as well as future research directions.
- Conclusion: Summarizes key findings, draws conclusions from the comparative study, and reflects on the future of finance with digital assets.

2 Literature review

The aim of literature review is to gather information from credible sources in order to provide a comprehensive theoretical overview on the research.

2.1 Overview of DeFi

Decentralized Finance or DeFi is a term that is used to refer to an open-source protocol group built on public blockchain networks with the primary goal of creating an open, permissionless and interconnected and transparent financial ecosystem accessible to anyone(Buterin 2014, 1).

Key Characteristics of DeFi:

- Permissionless Access: DeFi platforms provide open access to anyone with an internet connection, despite of geography or status (Schär 2021,153).
- Smart Contracts: Smart contracts are programmable self-executing contracts with terms of agreement directly written into code, which automate financial processes acting as a replacement of intermediaries (Buterin 2014, 1).
- Interoperability: DeFi applications can interact and integrate with each other, creating a modular and interconnected financial ecosystem (Werner et al. 2022, 1).
- Transparency: Transactions on DeFi platforms are transparent and verifiable by all, fostering trust in the system's integrity (Werner et al., 2022, 1).

The DeFi landscape has witnessed exponential growth, with billions of dollars locked in various DeFi protocols. This growth is linked to the innovative use of blockchain technology to offer financial services that are typically faster, more accessible, and often more profitable than traditional financial systems (Levine 2022.)

Despite its potential, DeFi faces significant challenges such as regulatory uncertainty, scalability issues, and security vulnerabilities, including smart contract exploits and fraud. The early nature of the ecosystem also raises concerns about its stability and the lack of consumer protection mechanisms (Saengchote et al. 2022, 7.)

Core Principles of DeFi:

- Decentralization: Elimination of centralized intermediaries, with operations running on decentralized networks primarily facilitated by blockchain technology (Nakamoto 2008, 1).
- Programmability: Advanced programmability of financial instruments and services through smart contracts, enabling functionalities that go beyond simple transactions (Buterin, 2013).
- Composability: Werner et al (2022,1) refers to DeFi protocols as "money legos," indicating their ability to be combined and integrated in various configurations to create new financial products and services.
- Inclusivity and Accessibility: DeFi aims to offer financial services to a global audience, especially those underserved by traditional banking institutions (Qin et al. 2021, 1).

2.2 Overview of CeFi

Centralized Finance (CeFi) refers to the traditional financial system where financial services are provided through centralized and controlled institutions such as banks, credit unions, and other financial institutions. This system is characterized by its dependance on intermediaries for the conducting of transactions and services. CeFi operates under a regulatory framework set by government institutions. CeFi involves intermediaries for transactions, which can result in slower processes and higher fees. However, it offers higher regulatory compliance and consumer protection (FWX 2023.)

Key Characteristics of CeFi:

- Centralized Control: Financial transactions and services are controlled by centralized entities that maintain authority over operations and user assets (Deloitte 2022, 6).
- Regulatory Compliance: CeFi entities are subject to strict and precise regulatory requirements designed to protect consumer interests and ensure the system's integrity (Qin et al. 2021, 7).
- Intermediation: Traditional financial systems rely heavily on intermediaries such as banks, which can lead to increased costs and potential delays in transactions (BIS 2023, 19).

- Limited Accessibility: CeFi services may not be accessible to everyone, particularly in regions with underdeveloped banking infrastructure or for individuals without formal banking relationship (Deloitte 2022, 6).

According to Defix (2023) CeFi institutions provide fundamental to modern economics services such as savings accounts, checking accounts, credit cards, loas and investment opportunities.

CeFi systems offer a high level of consumer protection, including insurance schemes like FDIC in the US, which protect consumer deposits. They also provide a degree of stability and trust, established over decades of operation. Although, they are often criticized for their exclusivity, high fees, and inefficiencies. Last but not least, CeFi institutions are potentially vulnerable to economic downturns and financial crises, as evidenced by the 2008 financial crisis.

2.3 CeFi vs. DeFi

Schär(2021, 160) indicates the fundamental difference of DeFi and CeFi. While DeFi aims to remove intermediaries and democratize financial system using blockchain technology, CeFi operates as a model that centralizes control and relies on established legal and regulatory frameworks. The two systems differ significantly in their approach to accessibility, transparency, and regulatory oversight.

Centralized Finance (CeFi) and Decentralized Finance (DeFi) present two fundamentally different conceptual approaches to financial services. CeFi, operates on a centralized model where the institution acts as an intermediary in financial transactions (Xu & Vadgama 2022, 5). In contrast, DeFi, is characterized by its use of blockchain technology to facilitate peer-to-peer(P2P) financial services without a central authority (Qin et al. 2021, 1).

According to Qin et al. (2021, 3)The operational mechanisms of CeFi and DeFi differ significantly. In CeFi, transactions are processed and controlled by the central institutions, which maintain authority over user funds and the execution of transactions while DeFi operates on a trustless model, where smart contracts automatically execute transactions, reducing the need for intermediaries.

The risk profiles of CeFi and DeFi vary. CeFi institutions are regulated and subject to oversight, which provides a layer of security but also introduces limited user control over user's assets. DeFi's primary risk stems from the technical vulnerabilities of smart contracts and the volatility of digital assets (Darlin et al. 2022, 3)(Werner et al. 2022, 6).

DeFi offers greater market accessibility compared to CeFi. Traditional financial systems often have barriers to entry such as credit checks and geographical limitations (Qin 2021, 1). DeFi platforms, however, provide more inclusive financial services, accessible to anyone with an internet connection (Deloitte 2022, 6).

Castro-Iragorri et al. (2021, 13)states that regulatory environment for CeFi is well-established, with clear guidelines and oversight mechanisms. However, the regulatory landscape for DeFi is still evolving, posing challenges for both users and platforms in terms of compliance and security.

Trust dynamics differ between CeFi and DeFi. In CeFi, trust is placed in the institution, whereas, in DeFi, trust is placed in the technology and code. This shift presents a new paradigm in how users interact with financial services (Saengchote et al. 2022, 1)

The range of financial products and services offered by CeFi and DeFi also shows notable differences. CeFi provides a broad spectrum of services under a regulated framework. DeFi, meanwhile, offers innovative products such as liquidity pools, which are not typically found in traditional finance (Bartoletti et al. 2021, 1.)

2.4 Deutsche Bank

Deutsche Bank is a leading global banking and financial services company, headquartered in Frankfurt, Germany, that was established in 1870. It provides a wide range of financial services including retail banking, asset management, private banking, and investment banking. As a major player in the traditional financial (CeFi) world, Deutsche Bank has been pivotal in shaping the banking industry both in Europe and globally (Deutsche Bank).

The loan process at Deutsche Bank encompasses several stages: application, assessment, approval, and management. Client submits a loan application, which is then analyzed for creditworthiness based on client's financial history, income, and

other factors. This process is heavily reliant on centralized credit scoring systems and manual underwriting. After approval, the loan is supplied, and clients are legally required to follow to the agreed repayment schedule.

The bank follows strict guidelines set by financial authorities, including the Basel III framework, to ensure stability and manage risks related to credit, market, liquidity, and operational aspects (Basel Committee on Banking Supervision, 2011). The bank also has budgeting for dedicated teams and technologies to comply with anti-money laundering laws and Know Your Customer (KYC) requirements.

The bank is also exploring blockchain technology for its potential in streamlining processes and enhancing security (Deutsche Bank, 2020).

2.5 Aave

Aave's journey reflects a significant evolution in the DeFi landscape. Initially launched as ETHLend, a decentralized lending application on Ethereum, it transformed into Aave, a more sophisticated and versatile DeFi protocol. (Xu & Vadgama 2022, 9)

Aave website Aave operates as a decentralized, non-custodial liquidity protocol, allowing users to participate as suppliers, borrowers, or liquidators. It introduced several innovative features, such as 'aTokens' representing deposited assets, stable rate borrowing, and credit delegation. Aave V3 further expands these capabilities, optimizing asset yield generation and borrowing power(Aave.)

Aave facilitates seamless cross-chain interactions and liquidity flow across various networks, underpinning a more interconnected and efficient DeFi landscape(Aave.)

Aave's security framework has evolved to mitigate risks associated with the DeFi sector. Features like Siloed Borrowing, which limits exposure to assets with manipulatable oracles, and the Sentinel feature, introducing a grace period for liquidations, exemplify its proactive approach to risk management. Furthermore, Aave's governance structure allows for dynamic risk parameter adjustments, reflecting a responsive and robust protocol design. Aave website(Aave.)

2.6 Compound

Compound, a pioneering entity in decentralized finance (DeFi), is a protocol built on the Ethereum blockchain, designed for lending and borrowing of cryptocurrencies. Founded in 2017, Compound's mission revolves around creating an efficient system for earning interest through a dynamic interest rate algorithm, which automatically adjusts rates based on available liquidity(Saengchote 2022, 6). It’s inception marked a significant development in the DeFi sector, introducing novel concepts of permissionless, censorship-resistant financial transactions, leveraging the benefits of blockchain technology. Unlike traditional finance where intermediaries control capital flow, Compound operates on a decentralized model, where smart contracts automate and regulate transactions without human intervention, ensuring privacy and eliminating identity requirements(Saengchote 2022, 0).

Compound's operational model is driven by its 'cToken' contracts. When users deposit cryptocurrencies (like DAI, USDC, or ETH), they receive cTokens (like cDAI) in return. These cTokens represent the original deposit and accrue interest over time. The interest rates are set by a dynamic algorithm that adjusts borrowing and lending rates in response to liquidity changes. This system ensures that Compound can generate enough token income to pay depositors while maintaining liquidity for loans(Saengchote 2022, 12).

A key innovation in Compound is its governance token, COMP. COMP holders have voting rights on protocol decisions, reflecting a decentralized governance model where decision-making is distributed among stakeholders. This aspect of Compound underscores its departure from traditional financial systems, where decisions are typically centralized(Saengchote 2022, 9)..

Compound's integration into the DeFi ecosystem has been substantial. It has contributed significantly to the popularization of 'yield farming,' where users maximize returns by engaging in lending and borrowing activities within DeFi protocols. This approach, often amplified through leverage, has become a hallmark of DeFi investment strategies, demonstrating Compound's influence on market behaviors and investment methodologies in the broader DeFi landscape (Saengchote 2022, 10).

However, Compound's operation is not without challenges. A notable concern is credit risk management. Given the pseudonymity of blockchain transactions, Compound cannot rely on traditional borrower information for credit assessments. Instead it depends entirely on the collateral's value. This system, while being innovative, poses risks, especially in highly volatile market conditions where the collateral's value can fluctuate rapidly.

Security is another critical issue. Compound's reliance on “data oracles” – a specific code written on blockchain to fetch external pricing data introduces a vulnerability. If these oracles are compromised or the data manipulated, it could lead to significant losses, as seen in some exploits within the DeFi sector. Additionally, the protocol's automatic mechanisms, while being efficient, could be susceptible to unforeseen market conditions or technical vulnerabilities, highlighting the need for continuous oversight and improvement(Saengchote 2022, 18).

2.7 Regulatory and ethical considerations in DeFi

The evolution of DeFi from cryptocurrencies like Bitcoin, introduced in 2009, has created a parallel financial system, distinct from traditional finance. DeFi transactions include a range of activities such as borrowing, lending, and insurance, all utilizing digital tokens. However, stablecoins, a key component in DeFi, face risks threatening their stability, highlighted during events like the 50% plummet in crypto-assets at the onset of the COVID-19 pandemic(Salami 2021, 426.)

DeFi's link with money laundering is a significant regulatory challenge. The absence of AML and KYC requirements in DeFi allows anonymous transactions, raising concerns about illicit activities. U.S. regulators, through legislation like the U.S. Infrastructure Investment and Jobs Act, have attempted to address these issues, though their enforceability in the DeFi context remains uncertain(Salami 2021, 428).

The governance of DeFi, managed through Decentralized Autonomous Organizations (DAOs), presents a conundrum. To achieve full decentralization, DeFi protocols must operate solely based on code without influence from central bodies like software developers. The question of who is regulated in such a decentralized framework is complex and depends on the degree of decentralization achieved.

Global regulatory approaches to DeFi are fragmented, ranging from no regulation to outright bans. This patchwork approach is insufficient given the global nature of DeFi transactions. Efforts have focused more on centralized institutions like cryptocurrency exchanges and wallet providers, rather than on decentralized protocols themselves(Salami 2021, 428).

DeFi's unregulated nature makes it susceptible to fraud and money laundering, with over $10 billion, according to Vereckey (2021), lost to scams in 2021. The lack of an even playing field in DeFi, despite its promise of democratization, is evident in the dynamics of liquidity and fee structures in dominant exchanges.

Vereckey (2021) states that tax collection in DeFi is problematic due to the pseudonymous and permissionless nature of blockchain transactions. Estimates suggest significant losses in potential tax revenue, highlighting the challenges in enforcing tax and anti-money laundering regulations in the DeFi space.

Governance in DeFi, conducted via DAOs, differs markedly from traditional finance. Decision-making is distributed among stakeholders using crypto tokens, raising issues about the enforcement of regulations and penalties in a decentralized environment (Vereckey 2021).

Vereckey (2021) asserts the need for global regulatory coordination for cryptocurrency and DeFi to address these challenges. Proposals include validators on blockchains verifying certified entities and transactions involving certified addresses proposed by Schoar, promoting regulatory compliance while preserving blockchain features.

3 Methodology

This chapter outlines the primary and secondary data sources utilized in the comparative study of the money loan process in traditional finance (focusing on Deutsche Bank) and decentralized finance (with an emphasis on Aave and Compound). The aim is to establish a comprehensive foundation for understanding how these distinct financial systems operate and interact.

3.1 Description of data sources

Data for Deutsche Bank includes financial statements and media releases accessible through the bank's official website. This data provides insights into the bank's loan processes, risk management strategies, and overall financial health.

The study primarily relies on data from the smart contracts and transaction records of Aave and Compound, which are accessible through their official websites and blockchain explorers. Financial metrics are extracted from a trusted DeFi metrics service Defilama. The blockchain's transparency ensures that the data is accurate and tamper-proof.

The study uses academic and industry literature to understand the broader context of both CeFi and DeFi.

The original Bitcoin whitepaper and Ethereum whitepaper are compulsory papers in understanding the technological underpinnings of DeFi. They provide crucial insights into the principles and mechanisms driving these platforms.

3.1.1 Application to data sources description:

These values will be presented as quantitative data:

- Common Equity Tier 1 (CET1) Ratio: Measures a bank's core equity capital (like shareholders' equity and audited profits, minus certain deductions) against its risk-weighted assets. Minimum requirement is 4.5%.
- Tier 1 Ratio: Compares a bank's core Tier 1 capital (CET1 plus Additional Tier 1 capital like preferred shares) to its risk-weighted assets. Minimum requirement increased from 4% to 6% under Basel III.

- Total Capital Ratio: Assesses a bank's total capital (Tier 1 plus Tier 2 capital, including subordinated debt) against its risk-weighted assets. Provides a broader view of capital adequacy.
- Leverage Ratio: Divides a bank's Tier 1 capital by its total leverage exposure, including off-balance sheet items. Acts as a backstop to risk-based metrics, with a minimum requirement of 3%.
- Liquidity Coverage Ratio (LCR): Ensures banks hold enough liquid assets to cover total net cash outflows over a 30-day stress period.
- Net Stable Funding Ratio (NSFR): Requires banks to maintain stable funding sources exceeding the required amount over a one-year stress period, promoting long-term stability.
- TVL stands for total value of assets sum that users keep in the protocol.

3.2 Data integration and comparative analysis

The study aims to integrate data from these diverse sources to present a transparent overview of the loan processes in both CeFi and DeFi. The comparative analysis will be grounded in empirical data from Deutsche Bank, Aave, and Compound.

3.3 Theoretical framework for comparing traditional and decentralized finance

For comparing Centralized Finance (CeFi) and Decentralized Finance (DeFi), an effective theoretical framework should encompass several key dimensions that capture the unique characteristics and dynamics of both systems.

Financial Performance Metrics: Traditional banks report metrics like net income, revenue, cost-to-income ratio, etc. For DeFi platforms, while direct equivalents might not be available, values as total value locked (TVL), fee income, and protocol revenue will be analyzed.

Capital and Liquidity Ratios and Credit Risk and Loan Performance: Banks have regulatory capital ratios (like CET1, Tier 1, Total Capital Ratio) and liquidity ratios (like LCR, NSFR). For DeFi risk management models are presented in smart contracts as collateralization protocols, liquidation processes, and governance model.

Interest Rates or/and NIM: Banks provide information on interest margins and interest rates for different products. Aave and Compound provide lending and borrowing rates for various cryptocurrencies.

3.4 Data analysis techniques

Financial data from Deutsche Bank, including loan volumes, interest rates, and default rates, are analyzed using standard financial analysis tools. For Aave and Compound, similar metrics are extracted from blockchain data. These metrics are compared to evaluate the efficiency and stability of each system.

Risk assessment involves analyzing the volatility of asset prices, collateral liquidation events, and the overall health of lending pools. For DeFi platforms, this includes monitoring smart contract risks and protocol-specific risks.

Qualitative analysis focuses on understanding the user experience, regulatory environment, and operational models of Deutsche Bank, Aave, and Compound.

The operational models of Deutsche Bank, Aave, and Compound are qualitatively assessed based on their governance structures, transparency levels, and adaptability to market changes.

Hypothetical scenarios modelling is a final step of comparative analysis. It is implemented in order to provide an understandable use cases of each of comparison subjects. Another reason for to balance different data metrics and way of conduction due to vast conceptual differences of CeFi and DeFi institutions.

3.5 Limitations and ethical considerations

The primary limitations of this study include:

- data Accessibility and Reliability
- market Volatility
- technological Complexity
- bias and objectivity.

While blockchain data is transparent and immutable, accessing comprehensive historical data can be challenging. For Deutsche Bank, some financial data might not be publicly available, limiting the depth of analysis.

The cryptocurrency market, integral to DeFi platforms, is highly volatile. This can affect the reliability of long-term predictions and comparisons with the more stable traditional finance market.

The complex nature of blockchain technology and smart contracts might limit the understanding of some aspects of DeFi platforms.

Efforts are made to present an unbiased comparison between Deutsche Bank, Aave, and Compound, avoiding any conflict of interest.

4 Comparative Analysis

4.1 Comparative analysis body

4.1.1 Deutsche Bank

Due to the fact that Deutsche Bank interest rate is a subject of non-disclosure, extracting any kind of data about interest rates is hard and is a subject of consideration. In this research the calculator for private customer loan from official Deutsche Bank will be used by providing all the conditions and representatives examples from Deutsche Bank.

Advertised loan example:

- net loan amount: €25,000
- effective annual interest rate: 3.25%
- fixed annual interest rate: 3.20%
- monthly repayment: €243.72
- number of repayments: 120 (over 10 years)
- total amount payable: €29,246.40
- total interest paid: €4,246.01.

General conditions include nuances to the loan above. Loan terms vary based on credit score, ranging from €1,000 to €80,000, with effective annual interest rates between 3.25% and 11.74%, and fixed annual interest rates between 3.20% and 11.15%. According to Preisangabeverordnung(PAngV) §17 (Price Information Ordinance(PAngV)Section 17 Advertising for consumer loans) the advertiser must assume an effective annual interest rate from which the advertiser can expect that at least two thirds of the contracts concluded as a result of the advertising will be concluded at the stated or a lower effective annual interest rate as well as provide an example (Deutsche Bank).

Representative loan example:

- net loan amount: €10,000
- effective annual interest rate: 8.94%
- fixed annual interest rate: 8.60%

- loan term: 84 months.
- monthly repayment: €158.83
- total amount payable: €13,341.72.

At least two-thirds of customers receive these terms when taking out an Online-Private Loan from Deutsche Bank. (Deutsche Bank)

Risk Management: Deutsche Bank, as a traditional financial institution, relies on credit assessments, borrower's creditworthiness, and legal frameworks to ensure loan repayment. Unlike DeFi platforms, there's no automated "health factor" mechanism; instead, legal obligations and contractual terms ensure repayments.

4.1.2 Aave

Aave lets its users to pick interest rate models for their borrows (fixed and variable)

Interest rate strategy:

2.5 Interest Rate Strategy

The `InterestRateStrategy` contract holds the information needed to update the interest rates of a specific reserve and implements the update of the interest rates. Every reserve has a specific `InterestRateStrategy` contract. Specifically, within the base strategy contract `DefaultReserveInterestRateStrategy` the following are defined:

- Base variable borrow rate R_{v_0}
- Interest rate slope below optimal utilisation R_{slope1}
- Interest rate slope beyond optimal utilisation R_{slope2}

The current variable borrow rate is:

$$R_v = \begin{cases} R_{v_0} + \frac{U}{U_{optimal}} R_{slope1}, \text{ if } U \leq U_{optimal} \\ R_{v_0} + R_{slope1} + \frac{U - U_{optimal}}{1 - U_{optimal}} R_{slope2}, \text{ if } U > U_{optimal} \end{cases}$$

This interest rate model allows for calibration of key interest rates:

- At $U = 0$, $R_v = R_{v_0}$
- At $U = U_{optimal}$, $R_v = R_{v_0} + R_{slope1}$
- Above $U_{optimal}$, the interest rate rises sharply to take into account the cost of capital.

Image 1. Interest rate strategy (Aave)

*U stands for utilization rate

Aave's interest rate model is sophisticated and dynamic, tailored to optimize utilization and manage liquidity risk. The algorithm is set to meet these goals:

When capital is available: low interest rates to encourage borrowing(Aave).

When capital is scarce: high interest rates to encourage repayments of debt and additional supplying(Aave).

Variable vs. Stable Interest Models: Aave incorporates both variable and stable interest rate models, derived from the formulas from white paper but with different parameters for each asset. Variable rates evolve with utilization, whereas stable rates remain fixed at issuance until specific rebalancing conditions are met.

Aave's model adjusts interest rates based on the utilization rate U. The interest rate curve is divided into two parts around an optimal utilization rate Uoptimal. Below this threshold, the slope of the curve is small, and beyond it, the rate increases sharply.

$$if\ U \leq U_{optimal}: \qquad R_t = R_0 + \frac{U_t}{U_{optimal}} R_{slope1}$$

$$if\ U > U_{optimal}: \qquad R_t = R_0 + R_{slope1} + \frac{U_t - U_{optimal}}{1 - U_{optimal}} R_{slope2}$$

Image 2. Interest rate model (Aave)

Supply Rate: The borrow interest rates paid are distributed as yield to aToken holders, calculated as:

$$S_t = U_t(SB_tS_t + VB_tV_t)(1 - R_t)$$

Image 3. Supply Rate Formula (Aave)

- Ut is the utilization ratio
- SBt and VBt are shares of stable and variable borrows accordingly
- Vt is the variable rate

- St and Vt are average stable and variable rates
- Rt is the reserve factor

  *Reserve factor is a percentage of interest which goes to a collector contract that is controlled by Aave governance to promote ecosystem growth.

This model underscores Aave's focus on balancing liquidity availability with incentivizing borrowing and repayment, adapting dynamically to market conditions and utilization rates.

Risk management is carried out by using specific tools such as health factor to calculate creditworthiness of the borrower and liquidation policy with liquidation threshold in order to prevent unpaid loans. This is called LTV(Loan to Value)

Liquidation threshold stands for percentage value at which position is defined as undercollateralized. It is individual for each asset.

> *If the value of the collateral falls bellow a predetermined threshold, a portion of it will be auctioned as a* liquidation bonus *to repay a portion of the debt position and keep the ongoing borrow collateralised. (Aave)*

Health factor is calculated as:

$$H_f = \frac{\sum Collateral_i \; in \; ETH \times Liquidation \; Threshold_i}{Total \; Borrows \; in \; ETH}$$

Image 4. Health factor formula (Aave)

> *When health factor is less than 1 position may be liquidated to maintain solvency as described in the diagram below(Aave).*

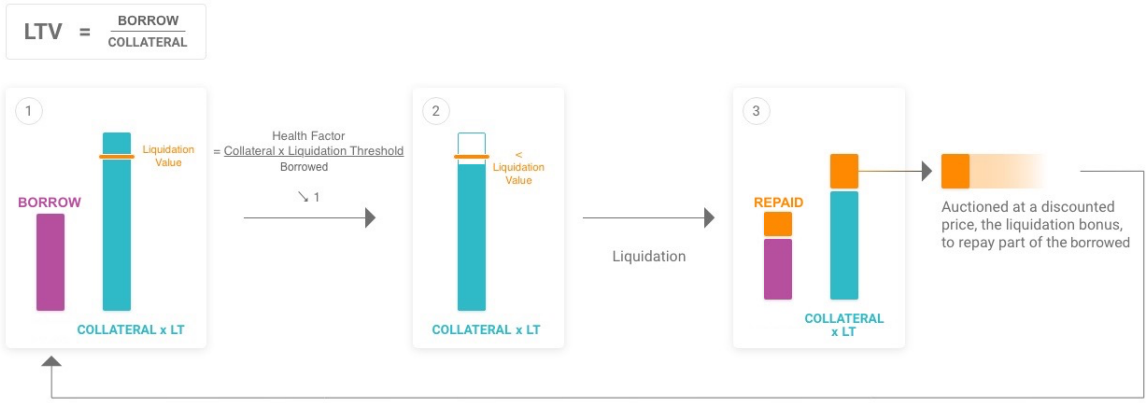

Image 5. Risk Parameters Safeguard Solvency (Aave).

4.1.3 Compound

Borrow rate model: users with a negative balance pay interest based on this model, which varies with the asset utilization rate and “kink”.

If Utilization ≤ Kink:

$$BorrowRate = borrowPerSecondInterestRateBase + borrowPerSecondInterestRateSlopeLow \times utilizationBorrowRate = borrowPerSecondInterestRateBase + borrowPerSecondInterestRateSlopeLow \times utilization \quad (1)$$

Else (Utilization > Kink):

$$BorrowRate = borrowPerSecondInterestRateBase + borrowPerSecondInterestRateSlopeLow \times borrowKink + borrowPerSecondInterestRateSlopeHigh \times (utilization - borrowKink)BorrowRate = borrowPerSecondInterestRateBase + borrowPerSecondInterestRateSlopeLow \times borrowKink + borrowPerSecondInterestRateSlopeHigh \times (utilization - borrowKink) \quad (2)$$

Supply rate model: users with a positive balance of their base asset earn interest based on this model. The supply rate depends on the utilization rate of the asset and “kink”.

If Utilization ≤ Kink:

$$\text{SupplyRate} = \text{supplyPerSecondInterestRateBase} + \text{supplyPerSecondInterestRateSlopeLow} \times \text{utilization} \quad (3)$$

Else (Utilization > Kink):

$$SupplyRate = supplyPerSecondInterestRateBase + supplyPerSecondInterestRateSlopeLow \times supplyKink + supplyPerSecondInterestRateSlopeHigh \times (utilization - supplyKink) \quad (4)$$

Calculating Utilization: the utilization rate is crucial in determining these rates. It's calculated as the ratio of total borrows to total supply.

Compound's Comptroller acts as the risk management layer. It determines the collateral requirements and liquidation conditions for users. The collateral factor for each cToken ranges from 0-90%, affecting the account's liquidity and borrow limit.

> *The Comptroller determines collateral requirements and liquidation conditions(Compound).*

The collateral factor ranges from 0-90% (Compound Finance, 2023).

> *The supply and borrow interest rates are a function of the utilization rate of the base asset. Each model includes a utilization rate "kink" - above this point the interest rate increases more rapidly. Interest accrues every second using the block timestamp(Compound).*

The value of the "kink" is determined by Compound's governance, which means it can be adjusted based on collective decisions made by stakeholders of COMP.

4.2 Application to comparative analysis

4.2.1 Financial performance metrics

Deutsche Bank(Deutsche Bank 2023):

- post-tax profit 2023 €3.5 billion by 25 October 2023
- net revenues: €22.2 billion by 25 October 2023
- Return on Equity (RoTe): 7.3%
- cost/income ratio: 72.4% .

Aave(Defilama):

- Total Value Locked (TVL): $5.701 billion
- borrowed: $2.972 billion
- treasury: $38.94 million
- fees (annualized): $129.45 million
- revenue (annualized): $19.51 million .

Compound(Defilama):

- Total Value Locked (TVL): 2.218 billion
- borrowed: $882.73 million
- COMP Liquidity: $4.88 million
- fees (annualized): $33.47 million
- revenue (annualized): $8.34 million.

*Annualized values are calculated by taking data from the last 30 days and multiplying it by 12

4.2.2 Capital and liquidity ratios, risk management

Deutsche Bank(Deutsche Bank 2023):

- Common Equity Tier 1 (CET1) Ratio: 13.9%
- tier 1 Ratio: 16.3%
- total capital ratio: 18.8%
- leverage ratio: 4.7% in Q3 2023
- Liquidity Coverage Ratio (LCR): 132%

- Net Stable Funding Ratio(NSFR): 121%.

Aave uses LTV over-collateralization strategy with liquidation policy and health factors.

Compound uses a Comptroller for risk management, which determines collateral requirements and liquidation eligibility with collateral factors ranging from 0-90%.

4.2.3 Interest rates or NIM

- Deutsche Bank: Group Net Interest Margin was 1.47%, down from 1.51 in Q2 2023.
- Aave: Implements a two-phase interest rate curve, changing based on the utilization rate (Aave, 2023).
- Compound: Utilizes a kinked interest rate model that increases rapidly after a certain utilization rate .

4.2.4 Governance and regulatory compliance

- Deutsche Bank: Adheres to traditional banking regulations and governance structures.
- Aave is had decentralized governance with its governance token AAVE, allowing stakeholders to participate in decision-making process.
- Compound: Governed by COMP token-holders using a decentralized governance model.

5 Hypothetical scenarios

In order to conduct hypothetical scenarios comparison the data from comparative analysis was taken, values were assumed based on historical data of market conditions. Market context was considered for Deutsche bank and different outcome scenarios were considered for Aave and Compound.

Hoenig (2023), former Kansas City Federal Reserve Bank president and CEO predicts a good chance economical recession in 2024, this is also taken in account of hypothetical scenarios.

5.1 Deutsche Bank

5.1.1 Advertised loan example (stable economy)

Market Context: This scenario reflects a stable economic period with moderate interest rates. Historical reference from 1990-2024 suggests periods of economic stability interspersed with downturns, but this instance assumes a relatively calm market.

Loan Details:

- net loan amount: €25,000
- effective annual Interest Rate: 3.25%
- loan term: 120 months (10 years)
- monthly repayment: €243.72 (as provided on the website)
- total amount payable: €29,315.71
- total interest paid: €4,315.71 .

*the numbers for this offer have already been calculated on Deutsche Bank website

5.1.2 Representative loan example (possible economic recession in 2024)

Market Context: Considering the divided opinions about the possibility of a recession in 2024, this scenario represents a more challenging economic environment with higher interest rates and uncertainty.

Loan Details:

- net loan amount: €10,000
- effective annual interest rate: 8.94%

- fixed annual interest rate: 8.60%
- loan term: 84 months
- monthly repayment: €158.83
- total amount payable: €13,341.72.

*the numbers for this offer have already been calculated on Deutsche Bank web-site

Additional considerations:

Future Predictions: Given the uncertainty in economic forecasts for 2024, it's crucial to consider various scenarios, including potential recessions and their impact on interest rates and loan affordability.

5.1.3 High credit score individual (prosperous economy)

Market Context: This scenario represents a thriving economy, with low interest rates reflective of a stable financial environment.

Loan Details:

- net loan amount: €80,000
- effective annual interest rate: 3.25%
- loan term: 120 months (10 years).

Calculations:

- monthly repayment: €781.75
- total amount payable: €93,810.27
- total interest paid: €13,810.27.

5.1.4 Low credit score individual (challenging economy)

Market Context: This scenario depicts a more turbulent economic environment, leading to higher interest rates, especially for individuals with lower credit scores.

Loan Details:

- net loan amount: €10,000
- effective annual interest rate: 11.74%

- loan term: 84 months (7 years).

Calculations:

- monthly repayment: €175.14
- total amount payable: €14,711.75
- total interest paid: €4,711.75.

Additional Considerations:

- Inflation and Economic Predictions: Inflation and broader economic conditions, like those anticipated for 2024, can significantly impact loan terms and borrowers' ability to repay. Predictions about economic downturns, such as a potential recession in 2024, must be factored into loan offerings and customer advisories.
- Loan conditions variability: As indicated on the website, loan terms, including interest rates, can vary greatly based on the borrower's credit score and the prevailing economic conditions. This variability needs to be transparently communicated to potential borrowers.
- For each persona, the loan calculations are made using the standard loan repayment formulas, taking into account the net loan amount, interest rates, and loan term. These personas reflect the diverse range of customers that a bank like Deutsche Bank would encounter, especially considering the economic fluctuations and uncertainties between 1990 and 2024.

5.2 Aave

5.2.1 Liquidation scenario

- collateral: 10 ETH
- initial ETH price: $1,500/ETH
- loan-to-value ratio: 50%
- liquidation threshold: 70%
- ETH price drop: 40%.

Calculations:

- initial collateral value: 10 ETH * $1,500/ETH = $15,000
- loan amount: 50% of $15,000 = $7,500
- new ETH price after drop: $1,500 - 40% = $900/ETH
- new collateral value: 10 ETH * $900/ETH = $9,000.
- liquidation check: new collateral value ($9,000) < liquidation threshold (70% of $15,000, i.e., $10,500).

Outcome:

The new collateral value ($9,000) falls below the liquidation threshold ($10,500), triggering liquidation.

5.2.2 Borrower with stable investment in a bull market

- collateral: 20 ETH
- initial ETH price: $1,200/ETH
- loan-to-value ratio: 60%
- borrowing interest rate: 4% annually
- market return rate: 10% annually
- loan term: 1 year.

Calculations:

- initial collateral value: 20 ETH * $1,200/ETH = $24,000
- loan amount: 60% of $24,000 = $14,400
- interest paid on loan: $14,400 * 4% = $576
- market returns: $14,400 * 10% = $1,440
- net profit: market returns - interest paid = $1,440 - $576 = $864.

Outcome:

The borrower makes a net profit of $864 from the investment after paying the loan interest.

5.2.3 Borrower during economic recession in 2024

- collateral: 15 ETH

- initial ETH Price: $900/ETH (due to recession)
- loan-to-value ratio: 50%
- borrowing interest rate: 7% annually (higher due to recession)
- market return rate: -5% annually (negative due to recession)
- loan term: 1 year.

Calculations:

- initial Ccollateral Value: 15 ETH * $900/ETH = $13,500
- loan Amount: 50% of $13,500 = $6,750
- interest Paid on Loan: $6,750 * 7% = $472.50
- market Returns (Loss): $6,750 * -5% = -$337.50
- net Loss: Market Returns - Interest Paid = -$337.50 - $472.50 = -$810.

Outcome:

The borrower incurs a net loss of $810, reflecting the challenging economic conditions of a recession.

5.2.4 High volatility market with significant profit

- collateral: 25 ETH
- initial ETH Price: $1,000/ETH
- loan-to-value ratio: 70%
- borrowing interest rate: 5% annually
- market return rate: 50% annually (high volatility)
- loan term: 1 year.

Calculations:

- initial collateral value: 25 ETH * $1,000/ETH = $25,000
- loan amount: 70% of $25,000 = $17,500
- interest paid on loan: $17,500 * 5% = $875
- market returns: $17,500 * 50% = $8,750
- net profit: market returns - interest paid = $8,750 - $875 = $7,875.

Outcome:

The borrower makes a significant net profit of $7,875, capitalizing on the high volatility of the market for substantial returns.

5.3 Compound

5.3.1 Earning opportunity in crypto market during traditional finance recession

- collateral: 30 ETH
- initial ETH Price: $800/ETH (considering recession in traditional finance)
- loan-to-Value Ratio: 65%
- borrowing interest Rate: 6.95% (based on Compound's current rates)
- market return Rate: 30% (high-return crypto investment)
- loan term: 1 year.

Calculations:

- initial collateral value: 30 ETH * $800/ETH = $24,000
- loan amount: 65% of $24,000 = $15,600
- interest paid on loan: $15,600 * 6.95% = $1,084.20
- market returns: $15,600 * 30% = $4,680
- net profit: market returns - interest paiid = $4,680 - $1,084.20 = $3,595.80.

Outcome

The borrower makes a significant net profit of $3,595.80, capitalizing on a high-return opportunity in the crypto market despite the recession in traditional finance.

This scenario demonstrates the potential for substantial gains in the crypto market even during periods of recession in traditional financial markets. The profitability hinges on selecting high-return crypto investments and managing borrowing costs effectively.

5.3.2 Compound deposit gain

- deposit: USDC (stablecoin)

- deposit Amount: $20,000
- annual supply interest rate: 4.54% (for USDC on Compound).

Calculations:

- interest earned in one year: $20,000 * 4.54% = $908

Outcome

The investor earns an interest of $908 over a year by depositing $20,000 in USDC on Compound.

This scenario demonstrates the earning potential through interest on stablecoin deposits in the DeFi space, using platforms like Compound. Deposits in stablecoins like USDC can provide steady returns, especially in a volatile market, making them an appealing option for risk-averse investors.

5.3.3 Deposit loss on volatile assets in Compound

- deposit: ethereum (ETH), a volatile cryptocurrency
- initial deposit amount: 10 ETH
- initial ETH price: $1,200
- ETH price drop: 30% over the year
- annual supply interest rate for ETH: 5.9% on Compound.

Calculations:

- initial deposit value: 10 ETH * $1,200/ETH = $12,000
- new ETH price after drop: $1,200 - 30% = $840/ETH
- new deposit value after price drop: 10 ETH * $840/ETH = $8,400
- interest earned on ETH: $12,000 * 5.9% = $708
- net loss: (initial deposit value - new deposit value) - interest earned = ($12,000 - $8,400) - $708 = $2,892.

Outcome

The investor incurs a net loss of $2,892. This loss is due to the significant drop in the value of the deposited asset (ETH), despite earning interest on the deposit.

This scenario highlights the risks associated with depositing volatile cryptocurrencies in DeFi platforms. While these deposits can earn interest, significant price drops in the underlying asset can lead to substantial net losses, overshadowing the interest gains.

5.3.4 Borrowing from compound vs. Deutsche Bank personal credit

Compound Loan:

- collateral: 20 ETH
- initial ETH ɜrice: $1,000/ETH
- loan amount: 60% of $20,000 = $12,000
- borrowing interest rate: assumed at 5.9% annually.

Deutsche Bank Loan:

- loan amount: same as Compound for comparison, $12,000
- interest rate: based on the document, assumed at 8.94%.

Calculations:

- interest paid on Compound loan: $12,000 * 5.9% = $708
- interest paid on Deutsche Bank loan: $12,000 * 8.94% = $1,072.8.

Outcome:

The total interest paid on the Compound loan ($708) is significantly lower than that of the Deutsche Bank personal credit ($1,072.8). This makes borrowing from Compound more beneficial in this scenario, particularly given the more favorable conditions in the crypto market and the dynamic interest rate model of Compound, which can adapt to market liquidity conditions.

6 Cross-comparative discussion, implications and future trends

6.1 Hypothetical scenarios overview

This section will provide a brief overview on conducted comparison.

6.1.1 CeFi

CeFi has following advantages:

- Stability and Predictability: In a stable economy, traditional banks like Deutsche Bank offer predictable and stable interest rates, which can be advantageous for long-term financial planning.
- Regulatory Compliance: CeFi institutions are regulated, ensuring a level of consumer protection and legal recourse in case of disputes or malpractices.
- Creditworthiness Assessment: Traditional banks assess borrowers' credit history, which helps in risk mitigation and ensuring loan repayment.

CeFi has following disadvantages:

- Inflexibility in Economic Downturns: In recession scenarios, traditional banks might increase interest rates, which can burden borrowers with higher repayment costs.
- Exclusion of Low Credit Individuals: Individuals with low credit scores may face higher interest rates or may be excluded from borrowing, especially in challenging economic conditions.

6.1.2 DeFi

DeFi has following advantages:

- Flexibility and Accessibility: DeFi platforms offer more accessible financial services, not limited by credit scores. This is particularly beneficial in bull market conditions or for individuals with crypto assets but no traditional credit history.
- Dynamic Interest Rates: DeFi platforms like Aave and Compound adjust interest rates based on market conditions and liquidity, which can sometimes offer more favorable terms than traditional banks.

- Profit Opportunities in Volatile Markets: DeFi platforms allow users to capitalize on market volatility, offering significant profit opportunities in scenarios like high volatility markets.

DeFi has following disadvantages:

- Market Risk and Volatility: In a recession or high volatility market, the value of collateral (e.g., cryptocurrencies) can drastically decrease, leading to a higher risk of liquidation and potential losses for borrowers.
- Lack of Regulation: The lack of regulatory oversight in DeFi can be a double-edged sword, potentially exposing users to higher risks of fraud and security breaches.

6.2 Similarities and differences

CeFi and DeFi systems exhibit different operational paradigms, although there are underlying similarities. Both aim to facilitate financial transactions, such as lending and borrowing. However, CeFi, represented by Deutsche Bank, operates within a traditional, regulated framework, emphasizing credit assessments and legal obligations for loan repayment. On the contrary, DeFi platforms like Aave and Compound leverage blockchain technology for decentralized governance and democratized operations.

CeFi's reliance on established financial infrastructure allows for robust regulatory compliance and risk management through credit assessments. On the other hand, DeFi's innovative use of smart contracts and decentralized models enables more flexible, efficient, and often more transparent financial interactions. However, this also introduces unique risks, such as smart contract vulnerabilities and lack of formal customer protection. The decentralized nature of DeFi offers greater accessibility and potentially lower transaction costs, compared to CeFi's more structured, but often more expensive, services.

6.3 The role of digital assets in DeFi

Digital assets are the play crucial role for DeFi platforms. Unlike traditional finance, where transactions are based on fiat currencies and involve physical or digital

representations of these currencies, DeFi platforms primarily operate with cryptocurrencies and tokenized assets. In DeFi, digital assets serve not just as a medium of exchange but also as collateral for loans, investment instruments, and governance tokens.

The ability to use cryptocurrencies as collateral in platforms like Aave and Compound has revolutionized lending and borrowing. It enables users to secure loans without traditional credit checks, relying instead on the value of their digital assets and KYC. This system enhances financial inclusivity, allowing individuals who might be excluded from traditional finance due to lack of credit history or other reasons to participate in financial activities. Furthermore, governance tokens in DeFi platforms enable decentralized decision-making, giving users a say in the platform's development and policy-making.

6.4 Market dynamics and user behaviour analysis

The market dynamics in DeFi are significantly influenced by the volatility of digital assets and the innovative features of DeFi platforms. Opposing to traditional finance, where market movements are often more gradual and influenced by a broader range of economic factors, DeFi markets may experience rapid changes due to the speculative nature of digital assets and the emerging technologies in blockchain.

User behavior in DeFi tends to be more speculative and risk-tolerant, driven by the potential for high returns and market analysis. This contrasts with typically more conservative approach seen in traditional finance customers of institutions like Deutsche Bank. DeFi users are often more tech-savvy and willing to engage with complex mechanisms like yield farming, liquidity pools, and token staking.

6.5 Impact on the global financial ecosystem

The emergence of DeFi has the potential to significantly impact the global financial ecosystem. It challenges traditional financial institutions by offering more accessible, efficient, and often cheaper financial services. The decentralized nature of DeFi can lead to a more democratized financial landscape, where users have more control and autonomy over their financial transactions.

However, the integration of DeFi into the broader financial ecosystem poses challenges, including regulatory compliance, risk management, and ensuring financial stability. The volatility and speculative nature of DeFi markets could also introduce new risks into the global financial system. While DeFi has the potential to complement and enhance the existing financial system, its integration requires careful consideration of these risks and challenges.

6.6 Potential integration of CeFi and DeFi practices

The integration of traditional finance CeFi and DeFi practices offers exciting possibilities for the future of finance. This integration could lead to the creation of hybrid models that combine the strengths of both systems: the regulatory compliance and established infrastructure of CeFi with the efficiency, transparency, and inclusivity of DeFi.

Potential areas of integration include using blockchain technology for more efficient transaction processing in traditional banking, and incorporating elements of DeFi's decentralized governance into TradFi products. However, this integration faces challenges, including using the regulatory frameworks of CeFi with the decentralized nature of DeFi, ensuring security and stability in the hybrid models, and managing the inherent risks in DeFi's innovative mechanisms.

6.7 Future research directions and technological advancements

Future research in the intersection of CeFi and DeFi is essential for advancing the financial sector. Key areas for research include the development of robust risk management strategies for DeFi platforms, exploring the economic and regulatory implications of DeFi, and understanding the impact of blockchain technology on traditional financial institutions.

Technological advancements will play a crucial role in shaping the future of finance. This includes the development of more secure and efficient blockchain protocols, improvements in smart contract technology to reduce vulnerabilities, and innovations in financial products that leverage the strengths of both CeFi and DeFi. Additionally, research into the ethical and social implications of DeFi, such as financial inclusivity and the potential for exacerbating or mitigating existing inequalities, is vital for any future development.

7 Conclusion

7.1 Answer to research question

The research goal was to evaluate viability of DeFi as an alternative to CeFi for Loans. Yes, DeFi certainly can pose a viable alternative to traditional bank loans, especially for those excluded from the traditional banking system e.g. bad credit score individuals or individuals from underbanked countries; or those who seek more efficient, flexible loan options. Although, its broader acceptance and viability as a first-choice financial solution depend on one's addressing its risks, particularly in terms of market volatility, regulatory clarity, and technical&personal security (do not download random files from interet, do your own research and interact only with trusted protocols), as well on one's extent of expertise in DeFi. It is generally unwise to borrow money without a proper level of understanding of financial system and landscape, furthermore considering loans in DeFi, exceptional expertise play crucial role in defining whether one is going to benefit or carry loss from interacting with this financial instrument. Governance model in Aave and Compound and the way protocol is deployed represent a different vision on loan industry landscape, where both borrowers and suppliers interact on equal terms and benefit each other.

7.2 Suggestions for future research

DeFi's innovative approach brings with it unique risks. Future studies should discover ways how these risks can be better managed or completely mitigated. One of the interesting concepts is mitigating negative loan position due to market volatility by implementing hedge strategy by opening an opposite direction position for the same asset using futures trading,

The need for research regarding regulatory frameworks for DeFi is gains huge relevance nowadays. Such frameworks should protect users without altering the decentralized nature of DeFi that makes it appealing. This research should provide a new regulatory approach, since frameworks and principles that are used for CeFi are not applicable to DeFi.

7.3 Summary

The emergence of DeFi poses both challenges and opportunities for traditional finance. DeFi offers innovative and inclusive, consequently CeFi institutions to respond by exploring blockchain and other fintech innovations to improve their services. The integration of CeFi and DeFi practices could lead to a more efficient, inclusive, and resilient financial system. While CeFi and DeFi serve similar fundamental purposes in the financial ecosystem, they operate under different models, each with its own set of advantages, challenges, and risks. The evolving landscape of DeFi offers a glimpse Into the potential future of finance, where traditional banking systems and innovative blockchain technologies coexist and complement each other.

Concluding, CeFi is an established system with proven mechanisms for stability and consumer protection. Considering optimistic economic mindset since it is hard to predict global crises as of 2008. While it faces challenges in terms of inclusivity and efficiency, the ongoing developments in financial technology, including DeFi, are pushing CeFi institutions to evolve and adapt to the changing financial landscape step-by-step, given the fact of the longterm history of CeFi institutions. Meanwhile those who consider themselves professionals give their preference to DeFi institutions.

References

Aave. 2020 . Protocol Whitepaper. Retrieved on 19 August 2023. Available at

https://github.com/aave/aave-protocol/blob/master/docs/Aave_Protocol_Whitepaper_v1_0.pdf

Aave. Borrow interest rate. Retrieved on 19 August 2023. Available at

https://docs.aave.com/risk/liquidity-risk/borrow-interest-rate

Aave. Interest Rates. Health factor. Retrieved on 19 August 2023. Available at

https://docs.aave.com/risk/asset-risk/risk-parameters#health-factor

Bartoletti, M., Chiang, J., Lluch-Lafuente A. 2020. SoK: Lending Pools in Decentralized Finance. Retrieved on 10 September 2023. Limited availability at

https://link.springer.com/chapter/10.1007/978-3-662-63958-0_40

BIS. 2023. Central banks, macro-financial stability and the future of the financial system. Monetary and Economic Department October 2023. Retrieved on 1 November. Available at

https://www.bis.org/publ/bppdf/bispap140.pdf

Buterin, V. 2014 . Ethereum: A Next-Generation Smart Contract and Decentralized Application Platform. Retrieved on 1 June 2023. Available at

https://ethereum.org/669c9e2e2027310b6b3cdce6e1c52962/Ethereum_Whitepaper_-_Buterin_2014.pdf

Castro-Iragorri, C., Ramirez, J. , Velez, S. 2021. Financial intermediation and risk in decentralized lending protocols. Universidad del Rosario. Retrieved on 10 September 2023. Available at

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3893278

Compound. Interest Rates. Retrieved on 19 August 2023. Available at

https://docs.compound.finance/interest-rates/

Compound. Supply Rate. Retrieved on 19 August 2023. Available at

https://docs.compound.finance/interest-rates/#get-supply-rate

Darlin, M., Palaiokrassas, G. , Tassiulas, L. 2022. Debt-Financed Collateral and Stability Risks in the DeFi Ecosystem. School of Management and Yale Institute for Network Science Yale University, USA. Limited availability

https://ieeexplore.ieee.org/abstract/document/9909090

Defilama. November 2023. Aave quantitative data. Available at

https://defillama.com/protocol/aave

Defilama. November 2023. Compound quantitative data. Available at

https://defillama.com/protocol/compound-finance

Defix Solutions. 2023. DeFi vs. CeFi: The Battle for the Future of Finance DefixSolutions. Medium. Retrieved on 10 November 2023. Available at

https://defixsolutions.medium.com/defi-vs-cefi-the-battle-for-the-future-of-finance-28b5581ce301

Deloitte. 2022. DeFi deciphered: Navigating disruption within financial services March 2022. Retrieved on 19 August 2023. Available at

https://www2.deloitte.com/content/dam/Deloitte/us/Documents/risk/us-financial-advisory-defi-march-2022.pdf

Deutsche Bank. 2020. Blockchain and corporates: unleashing potential. Retrieved on 30 September 2023. Available at

https://flow.db.com/more/technology/blockchain-and-corporates-unleashing-potential

Deutsche Bank. 2023 Deutsche Bank reports nine-month 2023 profit before tax of € 5.0 billion and raises capital outlook. Retrieved on 29 October 2023. Available at

https://www.db.com/news/detail/20231025-deutsche-bank-reports-on-the-third-quarter-results-of-2023?language_id=1

Deutsche Bank. 2023. Q3 2023 Presentation. Retrieved on 29 October 2023. Available at

https://investor-relations.db.com/files/documents/quarterly-results/2023/Deutsche-Bank-Q3-2023-Presentation.pdf

Deutsche Bank. Deutsche Bank History. Retrieved on 30 September 2023. Available at

https://www.db.com/files/documents/Deutsche-Bank-History--Chronicle-from-1870-until-today.pdf

Deutsche Bank. Online-PrivatKredit: Wünsche erfüllen per Knopfdruck. Retrieved on 30 September 2023. Available at:

https://www.deutsche-bank.de/pk/kredit-und-immobilien/kredit/privatkredit.html/

FWX. 2023. CeFi: The Future of Personal and Business Finance. Retrieved on 10 October 2023. Available at

https://fwx.finance/learn/article/what-is-cefi

Bartoletti, M., Chiang, J., Lluch-Lafuente A. 2020. SoK: Lending Pools in Decentralized Finance

https://link.springer.com/chapter/10.1007/978-3-662-63958-0_40

Hoening, T. 2023. Former Kansas City Federal Reserve Bank President and Ceo. Foxbusiness on 15 November 2023 . Available at

https://www.foxbusiness.com/economy/federal-reserve-walking-fine-line-recession-threatens-us-economy-former-fed-offical

Levine, M. 2022. The Crypto Story where it all came from, what it all means, and why it still matters. Bloomberg Businessweek. Retrieved on 21 September 2023. Available at

https://www.bloomberg.com/features/2022-the-crypto-story/?sref=w3vFo7gi&leadSource=uverify%20wall#xj4y7vzkg

Nakamoto, S. 2008. Bitcoin: A Peer-to-Peer Electronic Cash System. Retrieved on 1 June 2023. Available at https://bitcoin.org/bitcoin.pdf

Qin, K. , Zhou, L., Afonin, Y., Lazaretti, L., Gervais, A. 2021. CeFi vs. DeFi — Comparing Centralized to Decentralized Finance. Retrieved on 10 September 2023. Available at

https://scholar.archive.org/work/gmsphteygzhs7fryzsr36zpksi

Saengchote, K. , Putniņš, T., Samphantharak , K. 2022. Does DeFi remove the need for trust? Evidence from a natural experiment in stablecoin lending. Retrieved on 10 September 2023. Limited availability

https://www.sciencedirect.com/science/article/abs/pii/S2214635023000722

Saengchote, K. 2022. Decentralized lending and its users:Insights from Compound. Chulalongkorn Business School. Limited availability at

https://www.sciencedirect.com/science/article/abs/pii/S1042443123000756

Salami , I. 2021. SYMPOSIUM ON THE GLOBAL GOVERNANCE IMPLICATIONS OF BLOCKCHAIN . CHALLENGES AND APPROACHES TO REGULATING DECENTRALIZED FINANCE. American journal of international law. Retrieved on 10 September 2023. Available at

https://www.cambridge.org/core/journals/american-journal-of-international-law/article/challenges-and-approaches-to-regulating-decentralized-finance/1FC6B3EF8DEE460EF534A1F0A5E9DC72#article

Schär, F. 2021. Decentralized Finance: On Blockchain- and Smart Contract-Based Financial Markets. Retrieved on 19 August 2023. Available at

https://files.stlouisfed.org/files/htdocs/publications/review/2021/04/15/decentralized-finance-on-blockchain-and-smart-contract-based-financial-markets.pdf

Vereckey, B. 2022. Decentralized finance: 4 challenges to consider. MIT. Retrieved on 5 October 2023. Available at

https://mitsloan.mit.edu/ideas-made-to-matter/decentralized-finance-4-challenges-to-consider

Werner, S. , Ariah, K. , Perez, D. , Harz, D. , Gudgeon, L., Knottenbelt, W. 2022. SoK: Decentralized Finance (DeFi). Retrieved on 1 August 2023. Available at

https://dl.acm.org/doi/epdf/10.1145/3558535.3559780

Xu, J. & Vadgama, N. 2022. From banks to DeFi: the evolution of the lending market. University College London, Centre for Blockchain Technologies. Retrieved on 19 September 2023. Available at

https://www.researchgate.net/publication/350625378_From_banks_to_DeFi_the_evolution_of_the_lending_market