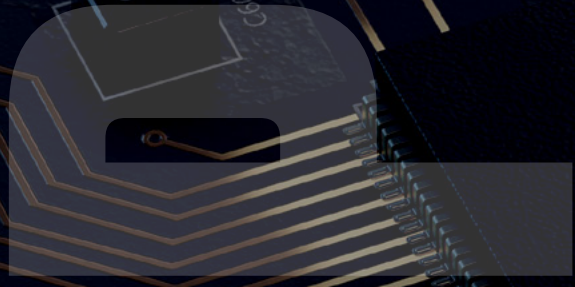
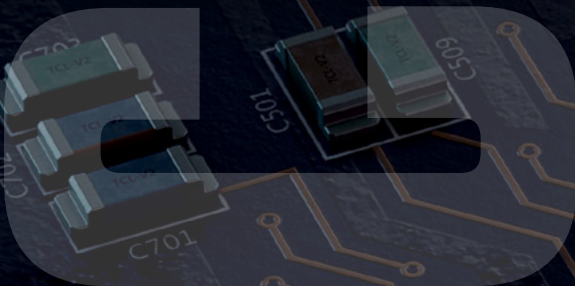


# THE CAPCO INSTITUTE JOURNAL OF FINANCIAL TRANSFORMATION



## CRYPTO

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Decentralized Finance (DeFi)  
from the users' perspective  
UDO MILKAU

## CLOUD

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#55 MAY 2022

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# THE CAPCO INSTITUTE

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**DEAR READER,**

Welcome to edition 55 of the Capco Institute Journal of Financial Transformation. Our central theme is cloud computing, which has transformed from an efficiency initiative for our clients, to an indispensable growth driver for financial services.

The pandemic has changed consumer expectations, with consumers now demanding 24/7 access to their financial resources from anywhere, as well as hyper-personalized products that reflect their lifestyle choices.

In this edition of the Journal, we explore the power of cloud and its potential applications through the lens of a joint Capco and Wipro global study, and take a deeper look at the financial services data collected in Wipro FullStride Cloud Services' 2021 Global Survey. The survey was focused on perceptions of cloud and its importance to business strategy from over 1,300 C-level executives and key decision-makers across 11 industries.

The study indicates that cloud is becoming ever more intelligent, hyperconnected, and pervasive, and enables companies to offer their end users the personalized, user-centric experience that they have come to expect. It's clear that only the financial services firms that can successfully leverage cloud, will thrive.

In addition, this edition of the Journal examines important topics around digital assets and decentralized finance, including central bank digital currencies, and bitcoin's impact on the environment, and cybersecurity and resilience.

As ever, you can expect the highest calibre of research and practical guidance from our distinguished contributors, and I trust that this will prove useful in informing your own thinking and decision-making.

Thank you to all our contributors and thank you for reading. I look forward to sharing future editions of the Journal with you.

A handwritten signature in black ink, appearing to read 'Lance Levy', with a stylized, flowing script.

Lance Levy, **Capco** CEO



# DECENTRALIZED FINANCE (DEFI) FROM THE USERS' PERSPECTIVE

UDO MILKAU | Digital Counselor<sup>1</sup>

## ABSTRACT

Decentralized finance (DeFi) applications have been surging with incredible speed for about two years. Some DeFi enthusiasts aim to recreate financial services on the foundations of distributed ledger technology and smart contracts, i.e., computer scripts executed on a distributed runtime platform. This perspective has a clear focus on technology. To shift the debate, this paper examines DeFi from the perspective of users and their contractual relationship with DeFi. Given that DeFi removes traditional intermediaries, one needs to ask which entity becomes the counterparty? One fundamental element of contract law is the “meeting of the minds”; hence we need to determine who are the interacting minds in a DeFi agreement? A second fundamental question is about the beneficiary, or in other words: cui bono? Finally, it is important to determine whether DeFi in fact provides “financial services” or whether it is simply a gaming table, upon which different tokens move positions? The question of the applicable law has to be answered by regulators, nevertheless, the analysis in this paper reveals that DeFi exhibits a structure with “central” entities and a trend towards “gamification”.

## 1. INTRODUCTION: FROM TECHNOLOGY TO HUMAN AGENTS

Decentralized finance (DeFi) is a new phenomenon that has grown rapidly since 2020. DeFi is also a new paradigm to reinvent financial services on the foundations of distributed ledger technology and smart contracts, i.e., computer scripts executed on distributed runtime platforms according to a code written by a programmer with an intention. Controversial opinions about the impact and the benefits of DeFi exist, which can be illustrated with three recent quotes:

- “DeFi offers exciting opportunities and has the potential to create a truly open, transparent, and immutable financial infrastructure” [Schär (2021)].
- “DeFi presents a panoply of opportunities. However, it also poses important risks and challenges for regulators, investors, and the financial markets” [Crenshaw (2021)].
- “There is a ‘decentralization illusion’ in DeFi since the need for governance makes some level of centralization

inevitable and structural aspects of the system lead to a concentration of power. If DeFi were to become widespread, its vulnerabilities might undermine financial stability” [Aramonte et al (2021)].

Any analysis of DeFi that is based solely on technology is bound to be limited by implicit assumptions. Such a perspective puts technology and back-end automation at the center, assumes technological perfection, and ignores the imperfections of our real world, including errors, hacking, scams, and so-called software aging due to changing building block of technological stacks [Parnas (1994)]. The assumptions can be summarized as a mechanistic utopia.

Human agents are at the perimeter of this paradigm – especially as human beings are fallible. Nonetheless, we all know that everything we “write” – whether legal contracts or computer code – is always incomplete, as we have limited knowledge about the past and present and cannot forecast the future with all of its contingencies [see Coase (1937),

<sup>1</sup> I would like to thank Michael Jünemann for his valuable comments on the topic of this article.

Williamson (1979), Grossman and Hart (1986), and Aramonte et al. (2021)]. It is for this reason that this article will focus on the users' perspectives of DeFi, as opposed to its technological foundations.

## 2. APPROACHING DEFI: THREE EXAMPLES OF HOW TO ACCESS DEFI

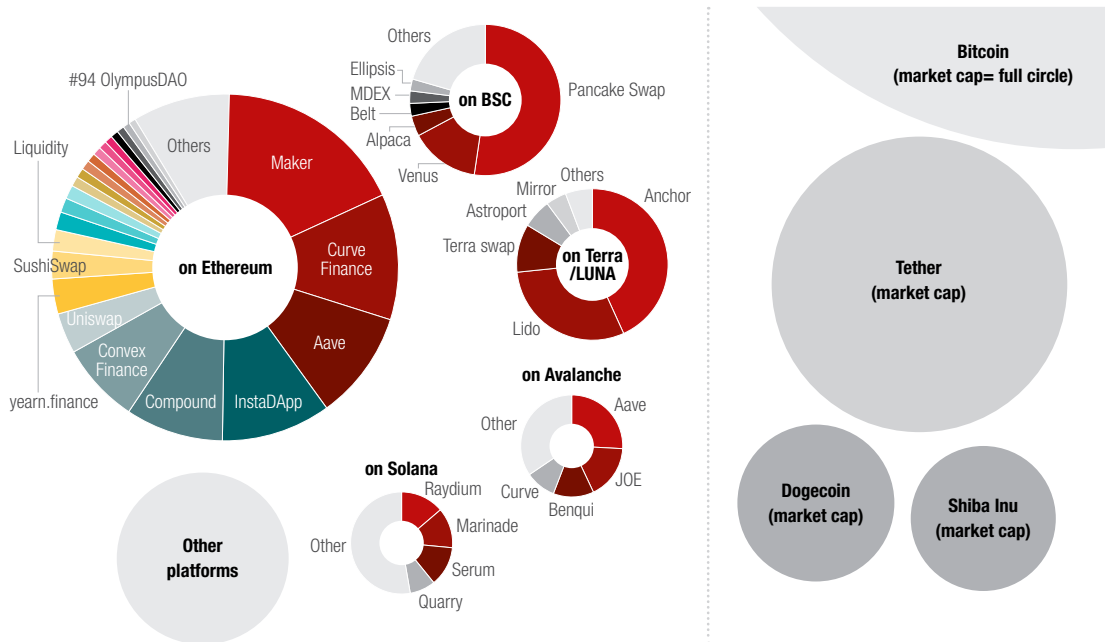
In this section, I will evaluate three examples of how DeFi could be accessed, namely Uniswap, Aave, and MakerDAO (Figure 1).

Let us follow a user who is looking for access to Uniswap (2021) and enters the internet page <https://app.uniswap.org/> for the first time. The user is asked to "Connect a wallet – By connecting a wallet, you agree to Uniswap Labs' Terms of Service and acknowledge that you have read and understand the Uniswap Protocol Disclaimer" (page accessed December 8, 2021).

After acceptance by the user (and technical connection to a user's wallet), this **central app** provides all the necessary information and access to Uniswap as a "decentralized exchange". This type of access is characteristic of DeFi.

First, one can see a typical contract agreement with an "offer" made by Uniswap via the front-end app (as described in the "Terms of Service"), "acceptance" by the user (by clicking on a button), and an explanation about different "considerations" (the interface being free of charge, but there are fees such as "gas" in Ethereum for processing; see below), which makes this situation a distinctive "meeting of the minds" as stipulated by contract law. It should be noted that the "Terms of Service" contain a "Privacy" statement, which includes a **consent of the user** for the application of third-party data to "collect to detect, prevent, and mitigate financial crime and other illicit or harmful activities on the Interface."<sup>2</sup>

Figure 1: Snapshot of the DeFi universe



This figure compares total value locked (TVL) of different blockchain platforms with the market capitalization of major crypto coins (right side; all values assessed at December 23, 2021). The TVL, which is the sum of all assets deposited, is typically displayed in U.S.\$., and the sum of all TVL was around U.S.\$256bn, as compared to around U.S.\$25bn at the beginning of 2021. TVL should be regarded as proxy, because data are taken from different sources and the deposited assets are tokens with high volatility. Few DeFi apps are implemented on various platforms (e.g., Aave and Curve).

Sources: defipulse.com; www.defistation.io; defillama.com; and coinmarketcap.com

<sup>2</sup> A detailed analysis of "know-your-customer" (KYC) and "anti-money-laundering" (AML) requirements, as well as data protection regulation and the issue of outsourcing, is beyond the scope of this paper.



Second, there is a fragmentation of service provision across different layers:

- The user's wallet (on the user's device) is required to store the cryptographic keys, which enable access to the tokens recorded on the blockchain platform.
- The app, as general access to the service, was developed and is provided by Universal Navigation Inc. based in Delaware with the trademark "Uniswap Labs", and displays available combinations of tokens to be "swapped" (e.g., DAI versus ETH), prices for tokens, trading information, etc.
- The "Uniswap protocol" is the central algorithm of this "decentralized exchange". Technically, this is a software executed on a blockchain platform. According to the Uniswap disclaimer: "Although Universal Navigation Inc. d/b/a/ 'Uniswap Labs' ('Uniswap Labs') developed much of the initial code for the Uniswap protocol, it does not provide, own, or control the Uniswap protocol, which is run by smart contracts deployed on the Ethereum blockchain." The governance of Uniswap is based on holders of "governance tokens" (UNI Token) providing voting rights. As these UNI tokens can be traded on crypto exchanges, UNI represents a "share-like" concept with voting rights and participation in the value of the virtual company. While governance tokens of other DeFi applications, such as PancakeSwap's CAKE token, entitle the holder to earn a portion of the revenues, Uniswap distributes fees to so-called liquidity providers.
- The tokens/token pairs on Uniswap represent a huge token universe. Xia et al. (2021) state that they "identified over 10K scam tokens listed on Uniswap, which suggests that roughly 50 percent of the tokens listed on Uniswap are scam tokens. All the scam tokens and liquidity pools are created specialized for the "rug pull" scams, and some scam tokens have embedded tricks and backdoors in the smart contracts." In contrast to the most traded tokens, these scam tokens represent low/no liquidity tokens waiting for victims. The problem of scams will be discussed later in this paper.
- Liquidity providers can be compared to market makers in traditional security exchanges, as they provide tokens to pools for trading and receive rewards (0.3 percent of the value of trades). Whereas market makers typically offer a quote, Uniswap applies an "automated market making" based on a simple algorithm: a "constant product formula"

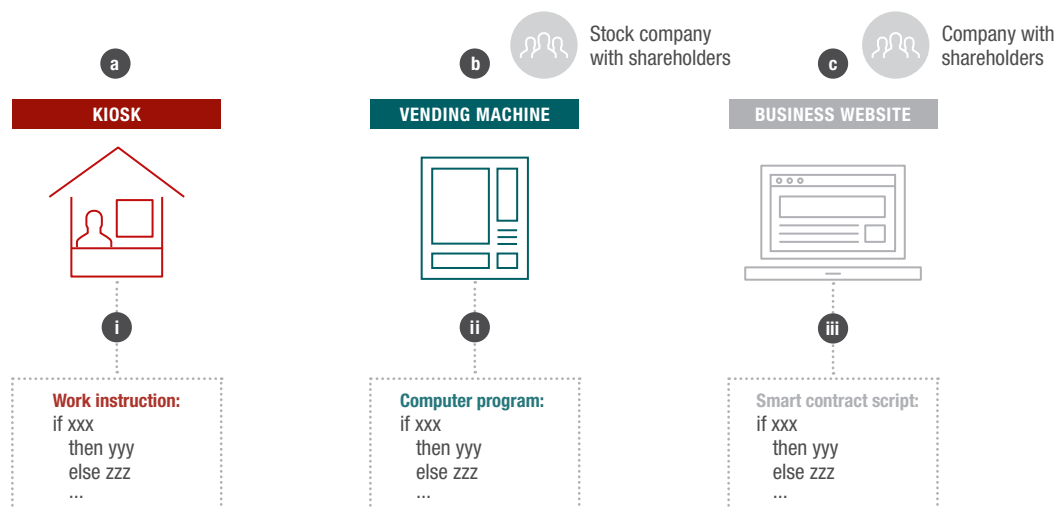
$x * y = k$ , where  $x$  and  $y$  are the amounts of tokens

A and B in the pool [Aramonte et al., 2021]. Despite the differences in the mechanism of market making (quote versus algorithm), liquidity providers and market makers have comparable economic functions and incentives.

- The last layer is the actual processing, i.e., running the smart contract computer scripts on an execution platform. Any processing on the Ethereum platform requires fees to be paid (called "gas" and to be in the native ether "ETH" tokens), which are composed of a base fee and a "tip" (priority fee) since Aug. 2021. This is similar to the more proprietary Binance Smart Chain platform (BSC; linked to the unregulated Binance crypto exchange) or Terra/LUNA (see Figure 1). This can be compared with commercial cloud service providers offering "outsourcing" of processing.

The second example, Aave, has a similar structure. Aave is described on its website (aave.com) as a "liquidity protocol for earning interest on deposits and borrowing assets," which is an emulation of the core banking function to intermediate between savers and borrowers. The "general terms of use" [Aave (2020)] unveils five layers: users, the general interface, the decentralized protocol, the liquidity providers, and the Ethereum platform. Similar to Uniswap, the website is the access interface and is provided by a commercial company: "In these Aave General Terms of Use ('Terms'), 'Aave', 'we' and 'us' refers Aave SAGL and we own and operate the website <https://aave.com/> ('the Site') which acts as a front-end to the decentralized Aave Protocol. ... As part of the Site, Aave provides access to a decentralized finance application ('Application') on the Ethereum blockchain, that allows lenders or borrowers of Ethereum assets ('Cryptocurrency assets') to transact using smart contracts ('Smart Contracts'). Using the Aave Protocol may require that you pay a fee, such as gas charges on the Ethereum network to perform a transaction." "Aave SAGL is a company incorporated in Switzerland, ... Privacy Policy ... gives you rights by operation of the EU GDPR. ... Your agreement with Aave's Terms of Service constitutes your consent to the collection and use of Personal Information as described in this Privacy Policy."

The AAVE token is used for a governance with voting rights and the possibility to "receive incentives" [Aave (2021)]. Furthermore, Aave was the first DeFi app that introduced so-called "flash loans", which are "repos without collateral" within

**Figure 2:** Three situations of “meeting of the minds” at a kiosk, a vending machine, and an online business website

The layer of interaction (i.e., the “contract”) is shown in the upper row, while the lower row shows the “technical” processing in the background, which was ex-ante defined by a programmer.

one block in the blockchain. These transactions allow for a temporary creation of “value from nothing” due to bookkeeping on a blockchain in batches – against fees to be paid, because there is no free lunch, and every transaction in DeFi has a beneficiary.

The third example is MakerDAO, which has a longer history. MakerDAO was created by Rune Christensen in 2014, and the core product is DAI, a “decentralized stablecoin” based on overcollateralization with other crypto assets [MakerDAO (2020)]. This resembles a repo agreement in traditional money market operations with one significant difference, as tokens without intrinsic value are collateralized by other tokens without intrinsic value. The DAI token was launched at the end of 2017, a “Maker Foundation” took over control in 2018, and the governance was shifted in 2021 to the holders of the governance token “MKR”.

The front-end was separated as Oasis app to: “Borrow Dai and Multiply your exposure to crypto Open a Maker Vault, deposit 25+ crypto collaterals. Either borrow Dai or buy additional collateral to increase your exposure. Connect a wallet to start.”

Oasis is now operated by a company incorporated and registered in England according to the “Terms of Service”: “Please read these Terms of Service (this ‘Agreement’) carefully. Your use or access of the Site or the Services (as defined below) constitutes your consent to this Agreement.” “This Agreement is between you (the ‘User’ and collectively with others using the Site, ‘Users’) and Oazo Apps Limited, a company incorporated and registered in England, United Kingdom (‘Company’ or ‘we,’ ‘our’ or ‘us’ and together with you, the ‘Parties’) concerning your use of (including any access to) Company’s websites, currently located at oasis.app.” “By clicking or tapping any button or box marked ‘accept’ or ‘agree’ (or a similar term) in connection with this Agreement, or by accessing or using the Site or the Services (as defined below), you agree to be bound by this Agreement.”

This DeFi application can also be described as a sequence of a user/wallet, a front-end app that is operated by a commercial entity, a protocol with a token-holder governance (voting and incentives), and processing on a blockchain platform.

### 3. CONTRACTS: THE MEETING OF THE MINDS

These examples reveal that the user of DeFi is typically interacting with a front-end app provided by a commercial firm. The user enters into a contract by accepting an offer – typically with a click on a button and accepting the Terms of Services. This matches the traditional perspective of a “meeting of the minds” as basis for a contract. The technical computing “behind the curtain” – whether based on smart contract computer scripts or traditional programming – can provide documentation and processing, but the formal agreements are made between the user and a firm. This supports the notion of a “decentralization illusion” in DeFi [Aramonte et al. (2021)].

Some scholars argued that code itself could establish a “lex cryptographica” and computer programs could be “self-contained and autonomous”. According to De Filippi and Wright (2018), “blockchain technology facilitates the emergence of new self-contained and autonomous systems that rely on lex cryptographica. These systems enable people to communicate, organize, and exchange value on a peer-to-peer basis, with less of a need for intermediary operators.”

One could ask, what “self-contained and autonomous” means in the context of technological systems, which, for the time being, have to be programmed ex-ante and have no free will to act independently from the original intention of the programmer. It helps to start with a comparison of three stylized situations when someone enters into a contract to buy a bottle of lemonade or a lottery ticket (also a “token”).

Figure 2 illustrates three situations: 1. at a kiosk, 2. at a vending machine, and 3. via a website. The first situation demonstrates the principle that a contract (between the consumer and the kiosk merchant with a published price list) in a written format is not required. In addition, the “at a kiosk” example also highlights the fact that the “internal processing” in the kiosk prescribed in a “manual” is neither the offer nor the contract, but simply “execution”, which could be “automatic” if the written manual is translated into a computer program and performed by a robot.

The next step, situation 2, tries to determine whether deals undertaken with a technical device, such as a vending machine, are considered legal contracts, from a contract law perspective, and consequently binding. To cut the long story of many decades short, a vending machine can display an offer as the first step of a legal contract (to be accepted by

a consumer) but “on behalf” of a legal entity – i.e., natural person or legal company – which installs and operates the machine, including all internal programming. This legal entity is a beneficiary of the contractual agreement and would be liable for any breach of contract (keeping in mind that contracts have a remedial function in cases of dispute).

The last step is the “digitalization” of a physical vending machine as an online business. The actual difference is marginal, because the interaction takes place with a “technical” representation of a legal entity: either with buttons on the machine with advertised prices (on behalf of a company) or with buttons on a website with advertised prices (on behalf of a company).

This perspective was applied in 2012, when the German Federal Court of Justice (Bundesgerichtshof) ruled that the way an automated system is expected to process and execute a declaration of intent, which was made using electronic means of communication and via an automated booking or ordering system, does not determine the content of the contract. What matters is how the human addressee is allowed to understand the respective declaration in good faith and custom [BGH (2012)].

The displayed (“offer”) and confirmed (“acceptance”) content is binding like a contract, whereas the execution of bits and bytes within a computer system is technically relevant for the performance but can be seen as a black box behind the curtain (Figure 2 at the bottom).

Even if we make a Gedankenexperiment (“thought experiment”) and assume that the potential buyer would operate directly on the blockchain, i.e., with the ability to parse published smart contract code, there has to be an offerer, who creates and publishes a smart contract like a declaration with a price list. The user could accept this offer by signing the smart contract (with a cryptographic key), and the offerer can confirm with a second signature. In the model of Figure 2, a smart contract is a declaration (“offer”) that has to be agreed to (“acceptance”).

The reality, however, diverges from this Gedankenexperiment, mainly because all examples of DeFi application implement the model with a front-end interface and a back-end processing, and every smart contract on the blockchain is published in so-called “bytecode”, which resembles assembler computer language of yesteryears. Only experts, and not your average consumer, can read, translate, and understand such bytecode.

Of course, expert witnesses could be asked to “interpret” the original computer script in court – and even they could overlook errors or backdoors – but the consumer interacts with the “display”.

Only the “meeting of the minds” establishes a contract and not any “mechanisms” inside the vending machine. The agreement to a contract does not usually need to be in a specific form, and “protocols” can range from a simple handshake (horse-trading) to signed paper-based documents to electronic messages with digital signatures. Taken together, DeFi can be structured in the interaction part (“meeting of the minds”), a part of the “written” documentation (with our limited strength of knowledge about the future) and the performance, which can be automated technically (with traditional computer programs or smart contract scripts).

#### 4. AUTOMATION, GOVERNANCE, AND CUI BONO

The promise of DeFi is a new financial system that operates without the involvement of either centralized entities, such as central banks or exchanges, or intermediaries, like banks or asset managers. These financial institutions would be replaced with a system of automates, i.e., smart contract scripts on blockchains. However, in reality, users will enter into contractual relationship with some “frond-end” providers, which resemble traditional brokers or financial services providers.

These access providers develop and operate the interfaces and transmit the transactions to some DeFi protocols. These protocols perform similar functions to those performed by traditional exchanges, money market funds, or bank lenders, if we apply the hypothesis that the tokens are a type of financial instrument and not mere play money (see further discussion below).

However, we already have “algorithmically managed” financial services, with the best examples being exchange traded funds (ETFs), which “passively” track an external index, and algorithmic high-frequency trading with a “programmed” trading strategy. These cases demonstrate the essential difference between operational management (performing functions) and governance (making decisions).

There is also a difference between “automated” and “autonomous”. While a formula, an algorithm, or a trading strategy can be written down – as a “manual” on paper or as a “programmed” software – and executed “automatically” without human intervention, we all have limited knowledge about the future. This incompleteness of knowledge, programs, and contracts require us to make decisions about changes to adapt to the future. With free will and without external force human beings can make these decisions “autonomously”.<sup>3</sup>

While operational management can – under well-defined conditions – be executed automatically, all actual decision-making requires a human governance, be it by an individual owner, a member of a cooperative organization, by shareholders of a stock company, or by “governance token” holders of a DeFi business. This governance includes a defined process to exercise voting rights (due to the ownership share) and can include rights for dividends or other distributions.

The U.S. state of Wyoming amended its legal definition of a limited liability company in mid-2021 by issuing the “Wyoming decentralized autonomous organization supplement” [Wyoming (2021)]. This supplement allows a limited liability company to be “algorithmically managed” by a “smart contract on the blockchain” but will require a membership governance and a registered agent (as point of contact). Contrary to the semantics, such “decentralized autonomous organizations” (DOAs) will be neither “decentralized” nor “autonomous” because they are tangible companies (LLCs) and require a governance by owners/members/token-holders.

In recent years, there has been a shift from initial coin offerings (ICOs) to the current DeFi governance tokens. Independent of the terminology, the fundamental question is always who controls the business and receives the benefit? In other words: cui bono? There is always an initiator, an “ideator”, or at least somebody who sells an idea to some investors. The SEC (2017) report about decentralized autonomous organizations is a comprehensive benchmark for economic purposes and attempts to obfuscate them. No “smart contract” is a divine contract ex machina – there has to be an economic agent from the start with commercial objectives and ongoing incentives.

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<sup>3</sup> Just as a remark, and not relevant to this paper, there is a third “a”, namely “autarchic”, which means independent of environmental impact.

## 5. WHERE IS “THE” BLOCKCHAIN?

The remaining question about the technological foundations of DeFi is: where is the blockchain? This paper will not delve into the reasons why there is not “the” blockchain, but different platforms that are either updated by “minors” (proof-of-work consensus), which have a natural tendency to consolidate (due to the generic game-theoretical economic incentives), or “validators” (proof-of-stake consensus), who are a manageable group by definition. In reality, few miners/validators dominate blockchains, while “normal network nodes” provide connectivity and archiving only. DeFi running on these blockchains is processed by a redundant (aka distributed) network infrastructure, but the functionality is not “decentralized” but performed by an algorithm with a centralized governance.

This operating model is similar to “cloud” computing, with a runtime platform provided for some fees, except for the “readable” bytecode, i.e., the published code of all smart contracts. The blockchain platforms – whether Ethereum or some newer platform like Solana or Avalanche – have the generic disadvantage that every vulnerability is visible to every hacker, but not to the average users. According to reports [Elliptic (2021)], DeFi crime increased to \$10.5 billion in 2021 (January to November 2021), up from U.S.\$1.5 billion in 2020.

There is only one exception, and that is the original concept of the Bitcoin blockchain, in which all participants run network nodes in a peer-to-peer network without any hierarchy or intermediaries. The Bitcoin blockchain with its proof-of-work consensus mechanism was a game-theoretical solution to “emulate” electronic cash in a repeated game, in which the rules and incentives reward cooperation and penalize manipulation [Auer et al. (2021)]. This concept has the implicit assumptions of a closed game and equal chances for everybody. The actual difference in expensive computer resources is a starting point for concentration, and a few so-called mining pools dominate the economy of Bitcoin today [Makarov and Schoar (2021)]. According to BTC (2021) and Etherscan (2021), by December 18, 2021, Bitcoin was effectively “controlled” by four mining pools, as counted by generated blocks, (60 percent in four pools: AntPool, Foundry USA, F2Pool, and an unknown address), and Ethereum by only three mining pools (57 percent in three pools: Ethermine, F2Pool, and Hiveon Pool).

This natural centralization allows sophisticated strategies to achieve “miner extractable value” (MEV) [Shin (2021)] due to the opportunity to include, exclude, or re-order transactions

within the blocks by the mining pools. This ranges from priority fees (so-called “tips” in Ethereum for faster transaction processing) to the use of information asymmetry with own “front-running” token deals (by so-called “searchers”). An excellent summary of the economy of the Bitcoin blockchain was provided by Auer (2019), and an overview of the fee problem was presented by Kreitmar (2021).

## 6. GAMES – GAMBLING – SCAMS

Parallel to centralization and commercialization of blockchain platforms, one can observe another current trend, which is “gamification”. A recent example is quite representative of the current environment but requires explanation.

According to the website [olympusdao.finance](https://olympusdao.finance), OlympusDAO (2021) claims to be “The Decentralized Reserve Currency – Olympus is building a community-owned decentralized financial infrastructure to bring more stability and transparency for the world.”

Neither OlympusDAO nor the OHM token possess any of the features of money (medium of exchange, unit of account, store of value) and they are, of course, not currency according to the definition of a governmental framework for money. The website, which offers (sic!) trading of OHM tokens, has no imprint, company information, venue, etc., at all. Some media refer to a pseudonym “Zeus” as the founder, and a white paper on the website is signed by “nf.carlo.acutis” as a pseudonym that can be found as the copyright of another firm “Intrinsic Research Co.: Macro Fundamentals” on [substack.com](https://substack.com).

The way to get OHM could be as follows. First, one buys ether (highly volatile ETH tokens) for real money at a crypto exchange. Second, these ethers can be used to “borrow” DAI tokens (overcollateralized) at MakerDAO. Third, one can use the DAI to purchase (“to bond”) OHM at OlympusDAO at a “market price” for this highly volatile and not very liquid token. As illustrated by Messari (2021), an investor can buy 1 OHM for a price of say 501 DAI and will receive 1 OHM for a small discount, while so-called “stakers” will be rewarded with 450 OHM, and 50 OHM will go to the OlympusDAO wallet. This adds to a generation of 501 OHM (for 501 DAO at 1:1), whereas the investor receives only 1 OHM at the market price. The rationale for the investor could be either to sell this 1 OHM at a crypto exchange later (if there is a “greater fool”), or to “stake” (i.e., deposit) the OHM at OlympusDAO and participate in the specified incentive mechanism from following sales. In short, the idea is to invest DAI tokens in a “scheme” of OHM tokens to obtain a return from later investors’ purchases.

An article on Coindesk.com, a news site for the crypto community, entitled “Olympus DAO might be the future of money (or it might be a Ponzi),” stated “Yes, it’s a Ponzi scheme. But who cares? So are the dollars in your pocket” [Thurman (2021)].

Both statements are wrong. For one thing, money is a social agreement about future usage [Milkau and Bott (2018)] with “no questions asked” [Holström (2015)] and instances range from centrally issued banknotes to cigarette money, which existed in Germany after World War II. For another thing, a Ponzi scheme is a fraudulent investing scam, which disguises the fact that promised profits for earlier investors are taken from later

investors. The mechanism of OlympusDAO may be near to a pyramid scheme, but the rules of the game are published in two white papers and the code can be inspected on the blockchain (by those who can read the bytecode).

However, the TVL of OlympusDAO collapsed on December 19, 2021, to U.S.\$4.5 million after an all-time-high of nearly U.S.\$500 million on November 24, 2021. Shortly before, a fork (i.e., a clone) of OlympusDAO, called AnubisDAO, surfing on the dogecoin hype, was launched on October 28, and attracted U.S.\$60 million worth of ETH – and one day later all investments were drained from the protocol in a so-called “rug pull” scam (closing a DeFi app after redirection of the investments) [TheDefiant (2021)].

**Figure 3:** Schematical structure of MiCA regulating the authorization and supervision of crypto-asset service providers and issuers



Notes: \* The European Banking Authority (EBA) can classify tokens as significant tokens due to significance or the interconnectedness with the financial system with specific additional obligations for issuers. \*\* But not high-quality liquid assets such as treasuries or government bonds; however, reserve assets may be invested in highly liquid financial instruments. The requirement of a reserve excludes “algorithmic stablecoins”, which would be “crypto assets”.



It can be debated whether such DeFi is gaming (for fun) or gambling (for dollars), and the boundaries between speculation, gamification, and scams are fluid in DeFi:

- **Speculation**, in a completely value-free sense, is trading in financial markets with real-world assets by an individual economic agent in search of profit [as discussed in *Théorie de la Spéculation* by Louis Bachelier in 1900].
- **Gamification**, from the perspective of this article, is a collective phenomenon of online communities created around common narratives (“us against them”) to use venues for mutual actions like online games and usually coordinated via social media or messenger services. Such influencer-follower dynamics creates information asymmetry and makes it possible to game the system, which is prohibited within regulated financial markets.
- **Scam in the DeFi context** – independently of the technical details of how smart contracts could be exploited – has two sides, especially in new scam types like “rug pulls” [Xia et al. (2021)]: greedy fraudsters communicate their new “tokens” on social media like Telegram or Twitter, abandon it unexpectedly, and channel users’ funds to their own accounts [Chainanalysis (2021)]. However, there has to be a greedy player, who sent value to opaque projects without reading the fine print in the technical documentations or smart contract bytecode scripts.

Although “gamification” seems rather modern, it has been around for centuries, with one the most well-known ones being the “tulipmania” in The Netherlands in 1634-1637. Contrary to the belief that tulipmania was a financial bubble, several researchers [Garber (1989), Day (2004), Thompson (2007)] have found that it was a phenomenon detached from the real economy. A closed community traded future contracts for tulips (that sellers never owned) against promises for money in the future (that buyers never had).

In the 21st century, this kind of collective hype developed into what the SEC (2021) called a “meme stock phenomenon”. This correlates with the common narratives in gamification. Whether it is a story about a meme stock like Gamestop initiated by collective action of retail investors at the neo-broker Robinhood (described as “predatory trading” by Hasso et al. (2021), meme coins (like Dogecoin, Shiba Inu, or Floki Inu coins – driven by tweets or social media), or meme tokens (like many DeFi stories).

## 7. REGULATION AND CONSUMER PROTECTION

In a free economy, everything can be traded if one finds somebody else to pay the price you are willing to sell at, including used stamps, baseball cards, or meme coins, even though none has any intrinsic value. Likewise, every adult may play games or gamble for money at a licensed casino. But the “rules of the game” have to be transparent for the consumer. They need to know what liabilities or obligations a counterparty has. From the perspective of the user, consumer protection, transparent agreements, certainty about the legal liabilities of a counterparty, and the possibility of legal recourse are key.

An instructive example is the current proposal for the Markets in Crypto-Assets (MiCA) regulation in the European Union<sup>4</sup> [EC (2020)], which defines the obligations of issuers or service providers towards consumers [condensed in abbreviated form in Figure 3]. Independent of the hierarchical classification of MiCA, one general requirement has to be emphasized. As Article 53 of MiCA states: “Crypto-asset services shall only be provided by legal persons that have a registered office in a Member State of the Union and that have been authorized ...”

Only legal entities can perform regulated crypto-asset services in the European Union and have to act in the best interest of clients, especially if they exchange crypto-assets against fiat currency or against other crypto-assets (MiCA, Art. 68-70).

MiCA will regulate the authorization and supervision of crypto-asset service providers and issuers (or refers to tokens as financial instruments covered by the Markets in Financial Instruments Directive/Regulation (MiFID/MiFiR)) and provides the basis for DeFi service providers or DeFi issuers active in the European Union. This approach avoids discussions about theoretical taxonomies independent of any enforceability. MiCA makes clear that any “service without entity” or “issuance without entity” would be not compliant.

As MiCA will not come into force until end of 2022, the impact of such a regulation on crypto-assets and DeFi remains to be seen. However, there is one case in the “crypto ecosystem” – although not DeFi, but CeFi (centralized finance) – which is emblematic of the problem with consumer protection: the stablecoin tether. Tether was launched in 2014 and is at present the “stablecoin” with the largest market capitalization (about 48 percent of all stablecoins as quoted on CoinMarketCap on December 20, 2021).<sup>5</sup>

<sup>4</sup> For a review of the regulatory environment in the U.S., see Gorton and Zhang (2021) and Allen (2021).

<sup>5</sup> For a general overview of stablecoins, please refer to Aramonte et al. (2021) and Waller (2021).





However, an important point was made by Jerome Powell and Jens Weidmann (2021) at the 2021 BIS Innovation Summit: all stablecoins need to “borrow” their stability from traditional currencies and are, subsequently, no rivals to the U.S. dollar, yen, or the euro. Aramonte et al. (2021) suggest that “Stablecoins are inherently fragile. ... The vulnerability is similar to that of traditional intermediaries, such as money market funds, whose investors expect to be able to redeem in cash at par.” One can say that any constant net assets value (CNAV) model is based on investors’ money, while a currency with silver or gold standard is based on reserved assets of the issuer.

The conduct of the conglomerate issuing tether was investigated by the N.Y. Attorney General (2021) and the U.S. Commodity Futures Trading Commission, and the latter issued warnings regarding tether and the associated Bitfinex crypto exchange. According to CFTC (2021): “However, the Tether order finds that from at least June 1, 2016 to February 25, 2019, Tether misrepresented to customers and the market that Tether maintained sufficient U.S. dollar reserves to back every USDT in circulation with the ‘equivalent amount of corresponding fiat currency’ held by Tether and ‘safely deposited’ in Tether’s bank accounts. ... Tether held sufficient fiat reserves in its accounts to back USDT tether tokens in circulation for only 27.6 percent of the days in a 26-month

sample time period from 2016 through 2018. ... and that Tether transferred Tether reserve funds to Bitfinex, including when Bitfinex needed help responding to a ‘liquidity crisis’.”

Subsequently, Tether started to publish “consolidated reserves reports” in 2021, and the most recent report [Tether, 2021] reveals that this “stablecoin” resembles a (CNAV?) money market fund with a reserve of 54 percent commercial papers, corporate bonds, and secured loans, but only 39 percent cash, bank deposits, and treasuries. Although tether is not a DeFi token but issued by a “central” legal entity, the development illustrates the difference between original claim and actual implementation, which is relevant for the user. Regulation and supervision with defined standards and obligations for issuers and service providers of CeFi and DeFi crypto assets achieves transparency and, as a result, customer protection.

## 8. CONCLUSION

There are increasing concerns among banking supervisors regarding DeFis. Agustín Carstens, General Manager of the Bank of International Settlements (BIS), recently highlighted this issue by stating that “Concerns also arise in the growing crypto universe of decentralized finance ... DeFi appears to be operating largely within its own ecosystem, with little in the way of financial intermediation services being provided to the

real economy. ... But the potential for spillovers should not be underestimated, especially since the stablecoin arrangements themselves can create important links. As history confirms, anything that grows exponentially is unlikely to remain self-contained and thus merits the closest attention" [Carstens (2021)].

Contrary to the discussions regarding technology or semantics (like "decentralized" for an app on a "distributed" ledger technology), the users tend to predominantly focus on, and are most concerned with, legal, economic, and sociological issues. They want to know whether what they are considering is speculation, gaming, or a scam? Is there adequate consumer protection? Cui bono?

Within the DeFi universe, there are single entities providing the interface to the "meeting of the minds" and economic beneficiaries with voting rights and/or receiving rewards – independent of whether something is called "decentralized finance" in 2022 or "Société Anonyme" as in the French Code de Commerce of 1807.

Taking the users' perspective as the guiding principal, legislation, regulation, and supervision have to clearly state whether a business is a regulated legal entity with sufficient consumer protection and mandatory "shock absorbers", whether it is company with a casino license for gambling (with jetons to be exchanged for money), a platform provider of a collective online game (potentially with fee-based add-ons), or whether it is an activity beyond the remit of regulations.

In my opinion, DeFi is neither "decentralized" nor provides financial services with the necessary consumer protection in place. It can best be portrayed as a "game of tokens" with substantial information asymmetries. However, as Carstens (2021) states, its spillovers could jeopardize the real economy and create new risks – for financial services and consumers alike.

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