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**DECENTRALIZED FINANCE (DEFI): THE FUTURE OF BANKING?**

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**Abstract:**

As the financial landscape undergoes a paradigm shift, decentralized finance (DeFi) emerges as a transformative force poised to reshape the future of banking. DeFi represents a groundbreaking departure from traditional financial systems, leveraging block chain technology to create an open and permission less ecosystem for financial services. This paper explores the key principles, challenges, and potential impact of DeFi on the banking sector. The foundation of DeFi lies in block chain, a distributed ledger technology that enables transparent, secure, and tamper-resistant record-keeping. Smart contracts, self-executing code on the block chain, form the backbone of DeFi platforms, automating financial processes and eliminating the need for intermediaries. This decentralized nature not only enhances security but also promotes financial inclusion by providing access to a global audience. Several financial services within the traditional banking sector, such as lending, borrowing, trading, and asset management, are being revolutionized by DeFi protocols. The elimination of intermediaries reduces costs, increases efficiency, and minimizes the risk of fraud. However, challenges such as scalability, interoperability, and regulatory concerns pose hurdles to the widespread adoption of DeFi. The potential impact of DeFi on the future of banking is profound. It has the capacity to democratize finance, giving individuals greater control over their assets and financial transactions. Furthermore, DeFi can foster financial inclusion by providing services to the unbanked and under banked populations, potentially bridging the gap between developed and developing economies. This paper reviews the current state of DeFi, examining prominent platforms, protocols, and use cases. Additionally, it analyzes the challenges and risks associated with the decentralized finance movement, addressing scalability issues, regulatory concerns, and potential solutions.

**Keywords:** *Decentralized, Finance, Banking***Introduction**

Decentralized Finance, commonly known as DeFi, represents a paradigm shift in the traditional financial system by leveraging blockchain technology to create an open and permissionless financial ecosystem. In contrast to traditional banking, which relies on centralized institutions like banks and governments, DeFi aims to eliminate intermediaries and provide financial services in a trustless and transparent manner.

Here's an introduction to some key aspects of DeFi and why it is considered the future of banking:

DeFi operates on decentralized networks, primarily blockchain platforms like Ethereum. This decentralization means there is no central authority or intermediary controlling the system. Instead, smart contracts govern transactions, lending, and other financial activities, ensuring transparency and reducing the risk of manipulation.

DeFi platforms are generally open to anyone with an internet connection, allowing global participation. This inclusivity is in stark contrast to traditional finance, which often involves lengthy processes, geographical restrictions, and exclusionary practices.

Smart contracts are self-executing contracts with the terms directly written into code. DeFi relies heavily on smart contracts to automate and enforce financial agreements without the need for intermediaries. This reduces costs, speeds up transactions, and minimizes the risk of fraud.

DeFi platforms offer decentralized lending and borrowing services, allowing users to lend their cryptocurrencies and earn interest or borrow assets without the need for traditional banks. This opens up financial opportunities for individuals who may not have access to traditional banking services.

DeFi introduces decentralized exchanges where users can trade cryptocurrencies directly without relying on centralized exchanges. This eliminates counterparty risk and provides users with greater control over their assets.

Assets in the traditional financial system, such as real estate or stocks, can be tokenized on blockchain platforms. This process involves converting these assets into digital tokens, making them easily tradable on decentralized exchanges and accessible to a global audience.

DeFi platforms often incentivize users to provide liquidity by offering rewards in the form of additional tokens. This practice, known as yield farming or liquidity mining, encourages user participation and helps in creating a more vibrant and liquid ecosystem.

While DeFi offers significant advantages, it is not without challenges. Security vulnerabilities, smart contract risks, and regulatory uncertainties are among the concerns. The rapidly evolving nature of the space requires users to exercise caution and conduct thorough due diligence.

## **Definition and applications of DeF**

Decentralised finance is not commonly understood by many market participants and policy makers due to the fact that it is a relatively new concept with complicated properties. The purpose of this part is to present an overview of the activities taken by DeFi and to propose features that could assist in better defining protocols that are truly decentralised. In the following section, it delves into the activities of lending and yield farming protocols, which are the primary applications of decentralised finance at the time that this study was being written. It also addresses the factors that are driving the increasing participation of investors in decentralised finance marketplaces.

## **Defining DeFi**

A new movement in the crypto-asset arena is called decentralised finance (DeFi), and it promises to duplicate a variety of operations that are now carried out within the conventional financial system in a manner that is open, decentralised, permissionless, and autonomous. The supply of financial goods and services that are constructed as decentralised apps on the blockchain is made possible by these applications, which are known as DeFi applications. The Ethereum protocol, which was introduced in 2015 and enables the construction of smart contracts, serves as the foundation for the majority of these apps. The concept of "decentralised finance" has been on the agenda of certain policy makers ever since the introduction of applications that are enabled by distributed ledger technologies (also known as "DLT") and that provide financial services without the need for intermediaries or centralised processes (FSB, 2019). The DeFi market brings this concept to life. Rather than depending on centralised parties for trust, decentralised finance markets are community-based networks that

are looking for ways to automate the characteristics that lead to confidence in centralised institutions. These markets operate in a worldwide and borderless manner.



**Figure 1. In the cosmos of DeFi, choose applications based on their activities.**

Note: Although this statistic includes initiatives that have self-proclaimed to be DeFi, it is important to note that not all of these projects are completely decentralised (according to the major features outlined). Additionally, a significant number of the DeFi apps that are displayed in the figure are still in the most preliminary stages of deployment.

decentralised finance applications are now working towards the goal of replicating the majority of the most important traditional financial goods and services in a decentralised way by utilising smart contracts (Figure 1). The lending product is the one that is expanding at the quickest rate, and it is being pushed by yield farming. As of the time that this report was written, lending accounted for more than half of the total TVL in DeFi applications, which was 53 percent of the entire TVL in DeFi as of 14.06.2021. Additional goods that are available as of the time that this article is being written include decentralised exchanges (DEX), which account for 33 percent of TVL; derivatives and synthetics; asset management; insurance; payments; and prediction markets. The remaining activity as of the 14th of June, 2021 is comprised of both of these categories. Because the majority of the lending activities entail collateralized lending, the activities of decentralised finance (DeFi) lending attempt to replicate market-based lending (securities lending, repos) rather than traditional consumer or retail bank lending. It is important to note that these activities, which have historically been affiliated with institutions, are being marketed to retail actors in the DeFi area. On the other hand, it is important to point out that flash loans, which are a kind of uncollateralized lending, are also a possibility. In particular, yield farming, also known as liquidity mining, is a process that enables participants in the DeFi market to lock up their crypto-asset holdings in applications and generate rewards in exchange for the provision of liquidity to the system. These rewards can take the form of interest on the crypto-assets that are locked up or new tokens of the platform that are issued as rewards. To put it another way, users of DeFi utilise such protocols to leverage their crypto-assets or to lock their crypto-holdings in DeFi protocols, which enables others to borrow them for leverage in exchange for some form of compensation. As far as its architecture is concerned, the DeFi market is made up of several levels, each of which serves a particular function (Figure 2). The layers build upon one another to produce an infrastructure that is open, highly composable, and interoperable. This architecture enables anybody to build upon, submit revisions to, or utilise other components of the stack. A highly interoperable protocol stack serves as the foundation of the system. This permits the implementation of smart contract functions, such as those found on the Ethereum blockchain (Schar, 2021). DeFi protocols are made up of software that is constructed on top of the settlement layer, at the protocol layer. Additionally, it is at this layer that certain use

cases are being developed and implemented as a collection of smart contracts, which are carried out when certain circumstances are triggered. As a result of the fact that these protocols offer standards for certain use cases that can be accessible by any user or DeFi application, they are highly interoperable (Schar, 2021). Aggregators at the top layer build user-centric platforms that connect to several apps and protocols. This enables users to execute activities that would otherwise be difficult by connecting to multiple protocols at the same time (Schar, 2021). With the help of DeFi, the evolution of the peer-to-peer (P2P) model of distributed ledger technology (DLT)-based systems has been taken to a user-to-smartcontract (or user-to-pool) paradigm. On the basis of smart contracts, agreements between parties participating in decentralised finance are automatically performed. Additionally, some procedures involved in decentralised finance transactions are built on a smartcontract-to-smartcontract basis, which eliminates the need for any human participation (for example, automated liquidation). In situations like this, smart contracts are activated by price or other information feeds that are supplied by nodes that are not part of the chain. this nodes are referred to as Oracles, and they give information such as the spot price of a crypto-asset (OECD, 2020). In terms of the recording of transactions, transactions are possible to be traced and verified on the chain, although in a pseudonymous manner. The current and historical balances and transactions are timestamped and kept in a tamper-evident way, much like any other distributed ledger technology (DLT)-based system. Additionally, these information is accessible to all participants in the chain, which helps to foster confidence in the network. However, participants of permissionless DeFi applications are typically not subject to CDD checks in the vast majority of DeFi applications. As a result, transactions can be traced back to wallets and accounts in a pseudonymous manner, without reference to the identity of the participating node. This is because CDD checks are not performed on participants of permissionless DeFi applications.

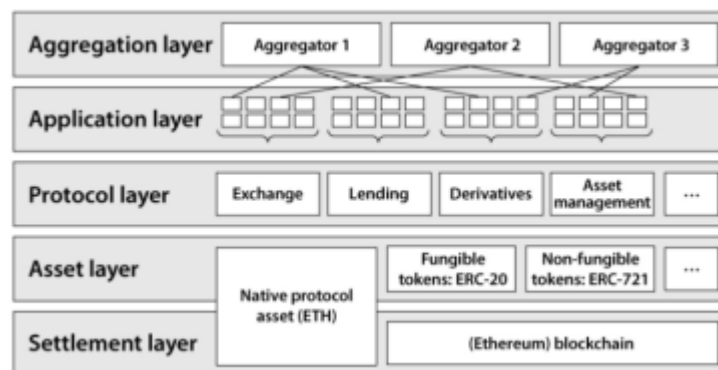


Figure 2. The architecture of DeFi

Source: DeFi Stack (Schär, 2021).

**Decentralized Finance properties**

The literature refers to DeFi attributes as principles, promises, and possibilities. Our literature review led us to discover eight DeFi properties:

1. Composability

2. Flexibility
3. Decentralisation
4. Accessibility
5. Innovativeness
6. Interoperability
7. Borderlessness
8. Transparency
9. Automation of business processes
- 10. Finality**

In what follows we discuss each property:

Composing skills. A distinguishing aspect of DeFi is, perhaps, its compose ability. "the capacity to construct a sophisticated, multi-faceted monetary system atop crypto-assets" is the definition of compos ability. In DeFi, the analogy of "money Lego" is frequently used to describe compos ability. The key tenet is that when individuals succeed, the whole society reaps the rewards. Composability refers to the ease with which a system's components may be linked together. In this respect, blockchain technology lays the groundwork for future financial services. Continuing with the previous analogy, financial services are like the "Lego" pieces; a blockchain is like a container housing them. A composable ability's advantages are:

- Unlike centralised payment systems, which are inherently inefficient, components may be simply joined.
- The components may be reused to construct new financial services, and they are publicly available.

One significant drawback of composability is the creation of a web of interdependent debts and responsibilities. As a result, we may see another global financial meltdown like the one that happened in 2008. How DeFi plans to handle this possible consequence of composability is still up in the air.

Ability to adapt. While several writers have made passing reference to DeFi's flexibility, no one has gone so far as to define the term. Being adaptable means being able to change things up quickly. From the vantage points of software and deregulation, we examine the adaptability of DeFi. Open source code is the foundation of DeFi. Since the software (like smart contracts) may be used, copied, and modified by anybody, this enables it to be flexible. under keeping with the Lego model described under the attribute Compos ability, it is possible to change the size, colour, and form of the Lego bricks. In addition, the absence of regulation makes DeFi very flexible. In theory, there are no constraints on the creation or use of services due to the absence of regulation. The absence of regulation on DeFi does have certain drawbacks, though, as it is also open to fraud.

Decentralised management. "Decentralisation" is often used in conjunction with "application," "verification network exchange," "business models," and "governance" in DeFi literature. However, the term "decentralisation" is not often used or explained further in academic works. When it comes to DeFi, decentralisation means providing financial services straight from the source instead of going via a middleman. Keep in mind that there is no central intermediary for DeFi services. They also claim that decentralisation is the method by which parties are able to resolve conflicts and agree on the veracity of digital information independently of one another. However, a centralised middleman's precise characteristics remain unknown. It is possible that this description applies to one or many entities, or perhaps only a handful. does not go into detail about who has trust in the middleman or whether there are other companies engaged. but argue that



principles of coding and agreement take the role of a trusted third party. It appears that confidence is still required in this situation due to the absence of a central party. The Ethereum platform's users have trust that the miners do not collude since a dominance by a small group of eight miners would have catastrophic consequences. Everyone in the DeFi community seems to have their own idea of what "decentralisation" means and how it's used. Financial services are made possible using distributed ledger technology (DLT), which incorporates blockchain, and is referred to as decentralisation in this white paper. Different parties can propose, verify, and agree upon modifications to the ledger in this setting, which is known as decentralisation.

Easy access. According to Schär, anyone can utilise DeFi protocols. This aligns with the way DeFi is described by Schär, wherein public platforms like Ethereum serve as the foundation for financial services. Nevertheless, as we've shown, DLT is also part of a more inclusive definition of DeFi. Limited access to financial services is a consequence of the permissioned private nature of some DLT platforms. On the one hand, nations with restricted access to financial services might begin adopting such services, while on the other, accessibility on public permissionless ledgers generates conflict. Concurrently, bad actors in a financial ecosystem would be able to join and take advantage of these services if the barrier to entry were lowered. Companies should think about the controls that need to be in place to make sure that regulations like Know-Your-Customer (KYC) and anti-money laundering (AML) are satisfied, because accessibility obviously has two sides.

Innovativeness. Bitcoin, Ethereum, and Diem are just a few examples of financial systems that enable anybody to (re-)use key technology by openly disclosing them through open-source licencing. Consequently, these technologies may serve as the foundation for new applications, which in turn can lead to advancements in both the platforms and the apps themselves. On the other hand, centralised financial institutions are different. No central bank that we are aware of has publicly released its underlying technology, with a few of notable exceptions. We contend that this would necessitate a mental change on the part of central banks. It is now challenging for these organisations to open source their fundamental technology due to their long-standing usage of proprietary software and the intricacy of that programme.

Working together. There are two types of interoperability that Schär discusses: functional and technological. When services are functionally interoperable, it's because they share a platform. The capacity for two distinct systems to cooperate is known as technological interoperability. supports the idea that DeFi can improve interoperability. Because centralised financial organisations have their own ledger, it could be difficult and expensive to transfer money between other institutions, or different financial services might not be compatible with one another. Furthermore, Chen claims that the current state of blockchain interoperability is the reason DeFi has not yet accomplished full (technical) compatibility. Furthermore, DeFi still lacks fully functioning compatibility. Interoperability is a hot topic in the blockchain ecosystem. Since it is anticipated that financial services provided on a DeFi platform may effortlessly interact with other financial services, this indicates that DeFi offers significant advantages over centralised financial services, provided that interoperability is accomplished in DeFi. To illustrate the point, token transfers across blockchains may now occur in a matter of minutes regardless of location. Compared to the old-fashioned method of sending money across oceans, which may take days, this is a huge improvement. Consider the potential competitive advantage that may accrue to a corporation if they were to utilise a DeFi money transfer service rather than a centralised one.

Without any borders. Chen and Bellavitis contend that borderlessness may be realised if financial services are not connected to physical regions or a fiat currency, and if these financial services are available to everybody regardless of where they are located on the planet. Therefore, according to Chen and Bellavitis, centralised

finance cannot be really borderless. This is due to the fact that centralised money is always related to a physical area or a fiat currency. Furthermore, Chen and Bellavitis contend that cryptocurrencies that are based on blockchain technology are borderless. This is due to the fact that these cryptocurrencies are accessible to customers located anywhere in the world. With borderlessness, there is a possibility that financial services may be unable to comply with anti-money laundering and know your customer regulations. Even further, Popescu contends that anti-money laundering and know your customer are notions that "do not really fit into the DeFi ecosystem." AML and KYC, on the other hand, are principles that we contend are appropriate for the ecosystem of decentralised finance. An argument that these principles should not be included in DeFi cannot be based on the fact that there is now no regulation and that there have been early debates on AML, KYC, and DeFi. Instead, established financial institutions may contribute their expertise and experience in the areas of anti-money laundering and know your customer (KYC) to this discussion, with the intention of incorporating these ideas into decentralised finance. Once this argument has been resolved, we anticipate that huge businesses will also begin to use DeFi. This is something that we anticipate happen.

## What is DeFi? Main characteristics

Despite the fact that there is no definition of decentralised finance that is universally acknowledged, this study outlines the essential characteristics that distinguish decentralised finance from traditional financial markets:

- **Non-custodial:** DeFi is distinguished by a number of primary qualities, one of which is that it does not include custody. In DeFi applications, there is no central authority or other intermediary that is granted access to or control over the digital assets of participants. Instead, individuals are solely responsible for managing their private keys and, consequently, their digital assets.
- **Self-governed and community-driven:** The source code for most DeFi protocols is available for public scrutiny and development since they are open-source. Depending on the details of each application, users are able to have a say in the application's direction through the issuance of governance tokens in various DeFi apps. 15 As the number of people involved in a network increases, its worth is multiplied by the community of people who make it operate.
- **Compostable:** Of all the advances introduced by DeFi, this is among the most crucial. It is possible to construct new applications by combining existing components of DeFi networks, such as digital assets, smart contracts, protocols, and apps built on top of the protocol layer. As the number of people using DeFi goods and services increases, their value will rise thanks to the network's scalability and the opportunities it provides for new product and structure development. This feature is made possible in large part by the fact that all DeFi applications are open source, meaning that anybody may access the source code and utilise it to build their own apps. Meanwhile, the market is already convoluted, and the dangers associated with its uses are made even more problematic by recycling assets on numerous applications.

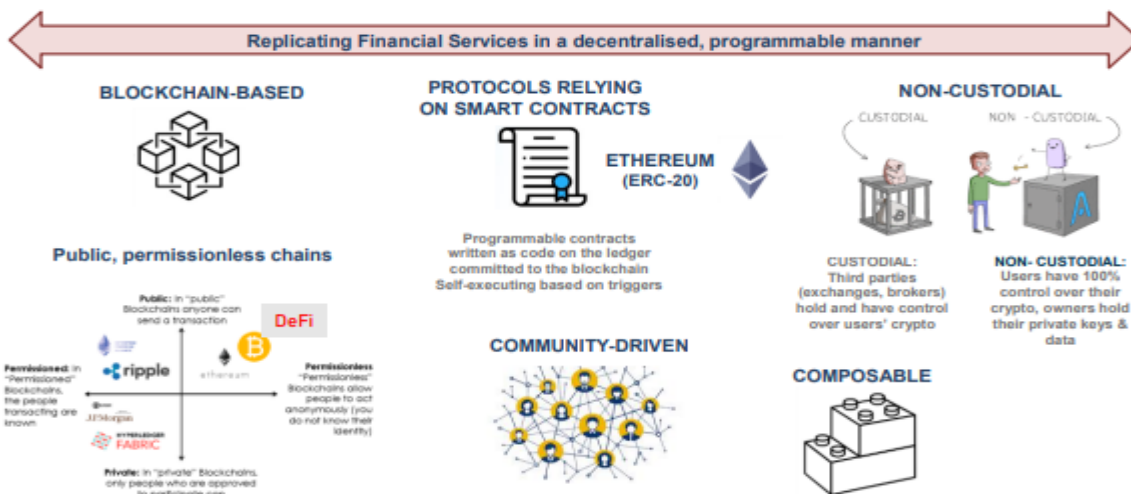


Figure 3. Main characteristics of DeFi applications

Source: Author's illustration.

### Is it truly DeFi? Defining by elimination

Many projects and startups use the term "DeFi" for marketing and other reasons, however this isn't always because they are genuine DeFi initiatives. Because they are financial apps built on top of open source code, some companies proudly call themselves DeFi. A decentralised organisational structure is also not present in all initiatives that claim to be DeFi. Figure 2.1 contains several so-called DeFi projects that don't actually adhere to the rules laid down here. Simply because a company offers financial services or products that are built on DLT doesn't mean it falls within the DeFi category. By definition, a permissioned DLT network cannot support a DeFi system, as participation and other rights are determined by an authoritative body. A DeFi application must have community-based governance, often based on the distribution and holding of governance tokens, and must not have any one entity or third party with power or influence over the DeFi arrangement, such as an admin key. But many DeFi ventures wind up with a centralised structure. An admin key to the protocol poses serious hazards to users since it opens the door for bad actors to attack the system and potentially harm smart contracts. While many DeFi initiatives are centralised during the bootstrapping early inception stage, the degree of decentralisation differs across them at this period of the market's growth (Ushida and Angel, 2021).

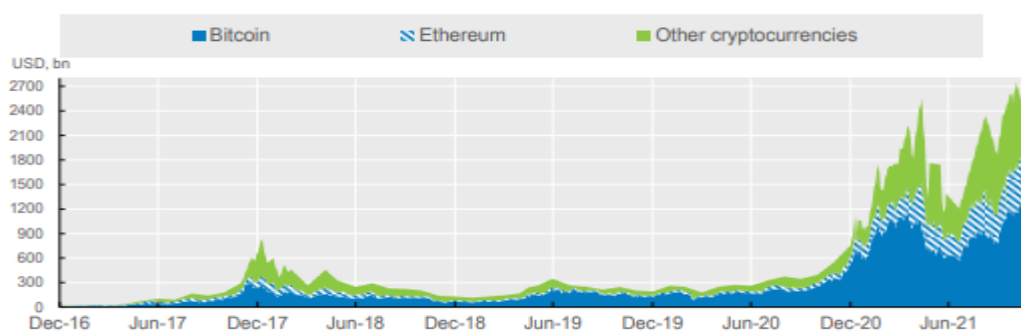
Because decentralisation is not a black-and-white concept, measuring it can be tricky and even dependent on subjective human opinion. Truly non-custodial applications are also required. 16. The design obviously goes against the non-custodial approach of DeFi networks, where users have complete control over their private keys and, by extension, their assets (until they transact), when third party nodes or intermediaries handle the management and storage of users' private keys, funds, or information. Users are able to participate in DeFi anonymously since they are not required to go via a regulated or custodial service provider, and the fact that



DeFi is not a custodian service makes it safe against the theft of crypto-assets by third parties. Users must also bear the risk associated with their actions, as their investments are vulnerable to theft if their private keys are lost. So far, the most common way to access the DeFi ecosystem is through non-custodian wallets, however this is starting to change. There are a few hybrid projects that call themselves DeFi. These types of projects often combine a DeFi architecture with a centralised front-end business setup. While this might limit the application's decentralisation capabilities, it also provides a means to ensure regulatory compliance, supervision, and enforcement by identifying a responsible organisation and a regulatory and supervisory access point. This method would render DeFi marketplaces unable to operate in a pseudonymous manner as they currently exist. The risk-reward analysis of such frameworks in comparison to completely decentralised applications is still in its early stages.

### Drivers and users of DeFi activity

Since the market is obviously driven by speculation, with very high returns offered by some products, FOMO (fear of missing out), and recycling of profits from other crypto-asset activity, there are no fundamental drivers of the surge in crypto-asset prices. There are virtuous cycles at work in the crypto asset market, where Bitcoin's price has dictated much of the action, and in the evolution of DeFi as measured by TVL. Potentially adding to the DeFi trend were the effects of loose monetary policy and the pursuit of yield by both individual and institutional investors. Bitcoin and other crypto-assets are seen by some ordinary investors as a way to protect themselves from inflation, even if their price movements have historically tracked those of more established financial markets. Several of the factors that propelled the DeFi industry's meteoric rise in 2017 and 2018 mirrored those of the crypto-asset bull market linked to the ICO boom (OECD, 2019). There are parallels when considering the difficulties and dangers that players face. An spike in investor interest in NFTs, which are mostly produced on the Ethereum blockchain, and the heavy use of ETH for DeFi applications are both factors contributing to the recent price increase of Ethereum's native currency, ether (ETH). The Ethereum blockchain is believed to be the issuing platform for 90% of all listed tokens (Schär, 2021). Most DeFi apps are built on top of smart contracts, which are enabled by the Ethereum blockchain. There have been record-breaking numbers of Ethereum transactions per day, and the volume of trades on Ethereum-based decentralised exchanges (DEX)20 has outpaced that of CeFi exchanges (for example, on August 30, 2020, Uniswap's daily volume of trades surpassed Coinbase's daily activity).



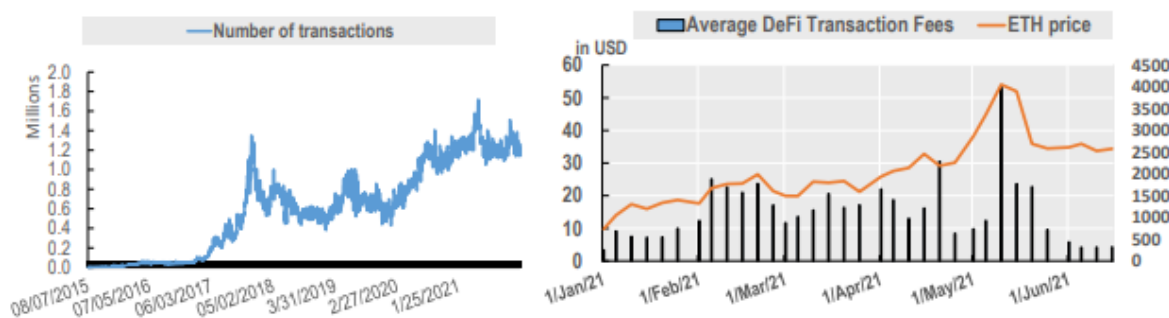
**Figure 4 Crypto-asset valuations are one of the drivers of DeFi activity**

Note: As of 1 December 2021. Source: Thompson Reuters Eikon.

The DeFi industry is already precarious, and the price volatility of crypto assets is making it much more so. Ethereum saw a 20% daily decline on March 12, 2020, sometimes known as "Black Thursday," marking the

first significant stress-test event in DeFi's brief history. As a result of people trying to move their cryptocurrency to different platforms after the price fell, the gas charge for Ethereum rose to 200 Gwei. There were tidal waves of automatic liquidations since collateral values fell as well. There was a protocol flaw that allowed external players responsible for liquidations, called keeper bots, to make zero bids for auctioned Ethereum collateral. As a result, around USD 8.32 million was withdrawn in total through zero bid auctions (Medium, 2021[10]). On March 11, 2020, a sum of USD 16 million was liquidated in lending protocols, and the following day, an additional USD 5.7 million was liquidated.

Additional huge liquidations in DeFi protocols have been prompted by the price surges in Bitcoin and Ether in the first half of 2021. Just in May, the price of Bitcoin dropped by over 30%, leading to the liquidation of \$8 billion worth of cryptoassets on May 18th. On May 12th, another \$3.4 billion was liquidated, allowing leveraged traders to unwind their long bets.<sup>22</sup> Over the course of 24 hours on May 18, 662 million USD in loans were unravelled using DeFi lending standards; on May 12, another 39 million USD were reversed. On February 22, the second-worst day for liquidations, USD 129.6m was liquidated. To put these liquidations in perspective, consider a typical day of DeFi product liquidations ranging from \$1 million to \$5 million (according to Debank figures). The value of key crypto-assets (Bitcoin, Ether) has dropped sharply, and the quick unwinding of leveraged positions and big liquidations in DeFi protocols are adding to the pressure on these assets' pricing. This is because there are feedback loops connecting the two markets. As collateral is automatically liquidated by DeFi programmes, pushing the worth of the crypto-assets used as collateral even lower, this might extend selloffs and create negative spirals. Stablecoins, which are being used to exit holdings in DeFi tokens, have had the reverse effect and are now trading at more than USD 1 per coin. This is rather interesting. Users' transaction fees may be affected by Ether's extreme volatility, as these fees might occasionally be linked to the price of the cryptocurrency (Figure 5). Ethereum gas fees have reached new highs in the past year (see Figure 5 ), and in some instances, transaction costs exceed the value being transacted, effectively blocking users wishing to execute small trades. This is because most of the DeFi activity is located on the Ethereum network, and other recent developments around Ethereum (NFT issuance, EIP 1559) have also contributed to this trend. Users are discouraged from executing small-valued transactions due to the disproportionately high fees, which essentially prevents them from using the service. Because users are hesitant to transact at such high fee levels, this causes a spike in the size of transactions, which leads to the banning of users' assets. This undermines the democratisation of finance and financial inclusion goals advocated by DeFi and has a disruptive impact on smaller retail investors. As a result, this influences the state of liquidity on decentralised exchanges (DEXs), which are hubs for trading cryptocurrency. Stablecoin transactions, such as USDT, follow a similar pattern in reaction to high and unpredictable ETH transaction/validation costs; that is, high fees cause a precipitous drop in the amount of transactions using crypto-assets, while it is difficult to draw a direct causative relationship (Carter, 2020).



## Figure 5 Ethereum daily transactions chart and transaction fees

Note: The cost of gas fluctuates with the supply and demand for processing power.

Source: Etherscan.io, bitinfocharts.

### Conclusion:

By delivering financial services that are more accessible, efficient, and transparent, decentralised finance has the ability to radically alter the conventional banking system. A major role for DeFi in determining the future of finance is expected to open up as the technology develops and solves problems. Users should use caution and knowledge of the potential dangers of this emerging environment.

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