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Development of decentralized finance and its impact on global financing structures

This article discusses decentralized finance, its development, and its impact on global financing structures. It elaborates on the changes that have occurred since the introduction of Bitcoin in 2009 and those due to the blockchain technology. Since Bitcoin, cryptocurrencies and blockchain technology have grown in popularity. Decentralized finance is a new revolution in the finance and payment structure sector, which has expanded in part because of the continued growth of the Internet and its association with social networking. The analysis compares the new financing structures with centralized, traditional financing structures, with banks being the primary flow regulators. Open data from the World Bank is used and a systematic literature review is conducted as the primary method. Decentralized finance threatens the existence of the Swiss financial center. The main driver of technological innovation is the Blockchain technology, which aims to revolutionize the global financial system. The steep rise of cryptocurrencies in recent years has made blockchain technology known, illustrating its economic implications for the banking system.

Keywords: decentralized finance, blockchain, cryptocurrency, Bitcoin, digital currency

JEL classification: B27, F65, G21, O16, P33

Introduction

Decentralized finance (DeFi) is technologically a blockchain structure. An autonomous organization and smart contracts play the decisive role here. Typical characteristics create a transparent ecosystem for financial services, the open-source orientation, and the freedom of permission. For Zetzsche et al. [2020], a central authority (to manage transactions) is not required; everyone has access to these financial markets. The interactions take place peer-to-peer and via various decentralized applications.

The prerequisite for implementing decentralized financial markets is that the underlying blockchain technology supports smart contracts. Smart contracts implement computer programs and have self-executable and self-enforceable conditions. The Bitcoin blockchain, e.g., only partially includes the required instruction sets for smart contracts. The control is decentralized, i.e., users interact through

the system, and thus the DeFi market offers them autonomy. This is the decisive difference with the traditional financial markets with centrally acting financial intermediaries [Popescu, 2020a]. It should be noted that the decentralized model does not apply to banks and securities dealers. Over the past few years, DeFi has been developing exponentially and today it has a significant impact on the global financial markets.

1. Decentralized finance

DeFi aims to create a highly interoperable financial system with greater transparency, equal access rights, and less need for intermediaries, as intelligent contracts take over these roles. This implies that it is an alternative (open, transparent, and automated) financial system.

Centralized financial markets prevent fair access and are vulnerable to counterparty risk, censorship, lack of transparency, and manipulation. The recent GME and Robinhood events, ultimately driven by regulatory requirements, vividly illustrate these shortcomings. Long before GME, DeFi stepped in to address them and ensure that the infrastructure that supports the programmable asset markets is as decentralized as the underlying technology [Popescu, 2020b]. While the decentralized exchanges (DEXs) were a little over two years old, they hit USD 60 billion in total in Q4 2020, while DeFi outstanding loans hit USD 4.5 billion.

1.1. Yield

Implementing liquidity incentives over the summer drove a mostly speculative frenzy, complete with income from farming, fork wars, and grocery stamps. Admittedly, while speculation can be the primary driver, it also leads to increased productivity and technological advances. As a result, DeFi's focus has shifted from acquiring liquidity to maintaining liquidity. As virtually the entire DeFi ecosystem competes for resources on Ethereum, gas costs have been phased out by hand, and there are government channels, knowledge-free rollups, and optimistic rollups. However, as liquidity increases, more money invested in DeFi comes on the market, and the risk is reduced, current interest rates hardly seem sustainable.

Just as the introduction of interoperability in technology results in commercialized base layer protocols, more efficient/liquid markets also lead to tighter spreads and lower returns over time. DeFi is not immune to TradFi's fragile recoveries, such as re-mortgage and excessive leverage. By definition, composability leads to dependencies that cause a systemic risk. However, the transparency offered by DeFi changes the risk equation. The systemic breakdowns in the TradFi

markets were partly the result of opacity (in 2008, no one knew who was bearing which risk), while DeFi's transparency enables real-time risk pricing and a verifiable collateral path. Protocols are also jointly owned and operated. This means that the fees are shared among users rather than with hedge fund managers. Both are important reasons to use DeFi even after returns normalize.

1.2. Financial inclusion

Cryptocurrencies are less regulated and cheaper than their traditional counterparts, removing barriers to entry for the 1.7 billion people worldwide without a bank account, many of which do not have it because they lack a legal form of identification, and the various under-banked currencies. The advantages here are supposed to include lower fee transfers, reduced banking, general adoption, and the use of digital IDs.

Starting with lower fee transfers, though there have been exciting advances, they remain challenging as regulatory barriers; capital controls and factors outside the banking system cause most of the friction and costs involved in making cross-border payments. While a portion of the population has been excluded from the financial system for decades, the pandemic has shown an urgent need for inclusion. Much of the US population can receive funds through direct deposit, but there is still a sizeable unbanked population who cannot. Stimulus checks were sent out to them in the mail, adding to inequality. Funding for SMEs has also been difficult due to lending practices that require loan officers, personal identification, and faxes. The proposal for a digital dollar was included in the original business cycle, and there is still an urgent need for better digital IDs and digital distribution channels.

It is important to note that depending on the design, digital currencies can potentially decrease financial inclusion. The Libra announcement raised concerns about the national sovereignty of developing countries at the risk of accidental dollarization [Le Maire, 2019]. It also seemed to create something very similar to a reserve bank that raised alarms about global financial stability. Shortly after that, the People's Bank of China raised concerns about the threat to existing reserve currencies [Goodell, Al-Nakib, 2021]. Whether or not these concerns were justified, they resulted in a massive surge in the central bank's R&D of digital currencies.

1.3. Mainstream adoption of DeFi

There have been significant developments in mainstream distribution towards a broader adoption of crypto payments. PayPal [2020] has introduced new features that allow its 346 million users and 26 million dealers to buy, hold, and sell cryptocurrency. Visa announced that it is connecting its network of 60 million

merchants to USDC. Mastercard enables cardholders to carry out transactions in specific cryptocurrencies on their network [Dhamodharan, 2021]. Square generates over USD 1 billion in quarterly Bitcoin revenue. Coinbase has more than 43 million users [Gudgeon et al., 2020]. BlockFi has more than USD 5 billion in personal loans, liquidity events in the public market are on the way, and Coinbase is expected to go public on a valuation that ranks it among the top 10 financial institutions in the US [Li et al., 2019].

1.4. Web 3.0

Web 3.0 refers to the use of blockchain technology to create an alternative to our current Internet, which is dominated by large, centralized platforms supported by extractive business models [Khan et al., 2019]. Web 3.0 is supposed to grant users access to a stateful Web, thereby reducing platform risk, empowering users, enabling new business models, and aligning incentives between network participants.

1.5. Key advantages of DeFi systems

Since DeFi systems are built based on blockchain networks, they have the same security, decentralization, and other benefits.

Open systems are great equalizers in business. People who typically do not have access to financial services can easily participate in these unlicensed systems. Typically, legacy financial services are only available in middle- and high-income regions. DeFi platforms do not have such a tendency. Since they exist online, they are available in any part of the world with Internet access [Chohan, 2021]. In addition, open ecosystems are also censorship-resistant. With decentralized finance, no user can be excluded.

Traditional financial systems have arbitrators and centralized servers, both of which are common avenues of attack. For example, a server mainframe could be hacked, and system administrators could make mistakes or deliberately sabotage a system for their benefit. DeFi applications, on the other hand, run on a network made up of thousands of devices. This eliminates the single point of failure that typically exists with financial services. As a result, decentralized financial platforms are extraordinarily robust and hardly ever shut down.

In older financial systems, one would have to refer multiple lenders and compare their rates to get the best interest rates and fees. In addition, one would need to make extra effort to find hidden fees. In DeFi systems, not all of these problems have to arise. Important information is stored on the blockchain, which anyone can easily access. Therefore, users can easily search for the best DeFi services avail-

able and anticipate the risks involved, e.g. when a stable coin platform is critically under-collateralized.

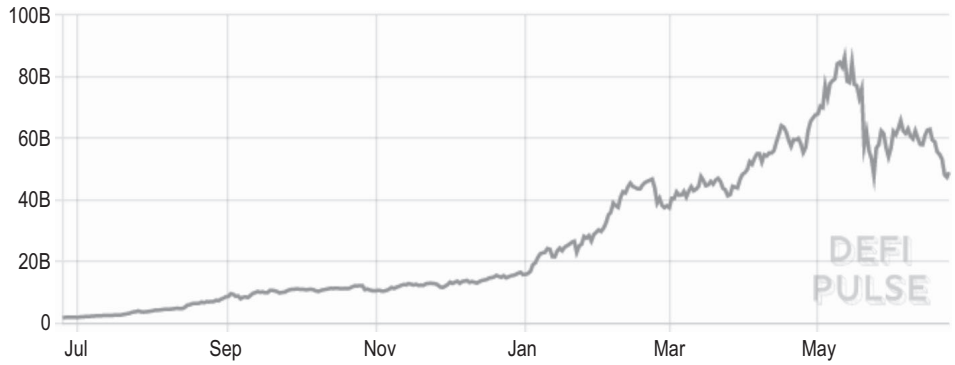

Figure 1. Total value locked in DeFi (USD)
Source: [DeFi Pulse, 2021].

Figure 1 shows the total value locked in DeFi, illustrating its growth as a result of the mentioned benefits.

2. DeFi use cases

While blockchain is still in its infancy, DeFi has only just been concieved. However, experts have already established use cases that have reformed the crypto space and are disrupting the financial world. Therefore, it can be assumed that in a few years DeFi technology will develop beyond even greater heights than before.

2.1. Lending and borrowing

Loan and credit platforms are some of the most popular types of applications in decentralized finance. These platforms allow anyone to borrow money provided they have enough assets to serve as collateral. Decentralized lending systems are generally cheaper than their traditional counterparts for several reasons. One can use DeFi platforms to secure digital assets such as cryptocurrencies and non-fungible tokens. Most finance apps also have instant transaction settlements, which is very convenient. In addition, they do not require any credit checks. For many people, these functions are more than sufficient to switch to decentralized lending platforms.

2.2. Limitless transactions

While cryptocurrencies like Bitcoin and Ethereum allow users to send and receive cross-border payments, they have never been stable enough to be used as cash. Most people would not like to use currencies that fluctuate regularly in value for their daily needs. Several DeFi systems give users stable coins that they can freely use as a means of payment. A platform called MakerDAO allows users to lock up their assets as security to generate a stable coin called DAI that can be used to top up Visa debit cards on Wirex.

2.3. Decentralized exchanges

A DEX is a platform that allows users to trade digital assets without the need for a custodian. Instead of letting an exchange take control, DEX users rely on smart contracts to bring buyers and sellers together and execute trades directly from their crypto wallets. As of 2020, centralized exchanges like OKEx and Binance still hold the vast majority of crypto assets in this space, but that could change in the future. DEXs such as Binance DEX, Kyber Network, and others have gained popularity over the past year. Ultimately, they give users more control and sovereignty over their wealth. In addition, they require less maintenance and have lower trading fees compared to centralized exchanges. Even so, they still have a long way to go in terms of liquidity, user interface, and advanced tools.

2.4. Decentralized marketplaces

Decentralized marketplaces like Open Bazaar are simply e-commerce applications built with a decentralized architecture – they can be thought of as Amazon without the Amazon company. People can buy or sell goods and services in digital currencies. Moreover, since there is no central authority, nobody has control over their items, unlike on eBay or Amazon. With this autonomy, one might wonder how buyer-seller disputes are resolved. Once a transaction has been recorded on a blockchain, it eventually becomes irreversible. The solution to that is a multisignature escrow scheme. By creating a 2-3 Bitcoin address, a moderator can be added during a transaction if the buyer and seller disagree. In such a scenario, the moderator or a third party decides which one to give his vote to.

Moreover, decentralized insurance protocols allow users to purchase insurance coverage tied to smart contracts. Rather than relying on large insurance companies, a small group of government individuals could pool their funds to cover claims [Zetzsche et al., 2020]. This eliminates the need to pay high premiums as this becomes almost a zero-sum game. Smart contracts, unlike insurers, do not try to make a profit from users. To date, insurance is not DeFi's most popular applica-

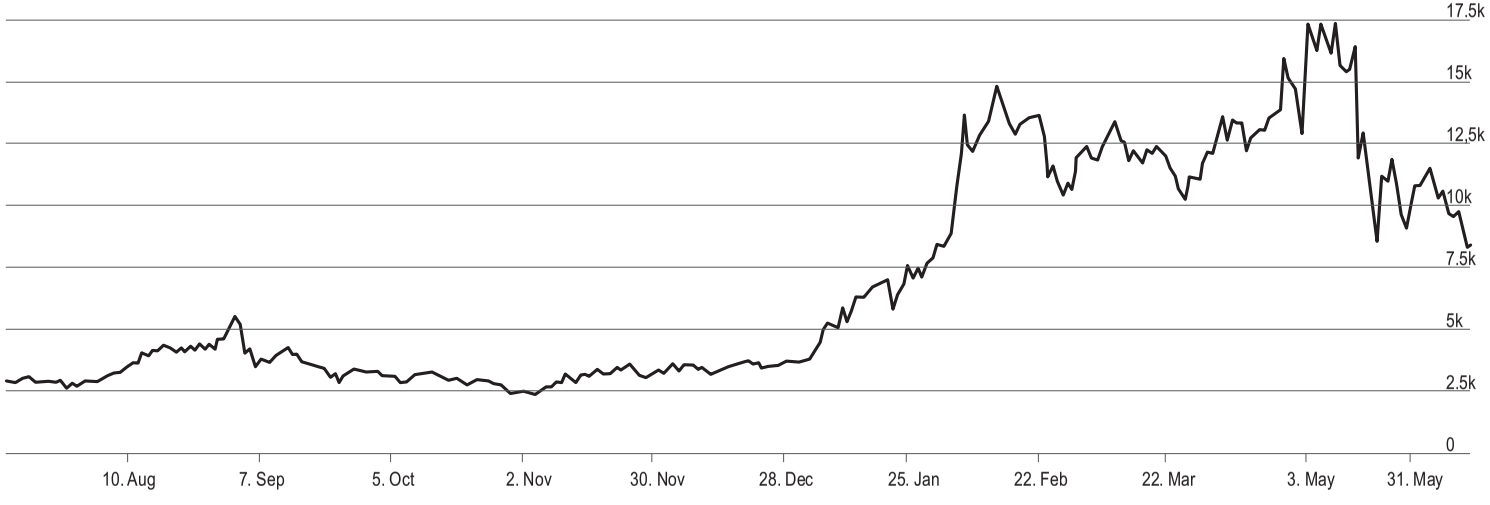

Figure 2. DeFi index
Source: [Etheriumprice, 2021].

tion, but there are plenty of blockchain companies like Etherisc that are thriving in the crypto-insurance space.

3. The Swiss market

The bankruptcy of the American investment bank Lehman Brothers on 15 September 2008 shook the foundations of the global financial system with debts of USD 631 billion. Unsettled by the financial crisis, consumers and companies in the western industrialized countries steadily lost confidence in the reliability of the existing banking system, which led to a search for alternative financing and investment options. According to the World Bank, only 62% of the world's population had a bank account in 2014 [Underwood, 2016]. In developing countries, most of the population does not yet have access to financial services, hindering economic development and increasing prosperity in countries such as Bolivia, Nicaragua, and India [Li et al., 2019].

In 2008, a few weeks after the collapse of Lehman Brothers, Satoshi Nakomoto, whose identity is still unclear, published the white paper *Bitcoin: A peer-to-peer electronic cash system*. With the implementation of Bitcoin, he created the first global cryptocurrency and laid the foundation for a fundamental technology with undreamt-of technological and economic development potential with the blockchain. Since 2009, it has been possible to make digital payments on the Internet in a decentralized peer-to-peer network in which the transactions are legitimized by an autonomous consensus mechanism instead of a trustworthy central authority [Underwood, 2016]. The transparency, immutability, and efficiency of business transactions in the blockchain are of equal economic and social importance for industrialized and developing countries. As a result, the global financial system can be made more trustworthy, cost-effective, and accessible.

While Bitcoin has been viewed with suspicion since the beginning of its existence, the financial sector's interest in blockchain technology has steadily increased, which is evident in the form of an increase in the volume of investment in start-up companies. A total of USD 1.79 billion has flowed into blockchain projects in the financial sector in the form of venture capital since 2012 and USD 1.13 billion from Initial Coin Offerings over just twelve months [Ramos, Zanko, 2020]. The world's largest banks have also joined forces in the R3 consortium to create a standardized blockchain platform with Corda for smooth transaction processing between banks.

3.1. The impact of the pandemic on Bitcoin

The pandemic negatively impacted the crypto market. The Swiss Blockchain Federation carried out a broad survey of 203 startups in the Swiss blockchain ecosystem. A considerable majority (79.8%) stated that they would most likely go bankrupt in the next six months [Lahmiri, Bekiros, 2020]. A similarly high percentage (88.2%) will not survive the COVID-19 crisis without government help.

Interest rates are low, and the financial markets' situation is serious given the economic consequences of the crisis. Nevertheless, investors are still aiming for the highest possible profits [Garg, Prabheesh, 2021]. Some people think about alternatives to conventional investment products [Werner et al., 2021]. Currently, Bitcoin is increasingly coming into focus again. Internet money is met with deep suspicion by some and strong approval by others [Lahmiri, Bekiros, 2020]. Following the Bitcoin price roller coaster from mid-March to the end of April 2020, it rose again. In early May, the price was USD 9,000. Anyone who invests in Bitcoins should deal with the topic intensively – and arm themselves against fraudsters.

The rapid pace of technological development is also significant for the Swiss financial center, which should not be underestimated. At the end of 2016, 261 banks were operating in Switzerland, generating CHF 32 billion of nominal gross value added and CHF 11.8 billion in profit in the same year [Auer, Tille, 2016]. With assets under management of CHF 6.6 billion, 48% of which come from abroad, the Swiss financial center is the frontrunner in the global wealth management business with a market share of 25%. Swiss asset managers maintained their market position during the financial crisis, but confidence in the banks there has also suffered, and increasing regulation has increased complexity and costs. The asset management business will not be able to escape the digital transformation.

Disruptive business models can shake the foundations of the Swiss wealth management business in the long term if blockchain technology succeeds in challenging the banks for the monopoly of trust [Casey et al., 2018]. However, the banks can deal with the development of decentralized finance in several ways. One of them is to wait and watch the market develop. The second option is to experiment with blockchain technology and new business models. Furthermore, the banks can take an active leadership role in the global democratization of the blockchain value network.

3.2. The impact of DeFi on the Swiss financial center

The digital transformation will not leave the Swiss financial center untouched. The main driver of technological innovation is the blockchain, which aims to revolutionize the global financial system. In recent years, the steep rise of Bitcoin has made blockchain technology known, illustrating its economic implications for the

banking system [Bartoletti et al., 2021]. Payments in Bitcoin are made almost in real-time, directly, transparently, verifiably, and forgery-proof between sender and recipient, completely without bank accounts and central clearinghouses. The integrity of the financial transactions is made possible by a decentralized, publicly accessible general ledger consisting of cryptographically secured and verified blocks.

Blockchain innovation starts with the financial market infrastructure, the foundation of the global financial system. The closed, central financial systems may give way to an open, decentralized blockchain platform, which provides the basis for new data-based business models [Smith, 2021]. Through digitization and decentralization, the asset management value chain is transformed into a value network dynamically orchestrated via the blockchain. Since the contracting parties can directly exchange all types of digital assets, the existing settlement networks and depository offices in the decentralized value creation process become obsolete [Casey et al., 2018]. At the same time, the decentralized general ledger replaces the bank account, which means that it loses its importance as a customer interface.

In order to strengthen the Swiss financial market in the global competition between locations, the Federal Council lowered the market entry barriers in spring 2017 with the amendment of the Banking Act and the Banking Ordinance and created a technology-neutral innovation area. The relaxation of financial market regulation allows fintech companies to test new technologies and innovative business models in the Swiss market [Smith, 2021]. The attractiveness of the Swiss regulation is shown by the increasing number of fintech companies settling in Crypto valley in the canton of Zug [Auer, Tille, 2016]. As a result, the Swiss fintech ecosystem takes a top position in fintech funding in an international comparison of locations.

The blockchain and Switzerland are based on governance structures that represent transparency, integrity, stability, and create trust. Switzerland provides the social foundation for the technological trust protocol of the blockchain. In combination with the availability of capital, financial market, technological expertise, and business-promoting financial market regulation, the Swiss financial center offers ideal conditions for setting up a global, decentralized asset management platform.

Conclusions

The DeFi ecosystem offers a range of innovative financial services such as lending, token issuance, insurance, and banking in an open-source, permissionless, and transparent network. Users have complete control over their assets while connecting to a whole range of decentralized peer-to-peer applications. DeFi gen-

erally requires the execution of smart contracts, a digital agreement tied to computer code instead of legal documents. Smart contracts can, therefore, self-execute and automate a large number of business transactions that would have required manual effort. The proponents of the digital transformation predict that the disruptive potential of the DeFi technology will lead to a profound structural change in numerous industries.

The blockchain innovation starts with the financial market infrastructure, the foundation of the global financial system. The closed, central financial systems might give way to an open, decentralized blockchain platform, which provides the basis for new data-based business models. Through digitization and decentralization, the asset management value chain is transformed into a value network dynamically orchestrated via the blockchain. Since the contracting parties can directly exchange all types of digital assets, the existing settlement networks and depository offices in the decentralized value creation process become obsolete. At the same time, the decentralized general ledger replaces the bank account, which means that it loses its importance as a customer interface.

DeFi and traditional finance are based on governance structures that stand for transparency, integrity, and stability and create the basis for trust. Traditional finance provides the social foundation for the technological trust protocol of the blockchain. In combination with the availability of capital, financial market, technological expertise, and business-promoting financial market regulation, the Swiss financial center offers ideal conditions for setting up a global, decentralized asset management platform.

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