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Powered by Blockchain Technology, DeFi (Decentralized Finance) Strives to Increase Financial Inclusion of the Unbanked by Reshaping the World Financial System

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Abstract

The invention of the Internet has paved the way for a new world of opportunities in life, including finance. Even with the presence of this invention, the traditional financial system has failed to meet expectations set up by other technological advancements. In today's world, almost everyone has access to the Internet, yet not all of them have bank accounts. According to a recent report from the World Bank Group, approximately 1.7 billion people worldwide still do not have any access to banks whatsoever. Although the Internet has helped transfer information from one part of the world to another within milliseconds, time and spending are still needed when it comes to financial assets. In the last few years, a growing trend toward decentralization in the financial system has been stimulated by blockchain and technological innovation. Satoshi and his unique invention, Bitcoin Blockchain, started to call for peer-to-peer transactions without intermediaries or centralization of any kind. Six years later, the invention of another blockchain, Ethereum, came into existence and has become the backbone of promising decentralized finance (DeFi). This paper provides an overview of blockchain technology, discussing the DeFi ecosystem and its possibilities regarding financially including the unbanked and improving the current financial system.

Keywords

DeFi, Decentralized Finance, Blockchain Technology, Cryptocurrencies

1. Introduction

The current CeFi (centralized financial systems), like banks and other interme-

diaries, have their own separate systems. Each entity is in complete control of where and how its data is recorded, stored, and managed. They can decide what kind of servers to use, where to locate them, and how their security protocols function. By nature of these systems being separate, they do not communicate or integrate efficiently. Therefore, transferring value between these closed, centralized systems is inefficient, costly, and time-consuming.

The invention likely to have the most significant impact on our lives for the next few decades is blockchain technology (Yaga, Mell, Roby, & Scarfone, 2018). In recent years, blockchain has been the most resounding word around the globe, and observers view it as the next generation of the Internet, holding vast promise for worldwide businesses. Blockchain integrates into many areas like finance (Foroglou & Tsilidou, 2015; Peters, Panayi, & Chapelle, 2015), (Casey, Crane, Gensler, Johnson, & Narula, 2018) in the form of cryptocurrencies, online payments, and remittances. It is also used in IOT (Christidis & Devetsikiotis, 2016; Zhang & Wen, 2015), smart contracts (Kosba, Miller, Shi, Wen, & Papamanthou, 2016), voting (Wang, Liu, & Han, 2018), healthcare industry (Peterson, Deeduvanu, Kanjamala, & Boles, 2017), and verification of educational materials (Srivastava et al., 2019). Such technology can even be used to track tangible items, intellectual property rights and many others. A blockchain is a distributed ledger technology (DLT) that functions both as a digital ledger and as a mechanism that enables assets to be securely transferred without an intermediary (Natarajan, Krause, & Gradstein, 2017). Like the Internet, which facilitates the transfer of information, blockchain is a technology that facilitates the exchange of value with the presence of collaboration, cryptography, and some smart codes. Anything from currencies to art and music can be tokenized, stored, and exchanged on a blockchain network.

In simple terms, blockchain is a structure of data that holds transactional records while ensuring security, transparency, and decentralization. This technology allows the management of transaction data to be decentralized on a network of computers around the world using open-source software. Any change to that software on a blockchain must go through a consensus process that no single authority has control over (Glaser & Bezzenberger, 2015). This system is transparent, because transaction data is recorded on an online public ledger that is available for everyone to see. This ledger is saved on a global network of computers, which makes it impossible for the data to be changed or altered. Furthermore, immutability is achieved through a cryptography and hashing process (Gazi, Kiayias, & Russell, 2018), so the data stored on a blockchain is tamper-proof and cannot be forged, changed, or altered. Each block stores information of transactions within that block and the hash of its previous one. A hash is a unique code that belongs to a specific block (Biryukov, Khovratovich, & Pustogarov, 2014), and if the information inside the block is modified, the hash will change accordingly. This connection of blocks through hash keys is what makes blockchain secure. Moreover, blockchain technology allows all network participants to reach a "consensus," agreeing to support a decision in the whole's best

interest. There are many ways to reach a consensus in the blockchain, for example: Proof of Work (Jakobsson & Juels, 1999), Proof of Stake (Siim, 2017), Proof of Capacity (Dziembowski, Faust, Kolmogorov, & Pietrzak, 2015), Proof of Activity (Bentov, Lee, Mizrahi, & Rosenfeld, 2014), Proof of Elapsed Time, and Proof of Burn.

Participants on the network are known as nodes, and their role is to validate transactions on the blockchain. In the Bitcoin network, these nodes are called miners, and they use Proof of Work to process and validate transactions on the network. For a transaction to get validated, each block must point to the hash of its preceding one. Furthermore, a transaction will happen only if the hash is correct, so if a malicious node tries to attack the network and change data on a specific block, the hash attached will also get modified, and the transaction will not occur.

How It Works

Digital assets like money or music are not stored in a central place. Still, they are distributed across a global ledger using a high level of cryptography. When a transaction takes place, it will be posted globally, across millions and millions of computers. On the production side, a group of people called "miners" in Bitcoin transactions have massive computational power at their fingertips. Every 10 minutes, a block gets created having all the transactions from the previous 10 minutes. The miners get to work, solving some sophisticated puzzles, and the first miner to solve and validate the block is rewarded with digital currency, like BTC in the Bitcoin blockchain. (**Figure 1**) (Kouicem, Bouabdallah, & Lakhlef, 2018) Steps of validation process in the blockchain.

2. Blockchain Evolution

The history of this system dates back to the 1990s when Stuart Haber and W. Scott Stornetta first visualized what is now known as a blockchain. Their first work was mainly on a cryptographically-secured chain of blocks where nobody

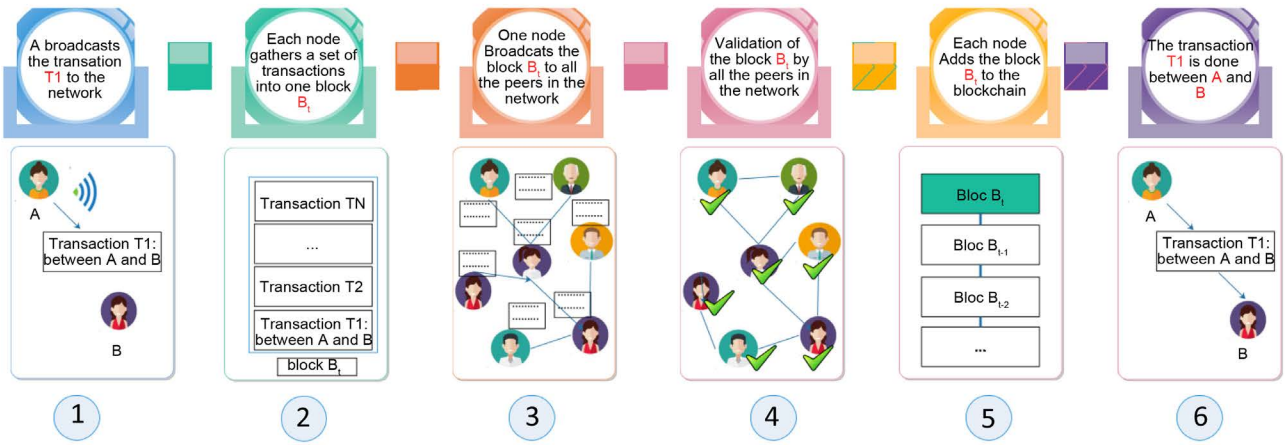

Figure 1. Steps of transactions' validation process (Kouicem et al., 2018).

could change or tamper with documents' timestamps. In 1992, Stuart and W. Scott upgraded their system to contain Merkle Treefor improved efficiency, enabling more documents on a single block (Bayer, Haber, & Stornetta, 1993). It wasn't until 2008 that the invention of Bitcoin's blockchain technology started to actually take shape (Narayanan et al., 2016). Satoshi Nakamoto (2008) is accredited as the anonymous brains behind the blockchain technology, Bitcoin. Nakamoto (2008) conceptualized the first blockchain in 2008, and since then, the technology has evolved and found its way into many applications beyond just cryptocurrencies. Nakamoto (2008) did not keep Bitcoin development hidden; instead, he handed it over to other core developers for further possible applications. Since then, the digital ledger technology (DLT) has developed, resulting in new forms of applications that make up the blockchain's history.

1) 2008-2013. Blockchain 1.0: Transactions.

Described as an electronic peer-to-peer system, Bitcoin came into being in 2008 as the first application of blockchain technology (Nakamoto, 2008). At the time of writing, the BTC market cap hovers between 250 - 257 billion dollars (CoinMarketCap, n.d.-a). It was then realized that the underlying technology powering Bitcoin could be separated and used for many more applications, which resulted in the blockchain technology we have today. Ever since Bitcoin hit the market, many applications have cropped up, all of which look to leverage the principles and abilities of the digital ledger technology DLT. Therefore, blockchain's history consists of a long list of applications that have come into being over the course of this technology's evolution.

2) 2013-2015. Blockchain 2.0: Contracts.

The second phase was "smart contracts (Smart Contracts Alliance, 2016)" operating on a second-generation blockchain system. Vitalik Burterin, was among a growing list of developers and one of the first contributors to the Bitcoin database. Vitalik started working on what he imagined would be a malleable blockchain that can perform multiple functions in addition to being a peer-to-peer network named Ethereum (Buterin, 2013). Ethereum was founded as a new public blockchain in 2013 with more functionalities than Bitcoin, a development that turned out to be a significant moment in the history of blockchain. Rather than using bitcoin's cash-like system, this technology used little computer programs to allow financial instruments, such as loans or bonds, to be represented. The Ethereum now has a market cap of around $44 billion (CoinMarketCap, n.d.-c), with hundreds of projects headed to the market.

3) 2018-2020. Blockchain 3.0: Applications.

Blockchain evolution does not stop with Ethereum and Bitcoin. Such technologies were found unable to support small transactions, so Ethereum improved the transaction rate to 15 transactions per second (tps), almost twice Bitcoin's seven tps. However, this rate is still not adequate for today's economy. Ripple, the fastest settlement system after VISA, handles 1500 tps (Ripple, n.d.). Blockchain is currently moving toward a decentralized network that will inte-

grate communications, data storage, smart contracts and open platforms, which would enable different blockchains to interact with each other. Thus, there is a need for Decentralized Applications (DApp) (Dapp.com, 2018) to have their backend running on a blockchain network and a user interface that accepts any programming language. The current cutting edge of blockchain, DeFi, integrates decentralization, and this will be talked about later in this paper.

The Current Financial System

Equipped with massive IT infrastructures and armies of brilliant operators, the current centralized finance (CeFi) is on the verge of collapse. The system is easily manipulated into having high fees, inefficiencies, deception, fraud and corruption, all while being vastly inaccessible to most people living on earth. According to a recent report from the World Bank Group, approximately 1.7 billion people still do not have access to banks whatsoever (Demirguc-Kunt, Klapper, Singer, Ansar, & Hess, 2018) (See **Figure 2**).

Many people still rely on financial service providers, banks, exchanges, or insurers, to establish trust in the world of economy. These big intermediaries are powerful; they can charge unnecessary fees and exclude whomever they want. The current banking system remains beyond the reach of millions of people. Globally, 31% of adults are still unbanked and do not have access to banking services. The reasons behind this issue are linked to factors like centralization, remoteness, intermediary costs, and a lack of trust in financial institutions. Having access to a financial institution that offers basic services such as loans and free check-cashing is essential for people who want to manage their consumption and safeguard against unexpected events. However, as people are being massively underbanked, 1.7 billion people today cannot benefit from those services provided by financial institutions.

Banks are subject to regulations and high costs associated with money-handling, resulting in their services becoming more costly. Today's traditional

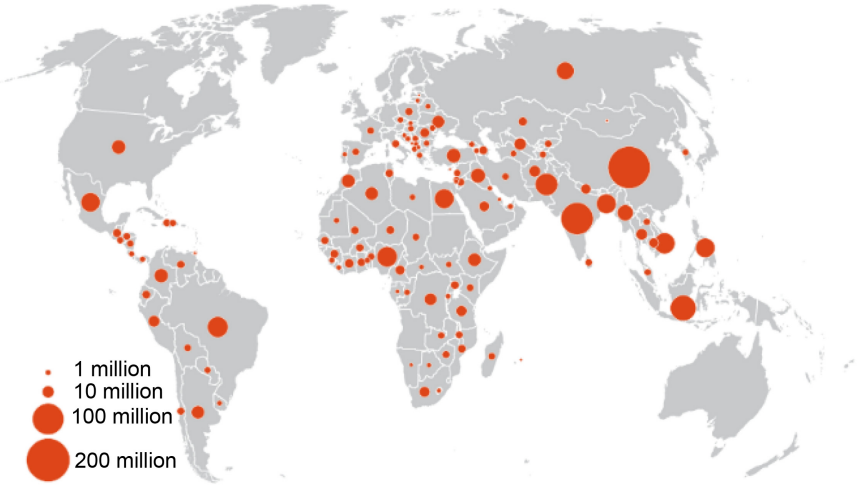

Figure 2. Globally, 1.7 billion adults lack an account (Demirguc-Kunt et al., 2018).

banking system has excluded many lower-income households in many countries and focused only on the higher-income segment. According to GulfBusiness, 26 million migrant workers in the GCC cannot open a bank account due to the high costs (King, 2017). These migrant workers and others worldwide, can only access specific financial services provided by other intermediaries who also charge extra fees. Moreover, overseas workers who send money to their families every month encounter more fees. According to the World Bank Report, that global remittance reached US$689 billion in 2018 (World Bank, 2019), US$528 of which to developing countries (See **Figure 3**) (McCarthy, 2020). Part of that amount goes to remittance providers like Western Union, MoneyGram, and others. These intermediaries are numbered, and since the competition is scarce, they create a monopoly in the market and charge high fees for their services. Given that low-income and migrant workers do not have access to national banks due to lack of documentation or high fees, they become victims of intermediaries that charge even more.

To sum up, inequality is a large issue in the current system, as there is a correlation between poor and unbanked people. For example, 75% of the unbanked population is poor and unable to access essential social support services. In addition, women in developing countries make up the majority of the unbanked (Felsenthal & Hahn, 2018), representing 55% compared to 46% of men. Accessing financial services comes with extra costs: travel costs, wasted time that could be used to earn, and being at the mercy of intermediaries and loan issuers who charge high prices for services. This only drives the unbanked further into poverty.

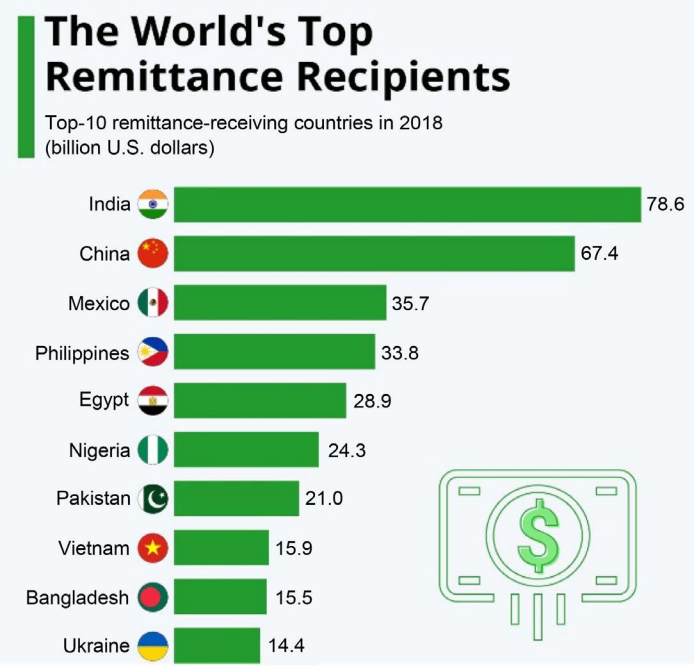

Figure 3. Top-10 remittance-receiving countries in 2018 (McCarthy, 2020).

Another drawback of the current financial ecosystem is centralization. Having the power centralized and held by legacy institutions, law firms, or regulatory bodies has resulted in data breaches causing the global recession in 2008, which proves the weakness of centralization and intermediation in the financial system. Moreover, centralization has shrunk the growth of businesses worldwide, letting banks set the rules related to payments and remittances that has led to losing more potential customers. The most widely recognized payment methods in all online shopping platforms are Visa and Mastercard, but the majority of the world's population does not have access to them, because of the sophisticated rules set by banks and their issuers. Therefore, potential online shoppers continue to shop in stores, which affect the growth of online businesses. Finally, sluggishness in the current financial ecosystem is pulling back the growth of the economy. Due to the closed centralized systems in one country, moving financial assets from one system to another, even within the same city, might take days to process. The time may be even longer when holidays and weekends are taken into account, and that contradicts the principles of technology.

3. DeFi Ecosystem

3.1. What Is DeFi?

Centralization is always present at the core of every economic system. Governments, banks and public companies have all been central authorities, and people trust them to maintain value and keep order in the economic systems. We needed centralized authorities, since we did not have the technological ability to transact in a peer-to-peer manner. The trust placed in those entities to maintain order has led to great power, and abuse of that trust in the form of high fees, barriers to entry and adoption, and limits on usage.

Decentralized Finance (DeFi) is a new experimental form of finance that does not rely on central authorities or intermediaries like exchanges, brokerages, or banks; it instead utilizes smart contracts on blockchains. This new system tries to advance the principles of disintermediation as it tries to create a financial system that is open to everyone and does not ask its users to place blind trust in it. The trust is verifiable via code. This "trustless" functionality is the primary aspect of Decentralized Finance (DeFi) (Julian Hosp, U-Zyn Chua, John Rost, & Kenneth Oh, n.d.). It allows users to have direct power over their financial assets and investments. Decentralization does not necessarily mean that there is no center, but it means that nodes can freely decide and choose the center. In centralized systems, the center determines the node, and the latter cannot survive without the former. However, in a decentralized system, anyone is a node, and anyone can be a center.

The leaps and bounds we have made in the technological field, this past decade, have allowed for the emergence and development of a new decentralized financial system. In its simple sense, DeFi is the merger of traditional banking and investing services with decentralized technologies such as cryptocurrencies and

decentralized applications (DApps). Technically, it refers to the integration of all decentralized products and services like digital assets, smart contracts, protocols, and applications. This technology calls for a low-cost, fast, efficient, trustworthy, and completely transparent global financial ecosystem that operates over the internet without any central authority and is highly accessible to everyone around the globe. DeFi's foundation is the blockchain technology which harbors attributes like efficiency, transparency, and accessibility that have been absent from the current financial system. The new financial era operates on the place from which mathematics, physics, and computer science were derived. Traditionally, banks, governments, and other intermediaries have managed the financial system. However, in the coming years, DeFi will allow the entire financial system to operate more from the principles of mathematics and computer science, using what is known as blockchain technology.

3.2. DeFi Ecosystem—Ethereum

Bitcoin and Ethereum are use cases of blockchain technology with different purposes. The first is a digital currency that people can use as a payment or hold as a store of value, while Ethereum is a programmable blockchain that coders can build on to create valuable products. Due to the properties of blockchain technology, the software built on Ethereum blockchain is called decentralized applications (DApps). These DApps inspired the idea for a movement towards decentralized finance—DeFi, which aims to transform the current financial system into a more transparent, decentralized, and trustworthy system.

The Ethereum blockchain-based software operates on its own without the need for any central authority (Buterin, 2013). The base layer consists of a vast network of nodes—computers, connected to the internet with software installed and running on the Ethereum blockchain. This layer of nodes is where transaction data is processed, validated, broadcasted, and stored. While transaction data is processed and published to the blockchain, nodes are rewarded with an economic incentive Ether, which is Ethereum native currency. Transaction data can contain a value in the form of Ether and information in the form of code; these codes can trigger actions in the next layer of the Ethereum network. On top of the Ethereum base hardware layer, there is a software layer that supports a programming language library consisting of languages like Solidity, Viper, and more. Using these computer languages, developers can write smart contracts.

The term "Smart contracts" was first proposed in 1994 by the American scientist Nick Szabo (Szabo, 1996), who invented the digital coin, BitGold, ten years before bitcoin was created. Nick's idea was to use computer codes to execute functionalities of sophisticated contracts in securities' buying and selling, like options and futures. Smart contracts can authorize transactions and carry out terms of contracts within a trusted environment which eliminates the need for a central authority.

Both hardware and software layers of Ethereum are combined to create a global decentralized supercomputer known as the Ethereum Virtual Machine

EVM. In computing, virtual machines are simulations of computer networks that can be used in many different cases. In the case of the Ethereum blockchain, the EVM's role is to ensure flexibility and separation of each host and software application that represents the final layer of Ethereum blockchain where developers can launch third-party DApps like Crypto-Kitties and Augur. There are different DApps categories, including games, identity, health, property, and finance represented in DeFi built on the Ethereum ecosystem.

3.3. DeFi Financial Stack

The DeFi framework has five components that lend to its potential usability and adoption, which are Stable coins, Exchanges, Money markets, Synthetics, and Insurance.

1) Stable Coins.

Each cryptocurrency has a high fluctuation rate; however, stable coins attempt to achieve little or no volatility by pegging their value to price-stable assets like Gold or the U.S. dollar. USDT, USDC, and DAI are all tokens pegged to the U.S. dollar in that they maintain the same value of the U.S. dollar. There are two main types of stable coins; custodial backed and algorithmic coins. Custodial tokens, like USDT and USDC, use a stored reserve of fiat to guarantee the peg. These coins are backed 1:1 and should not deviate from it exactly as shown in **Figure 4** (CoinMarketCap, n.d.-d), that since 2016, USDT has maintained the same value of the US dollar.

The other type of stable coins is operated and stabilized through algorithms and smart contracts. This approach is similar to fiat-collateralized one, except that their underlying collateral asset is another cryptocurrency instead of a tangible commodity or a fiat currency. DAI is an algorithmic backed coin on the Ethereum blockchain and uses digital coins as an economic incentive to encourage arbitragers to maintain its peg to the US dollar. Shown in the opposite **Figure 5** (CoinMarketCap, n.d.-b), algorithmic coins exhibit some volatility and sometimes struggle to maintain the peg.

However, connecting a coin to another asset like gold or currency is possible.

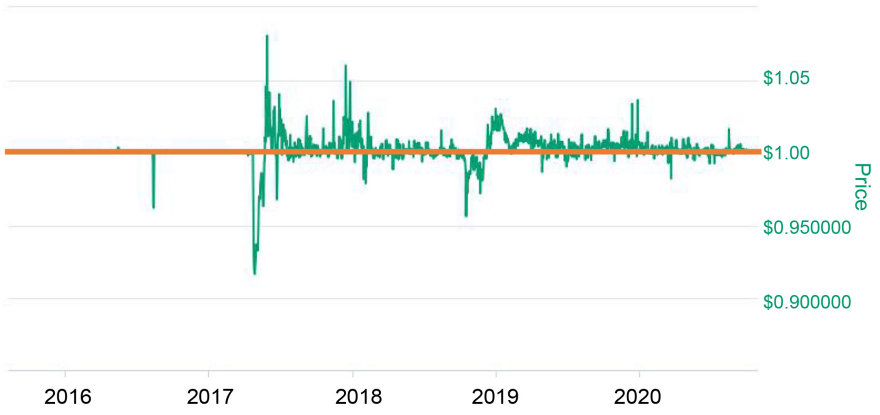

Figure 4. USDT against USD (CoinMarketCap, n.d.-d).

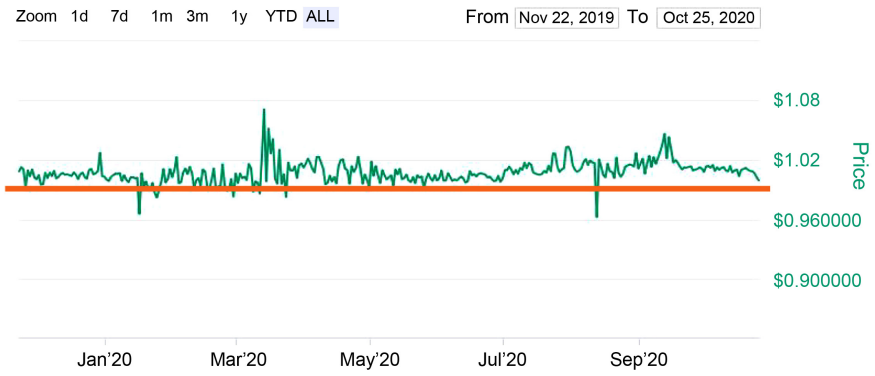

Figure 5. DAI against USD (CoinMarketCap, n.d.-b).

These coins were designed to bridge the gap between fiat and cryptocurrencies, and also to decrease the volatility associated with holding cryptos by allowing their holders to swap to these stable coins whenever they want and keep the value relatively unchanged. The reserve asset backing these stable coins is always more than the stable coins put in circulation to avoid any liquidity issues. DeFi stable coins are an essential building block in the whole decentralized financial system, as it ensures the stability of value in the market.

2) Decentralized Exchanges (DEX).

Decentralized Exchanges (DEX) are financial applications that allow users to swap any cryptocurrency for another peer-to-peer without an intermediary of any kind. In most markets, centralized exchanges and companies function as mediators to facilitate trading assets, and they charge some trading fees while also being under-collateralized, causing liquidity issues when placing orders. Decentralized exchanges, like Uniswap or Kyber Network, can help users to trade their cryptos for small swap fees, and with minimal custodial risk; while maintaining complete control over their assets. Moreover, some exchanges like Uniswap give their users the ability to pool their cryptocurrencies and earn fees or to send a particular type of cryptocurrency while holding another. These Decentralized Exchanges (DEX) offer essential functionality to the DeFi financial system, low fees, superior security, over-collateralization, and complete control of assets.

3) Money Markets.

Liquidity is a crucial component of any financial market that is offered only by banks in the current financial system. However, in the decentralized financial one, Money Markets provide liquidity and enable users to either borrow or lend money without banks or any central authority. DeFi Money Market projects, like Compound, use a liquidity pool model that enable users to either lend or borrow money outside of the banking system. Lenders can earn passive income, placing their cryptocurrencies in a pool, and borrowers on the other side must secure a loan with an interest rate that is based on supply and demand. Unlike centralized banks, DeFi Money Markets are entirely transparent, and anyone can review the amount of loan issued from a lending pool to ensure that the liquidity pool is

over collateralized. Moreover, there is no credit history associated with its users that achieves borrower's privacy.

4) Synthetics.

In finance, assets designed to behave like other assets are called synthetics. These synthetics are derivatives whose value is derived and dependent on the value of other assets. Options, swap, and future contracts are all synthetic products that offer investors highly customizable options providing certain risks, exposure, and cash flow patterns. In decentralized finance, this type of financial instrument is necessary to simulate activities like funding, liquidity, creation, and market access. There are synthetic platforms where users can engage in synthetic activities, and using these platforms; users can use Ether as collateral and mint synthetic assets like DAI that can simulate the US dollar. This part of DeFi is extraordinarily complex and could expose users to many risks.

3.4. Insurance

Decentralized insurance is used to mitigate and cover the risks associated with DeFi platforms. It also protects DeFi users against any potential attack. Unlike centralized systems that require people to use insurance companies, decentralized insurance allows its users to provide insurance in exchange for interest or to buy insurance on financial products. DeFi projects that currently provide insurance products and services include Nexus Mutual and Opyn. Essentially, Decentralized Insurance is a safeguard against hacks, glitches, or bugs; therefore, the DeFi environment can be safer and more secure for its users to trade and invest.

3.5. DeFi's Architecture

Like Legos, decentralized applications on Ethereum blockchain integrate with other components of the DeFi financial stack to form the backbone of the future global financial system. DeFi components form five categories that DApps can be built on, same as Legos. Developers with a project in mind can assess the five different categories and other DApps to use and assemble a stack that would work together to create the final product or service. Within the scope of DeFi architecture, Legos can represent computer protocols that dictate how decentralized applications interact with other applications. This structure allows developers to build on existing foundations while mixing pre-built functionalities to create new financial products and services.

One of the main principles of the DeFi ecosystem is "Interoperability", and the above structure assures that each new project does not only exist as a single product or service, but instead serves as a new Lego piece that developers can leverage for other projects. To explain, founders of Maker DAO, a computer protocol behind DAI, created a collateralized position tool using a custom smart contract that connects with the DAI stable coin. Connected as two Legos, they create the Maker DAO CDP Tool that users can use to borrow funds in the form

of DAI and use Ether as collateral. This new project, Maker DAO CDP Tool, is open for other developers to use and create other projects. The compound project operates using the Maker DAO CDP Tool, DAI stable coin, and its custom smart contract all connected to create "Compound", a lending market. With these more complex structures, developers can build on top of and add more projects to existing DeFi architecture. DeFi's Lego-like architecture offers efficient, limitless, creation, and expansion of a new global financial system.

3.6. DeFi's Future

DeFi solves some of the problems existing in the current financial system; financial exclusion, transaction costs, slow speeds, and security issues, while providing users with a seamless experience from anywhere in the world. In fact, large, powerful institutions are central authorities who control the existing financial systems. But DeFi aims to eliminate, or lessen that centralization and remove some of the power and control intermediaries currently enjoy. Furthermore, this revolution is trying to create a transparent, permissionless, and open-source financial ecosystem that is theoretically accessible to anyone, including the unbanked, 1.7 billion people.

This new decentralized ecosystem eliminates the wealth, status, and location barriers, as it provides the unbanked with access to financial services, including digital payments and remittances. It allows them to use smartphones to register details digitally and have the information needed to set up bank accounts. These digital profiles are secured by blockchain and will allow everyone including refugees to access loans and build businesses wherever they go. In the process, it will help to solve the issue of global poverty. DeFi also eliminates the need for certain intermediaries, and makes global payments affordable. Moreover, services in the DeFi ecosystem are predicted to lower the average global remittance fee to 4%, lower than its current average which is 7%. Unlike centralized systems, DeFi is operating on the blockchain network running on many computers making data unbreachable. Each of these solutions is powerful in their own right, and their combination brings profound implications.

4. Conclusions

Decentralized finance is the next disruption to the financial system. Powered by blockchain technology, DeFi represents an early exploration of new ways for moving value from one place to another while ensuring interoperability, accessibility, open-source, financial inclusion, and financial transparency. It provides retail users with opportunities to access the services they lack in the current financial system. Institutions will be able to move real-world assets into the blockchain with fewer costs and improved efficiencies. Blockchain technology does not necessarily need to overthrow the current traditional financial system but instead complement it. It should force the current system to do better and, more importantly, allow for financial inclusion of the 1.7 billion unbanked populations.

Reforming the traditional financial services in a decentralized manner is valuable and novel. Technically, all the services included in the DeFi ecosystem are those of the traditional financial system: borrowing, lending, exchanging, savings, derivatives, futures, and different forms of currency pegs. While these services are implemented in the DeFi system, their functions remain the same as they are in the traditional financial system, and they will change as the technology evolves. Moreover, the burden of reinventing and programming from scratch is reduced, because DeFi will allow users to rely on more mature, smart contracts with the confidence that they can function successfully without security problems. Thus, developers can shift their focus from feasibility to building new novel applications.

The potential of this new ecosystem is vast and could have a significant impact on how users conduct financial transactions in the future. First and foremost, it seems possible that Decentralized Finance will provide banking services to people who are currently unbanked. These people are likely in need of a banking system, and this suddenly becomes possible using DeFi technology-driven solutions.

5. Recommendations

Like any new technology, it is important to be critical of the promotion and study the challenges of mass adoption. For the moment, DeFi requires a high level of knowledge regarding its functionality, as this technology is still immature and prone to some unexpected problems, risks, and security issues. One significant aspect that has yet to be addressed is the user interface to access DeFi, which is not yet fully developed. It will take quite some time to broadly instate the visions of this new ecosystem, like broadened access, reduced volatility, increased liquidity, matured underlying security of the smart contracts, and a robust infrastructure.

6. Suggestions for Future Work

This paper provides an overview of blockchain technology, discussing the DeFi ecosystem and its possibilities regarding financially including the unbanked and improving the current financial system. Future work should focus on the blockchain technologies that could be implemented in the current financial system to either improve or replace the outdated SWIFT network. Future work should also study blockchain technologies like RippleNet, and investigate its possibilities on the international banking systems. A focus should also be given to the transformation within financial institutions, mutualizing data through digitization, sharing that data on blockchains, tokenizing business logic, and eventually transforming all supporting software into programmable financial instruments.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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