Review

Understanding the Future of Money: The Struggle between Government Control and Decentralization

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Understanding the Future of Money: The Struggle between Government Control and Decentralization

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Abstract: This article offers a clear and approachable introduction to the evolving landscape of money and the frictions developing between traditional government control and decentralized finance (DeFi). Tailored for readers with a basic awareness of cryptocurrency but limited familiarity with its broader implications, the article demystifies DeFi by explaining its core concepts including blockchain, Centralized Bank Digital Currencies (CBDCs), and the historical role of government regulation of money through central banking. Against this backdrop, it examines the transformative potential of DeFi, emphasizing the growing tension between the centralized authority of governments and the decentralized ideals driving this new financial model. While governments seek to maintain stability and control, individuals increasingly gravitate toward the more affordable, efficient, and inclusive solutions promised by DeFi. Designed to empower readers with a better grasp of the forces shaping the future of finance, this article underscores the importance of understanding the delicate interplay between governmental oversight and decentralized innovation. As the digital economy expands, this dynamic struggle will influence not only economic policies but also personal financial choices and access to resources.

Keywords: decentralized finance; cryptocurrency; stablecoins

1. Introduction: Why the Future of Money Matters

In an era defined by rapid technological advancements and quickly changing economic landscapes, the emergence of decentralized finance (DeFi) represents a pivotal shift in the way money is conceptualized and utilized (Georgiou, 2020; Schueffel, 2021; Uzougbo, 2024). For centuries, governments have exerted control over monetary systems, relying on central banks and government regulations to manage economies and influence financial stability (Bordo & Siklos, 2017). However, the introduction of blockchain technology and cryptocurrencies has introduced alternative financial models that challenge traditional paradigms, offering individuals new opportunities for managing their financial resources. This paper underscores the significance of this moment in history, where the balance of power in finance is transitioning in an unpredictable manner.

The implications of this shift extend beyond the realm of finance, impacting individuals and communities regardless of their familiarity with the underlying mechanisms of microeconomics and blockchain technology. As DeFi continues to gain traction, its influence will permeate daily financial life, from the way goods and services are priced (Carter & Jeng, 2021; Treleaven, et al., 2022) to how individuals save and invest (Zetzsche et al. 2020; Jensen et al., 2021; Schueffel, 2021; cite). Yet, despite the potential consequences of this shift, many remain relatively unaware of the details and intricacies involved (Luchkin et al., 2021; Qin et al., 2021;Vulisetty & Chittella, 2024). This article seeks to provide a foundational understanding of DeFi, illustrating its significance in the context of an economic landscape that has until now been dominated by government control.

As the global economy teeters on the brink of this transformation, it becomes crucial for the broader population to grasp the dynamics at play. By describing the fundamentals of decentralized finance and its potential impact, this paper aims to empower individuals to navigate an increasingly

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digital and decentralized financial future. Recognizing that the choices made today will affect economic opportunities in the years to come, this article advocates for informed engagement in the ongoing dialogue about the future of money.

2. What Is DeFi?

Decentralized finance (DeFi) refers to an emerging financial system with two main characteristics (Jensen et al., 2021). The first defining feature is its quality of being permissionless, meaning that anyone with internet access can access its services without needing approval from intermediaries such as banks or governments. Its second quality is that these financial services operate on blockchain-based networks which by their nature are accessible and verifiable by anyone, promoting accuracy and transparency. At its core, DeFi leverages smart contracts, self-executing agreements coded directly onto blockchains, which automate transactions (Jensen et al., 2021; Schueffel, 2021; Auer et al. 2023; John et al., 2023). Unlike traditional finance, which relies on central entities to facilitate lending, borrowing or exchanges, DeFi allows users to perform similar functions without banks or government bodies.

The permissionless nature of DeFi not only empowers users but also creates a new financial infrastructure that is more transparent and efficient than conventional systems (Chen & Bellavitis, 2020; Schueffel, 2021; Alamsyah et al., 2024). As it evolves, DeFi holds the potential to reshape financial markets by increasing accessibility and reducing the costs and barriers typically associated with financial services. This could make financial services more inclusive, providing access to underserved populations globally. As DeFi expands, it promises to offer consumers greater financial autonomy in everyday transactions (Ozcan, 2021).

An important element of DeFi is cryptocurrency, which functions as a medium of exchange (Khan et al., 2020; Kim, 2021; Pernice & Scott, 2021), albeit still to a limited degree (Fouzi et al., 2021; Kunal, et al. 2021), and as collateral within the system (Azoulay, et al., 2023). Most cryptocurrencies run on blockchain technology and some, including Etherium and Cardano, have dual roles of being not only a digital currency, but also as a platform for smart contracts, the network on which DeFi runs (Kozhan & Viswanath-Natraj, 2021; Auer et al., 2023).

It follows that certain cryptocurrencies act as both the technological foundation and the medium of exchange within DeFi systems, enabling seamless transactions across decentralized platforms. At the same time, blockchain provides the transparent, secure, and immutable infrastructure on which these financial services operate. The next section provides an introduction into the nature of blockchains and their functions.

3. The Relationship Between Blockchain and Cryptocurrencies

Although hundreds of cryptocurrencies have been developed in recent years, this section will focus on the first cryptocurrency, Bitcoin, and one of the most influential successors, Ethereum. Together, these two illustrate the different ways blockchain technology can be applied: Bitcoin as a decentralized, peer-to-peer payment system, and Ethereum which additionally is used as a platform for building decentralized applications through smart contracts (Metcalfe, 2020; Oliva, et al., 2020; Kushwaha, 2022).

Bitcoin and Ethereum are two largest cryptocurrencies in total value, both operating on blockchain technology but with distinct purposes and functions. Bitcoin, often described as digital gold, is designed primarily as a store of value and medium of exchange. It facilitates peer-to-peer transactions without intermediaries, similar to traditional currencies but without a physical form like coins or bills. Instead, Bitcoin exists solely in a digital format, with each unit and its subdivisions (100,000,000 satoshis = 1 BTC) recorded on the Bitcoin blockchain. The total amount of Bitcoin that can ever exist is programmed to 21 million Bitcoin, with nearly 20 million already mined (Taskinsoy, 2021), meaning that it is not subject to inflationary pressures such as the issuing of more tokens.

Ethereum, while also functioning as a digital currency, goes further by providing a platform for smart contracts, self-executing agreements where transactions are automatically triggered once predefined conditions are met. This makes Ethereum more than just a currency; it serves as the

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foundation for decentralized applications (dApps) across various sectors, including finance, gaming, and supply chains. Ether (ETH), the native currency of Ethereum, powers these applications by facilitating transactions and paying for computational resources on the network. Like Bitcoin, Ether exists solely digitally, but unlike Bitcoin, it does not have a limited supply.

Blockchain is a crucial technology that underpins cryptocurrencies, but its applications go far beyond just digital money. At its core, blockchain is a type of digital ledger that securely records information in a way that prevents alteration (Demirkan, 2020; Odeh et al., 2022). This is achieved through a series of connected data blocks, each with a unique identifier known as a hash value. This design makes it nearly impossible to change any information once it's been added, ensuring that the records are transparent and trustworthy. Originally developed to securely store digital documents (Whitaker, 2019), blockchain can also be used in various fields like education (Bhaskar et al., 2021), to verify and store an individual's academic credentials, in healthcare (Yaqoob, et al., 2022), to store patient records securely and in real estate (Podshivalov, 2022) for managing transaction and ownership data that needs to be accurate and tamper-proof.

To understand how blockchains work, think of them as a chain of digital blocks, each containing a list of transactions or data entries. When a new piece of information is added, it is grouped into a block along with other transactions. Once the block is filled, it is sealed and linked to the previous block in the chain using its hash value, creating a chronological order. This interconnected structure forms an unchangeable record of all transactions, making it easy to trace back through the chain to verify any information. For a basic, but slightly more detailed introduction to blockchain, see Tommerdahl, 2024.

Each participant in a blockchain network maintains a copy of the entire ledger, which enhances security and reduces the risk of fraud. Since everyone has access to the same information, the need for intermediaries, such as banks or other third parties, is eliminated. This decentralization is a significant advantage, as it not only increases efficiency but also builds trust among users, knowing that the records are accurate and cannot be easily manipulated.

With its diverse applications, blockchain has the potential to revolutionize how data is stored and shared across industries, paving the way for more secure and efficient systems. For an advanced and greatly detailed technical description of DeFi from its technical primitives to financial services, see Auer, et al., 2023.

One common criticism of cryptocurrencies is their price volatility, with Bitcoin having fallen by over 50% of its value on repeated occasions, often in less than 24 hours (Taskinsoy, 2022). Stablecoins are a specific category of cryptocurrencies designed to maintain a relatively stable value by pegging them to another asset such as the US dollar or a commodity such as gold. For instance, a popular stablecoin, Tether, is pegged to the US dollar, meaning that for every Tether (USDT) issued, there is an equivalent dollar held in reserve. This reduces the risk of volatility while at the same time using blockchain networks to facilitate transactions and record data securely and transparently.

4. The Historical State of Global Finance

The evolution of money is deeply intertwined with the development of trade, where barter systems, due to their limitations, led to the emergence of commodity money, such as gold and silver coins, which provided a reliable medium for exchange in various cultures (Taskinsoy, 2020). As trade networks expanded and economies grew more complex, the constraints of commodity money also became evident, and more structured monetary systems emerged.

One of the most significant developments in this evolution was the establishment of the gold standard. Under this system, which gained prominence in the 19th century, the value of the U.S. dollar and many other currencies was directly tied to a specific amount of gold (Cooper et al., 1982). This meant that individuals could exchange their dollars for a set quantity of gold, and the government was obligated to back the currency with gold reserves. The gold standard provided a sense of stability and trust in the currency, as its value was derived from a tangible and relatively limited asset.

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The gold standard began to unravel during the early 20th century, particularly during World War I, when many countries including the United Kingdom, Germany, France, Italy, Austria-Hungary and Russia, suspended its use to finance war efforts (Yeager, 1984). The establishment of the Bretton Woods system in 1944 marked another significant turning point in global finance which moved many world currencies closer to the gold standard (Luchkin, Novikova, Zyatkova, et al., 2020). This agreement used fixed exchange rates to tie the value of major currencies to the U.S. dollar, which was itself convertible to gold, facilitating international trade and investment and fostering a period of unprecedented economic growth.

However, the Bretton Woods system began to falter in the late 1960s, due to increasing economic pressures. In 1971, President Nixon suspended the convertibility of the dollar into gold, a move aimed at addressing these pressures and stabilizing the US economy (Gentle, 2024). This action ultimately led to the collapse of the Bretton Woods system and the transition to floating exchange rates. With this transition, the U.S. dollar and many other currencies became *fiat* money, defined as currency that a government has declared to be legal tender but is not backed by a physical commodity. This shift allowed for greater flexibility in monetary policy but also introduced new challenges, including inflationary pressures and economic volatility. Unlike the gold standard, where currency value was tied to a physical asset, fiat currencies derive their value from the trust and authority of the state, making them more susceptible to fluctuations based on government actions and market perceptions.

As technology progressed, the financial landscape began to shift once more with the rise of digital money. Innovations such as credit cards and online bank accounts transformed the way individuals and businesses conduct transactions, making financial services more accessible and efficient (Lauer, 2020). This transition laid the groundwork for the development of cryptocurrencies but it must be noted that several forms of centralized digital money existed before cryptocurrencies.

The creation of Bitcoin in 2008, heralded by the release of its white paper titled "Bitcoin: A Peer-to-Peer Electronic Cash System," (Nakamoto, 2008) represented a revolutionary shift in the concept of money. Authored under the pseudonym Satoshi Nakamoto, this foundational document outlined a vision for a decentralized digital currency designed to operate independently of any central authority. The white paper proposed a system in which transactions could be verified by network nodes through cryptography and recorded in a public distributed ledger known as the blockchain. This mechanism not only ensures the integrity of each transaction but also eliminates the need for intermediaries, thereby reducing transaction costs and increasing accessibility.

The identity of Satoshi Nakamoto remains one of the most enduring mysteries in the cryptocurrency world, with speculation about their true identity ranging from an individual programmer to a group of developers. Regardless of who Satoshi is, their vision for Bitcoin has sparked a global movement, fundamentally challenging traditional financial paradigms. Satoshi's white paper's introduction of key concepts such as decentralization, trustless transactions, and the use of cryptographic proof has inspired innovations and laid the groundwork for the broader decentralized finance (DeFi) ecosystem we see today.

In contrast to fiat currencies, which are centralized and controlled by governmental institutions such as central banks and regulatory agencies, Bitcoin operates on a decentralized network that is not subject to any authority. Fiat currencies derive their value from the confidence of the public in the issuing government and its ability to manage monetary policy. Central banks, such as the Federal Reserve in the United States, have the power to regulate the supply of money, set interest rates, and implement monetary policies to stabilize the economy (Braun & Gabor, 2020). In stark contrast, Bitcoin is governed by a decentralized protocol, with transactions verified by a network of nodes rather than a central authority, granting users autonomy and control over their financial transactions. Bitcoin is also finite. These fundamental differences highlight the contrasting philosophies underpinning traditional finance and the emerging decentralized finance landscape.

5. Positive Aspects of DeFi and Cryptocurrencies

The emergence of DeFi has the potential to radically transform financial landscapes through providing users with greater control over their financial assets and introducing innovative products

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and services. One of DeFi's most compelling features is the ability for individuals to control their money (Alamsyah et al., 2024). Unlike banking systems, which often impose restrictions and rely on intermediaries, DeFi allows for transactions that are uncensorable.

A useful example of a common transaction that would benefit the public is that of sending money internationally. In today's traditional financial system, sending money is often subject to strict regulations, high fees and long wait times. For instance, if a person in the United States wants to send money to a family member in a country with a volatile economy, such as Venezuela, they may face multiple layers of approval. Traditional international remittances typically go through several intermediaries, including the sender's bank, international payment processors, and the recipient's bank. Furthermore, depending on the relationship between the two countries, restrictions or sanctions might delay or even prevent the transfer. The transaction can take several days, and substantial fees may be deducted at each step of the process.

With DeFi, however, the sender can bypass these restrictions and intermediaries by transferring cryptocurrency directly to the recipient's digital wallet. This can happen almost instantly and with lower, more transparent fees than traditional systems. The sender has the option of sending a cryptocurrency such as Bitcoin or stablecoin to shield the value of the funds from fluctuations in the Venezuelan bolívar. This ability to secure funds in a relatively stable digital currency gives DeFi users in high-inflation economies a valuable tool for maintaining the real-world value of money sent from abroad, while bypassing the restrictions and fees of traditional systems.

One of the most transformative aspects of DeFi is its potential to bring financial services to the unbanked and underbanked populations around the world (Alamsyah et al., 2024). Traditionally, accessing banking services like loans, savings accounts, or investment opportunities requires identification documents, proof of income, and a physical branch location, all resources that millions of people lack. According to the World Bank, approximately 1.4 billion adults globally were unbanked in 2021, often due to barriers like geographic isolation, economic instability, or insufficient infrastructure (World Bank, 2022). Many of these individuals live in developing countries where banking systems are either underdeveloped or prohibitively expensive to use. DeFi, which only requires an internet connection and a digital wallet, has the potential to bridge this gap, providing access to financial services regardless of a person's location, credit history, or economic status.

For unbanked individuals, DeFi provides a gateway to fundamental financial tools such as saving, investing, and accessing credit without the need for traditional bank accounts. Using DeFi platforms, people can earn interest on their digital assets, engage in peer-to-peer lending, and participate in yield farming, where they earn rewards by providing liquidity to DeFi protocols. These opportunities are often available with minimal fees, bypassing the high costs that traditional banking systems often impose. By offering decentralized financial products, DeFi enables individuals to grow wealth independently and participate in financial activities that might otherwise be out of reach.

DeFi also introduces transparency and autonomy to financial transactions, which may be especially valuable in regions where the traditional financial system may lack accountability or suffer from corruption. Because DeFi transactions are conducted on blockchain networks, users have full visibility into how funds move and how protocols function, enhancing trust and reducing the potential for fraud. DeFi's ability to allow direct management of personal finances makes decentralized finance a powerful alternative for those who have historically been excluded from the financial system.

5. Risks Associated with DeFi and Cryptocurrencies

5.1. Risk of Private Key Loss

However, the rise of DeFi is not without significant risks. One of the most frightening of these is the possibility of losing keys (Ozili, 2022; Alamsyah et al., 2024). In DeFi, managing digital assets independently requires users to understand and to securely store their private keys, which are essentially sets of words chosen by the user that grant access to their cryptocurrency wallets. A wallet is a digital tool that allows users to store, send and receive cryptocurrency. Using a wallet means that the user maintains full control, where no one else has access, maximizing privacy and security. This

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contrasts with storing cryptocurrency on a centralized exchange such as Coinbase or Binance, where the exchange keeps custody of the private keys. While the use of an exchange can be more convenient, it also introduces the risk of a third-party control, meaning that users could lose access to their funds if the exchange was ever compromised. In a private, often called 'non-custodial' wallet, however, losing the private key has the severe consequence of permanently losing access to the assets held in the wallet. This underscores the potential dangers of both custodial wallets, held by exchanges, and non-custodial wallets, held by individuals.

Hacking is also of concern for cryptocurrency holders, particularly for those holding assets on centralized exchanges (Oosthoek & Doerr, 2020; Grobys, 2021; Ozili, 2022). These exchanges are connected to the internet, making them vulnerable to cyberattacks, which can result in stolen funds, often with no recourse. Furthermore, hacking risks are not limited to exchanges. Non-custodial wallets, controlled by the individual but connected to the internet are often called hot wallets and can be vulnerable to hacking as well, particularly if users do not take precautions such as setting up two-factor authentication. In contrast, cold wallets, which are stored offline, are far less exposed to hacking attempts. Every form of wallet or exchange comes with its own unique strengths and risks.

5.2. Risks of Lack of Regulation

A further danger of DeFi in its current state is its lack of regulation. While this lack can be positive in the sense that fewer gatekeepers exist, less consumer protection is available. For example, cryptocurrency accounts are not insured, unlike fiat currency which is protected by the FDIC up to $250,000 per single account per bank in the US. Losses incurred due to inability to access a wallet or the shutting down of an online exchange may be irreparable.

Different nations have adopted distinct approaches to the regulation of DeFi, reflecting local political and economic priorities. For example, China has taken a hardline stance, widely restricting Bitcoin, initial coin offerings, mining and exchanges (Uzougbo, 2024). However, given the amount of crypto activity by Chinese investors, it appears that crypto is disincentivized but not actually banned (https://www.nasdaq.com/articles/china-never-completely-banned-crypto), contrary to several media reports of complete bans. European countries are more measured, exploring and adopting frameworks that attempt to regulate DeFi activities (Maia & dos Santos, 2021; Carata & Knottenbelt, 2024). The US is in a similar position and regulatory confusion exists around the question of whether cryptocurrencies are regulated by the Securities and Exchange Commission (SEC) or by the Commodity Futures Trading Commission (CFTC) (Uzougbo et al., 2024).

Without a fully developed regulatory landscape, large sections of DeFi remain unregulated or fall into a gray area. The lack of regulatory oversight in DeFi may make potential adopters hesitant to invest, as they face uncertainly about security and legitimacy.

5.3. Risk of Increasing Wealth Inequality

Although several arguments have been put forward about financial opportunities becoming more democratized through DeFi, there is also significant concern that DeFi could actually exacerbate wealth inequality. To understand this, it's useful to look at the Gini coefficient, a measure of wealth distribution where values closer to 1 indicate high inequality and values closer to 0 reflecting more equal wealth distribution. For instance, South Africa has one of the world's highest Gini values for 2024 at 0.63, indicating a large wealth gap, whereas countries like Slovenia and the Czech Republic have relatively low Gini values around 0.25, reflecting more equal income distribution. In the middle range, countries like the United States and China have Gini values around 0.4 to 0.5, suggesting moderate inequality (Data Pandas, n.d.).

Bitcoin, the most prominent cryptocurrency, currently has a Gini value of approximately 0.65 (Juodis et al., 2024), which places it among the highest levels of wealth inequality. This concentration of wealth in the hands of a few large holders mirrors traditional wealth concentration patterns rather than democratizing access as initially envisioned. With a small number of entities controlling a significant amount of Bitcoin, the potential for DeFi to create a more equitable financial system could be undermined. Currently, 0.01% of all wallet addresses contain over 58.21% of all Bitcoins in

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circulation (World.org, n.d.). Also, when considering the Gini value of a country, every household is typically considered in the calculation. However, for Bitcoin's Gini value calculation, only those who hold Bitcoin are considered. Considering that less than 3% of the world population own Bitcoin, the Gini value of Bitcoin, covering the global population would be closer to 0.99 (M. Juodis, personal communication, December 11, 2024). Of course, this would only be comparable to the Gini value of a nation if Bitcoin became the global currency, but it is useful to illustrate the coefficient in both ways, within current holders and as a hypothetical global currency, to gain insight into current Bitcoin distribution.

Access to DeFi faces significant challenges due to various socioeconomic and technological barriers. For example, lack of internet access prevents many individuals in rural or low-income regions from participating in DeFi entirely. Since DeFi fundamentally relies on internet connectivity, this digital divide leaves approximately one third of the global population unable to benefit from its potential financial inclusivity (DataReportal n.d.). Similarly, at least 3.3 billion members of the global population who lack government-recognized digital identity needed to securely transact online are excluded (World Bank n.d.). While traditional finance relies on KYC (Know Your Customer) processes to verify identities, some DeFi platforms also require these credentials. Overcoming this hurdle might involve exploring decentralized identity solutions that do not hinge on government-issued documents.

In addition to connectivity and identification challenges, there exists a knowledge gap that limits access to DeFi. For many, DeFi can be intimidating or confusing due to complex concepts and technical requirements, leading either to hesitancy or to uninformed financial decisions. Educational initiatives are critical to bridge this knowledge gap, equipping potential users with the understanding necessary to participate safely and effectively. Furthermore, financial barriers also prevent individuals with limited disposable income from participating in DeFi markets, particularly the purchase of cryptocurrencies.

Another challenge in providing opportunity for greater equality of wealth distribution is the divide between early and late adopters, with the former securing DeFi assets at much lower prices than the latter, limiting the potential gains to be made by late adopters and reinforcing wealth disparities. As DeFi grows, it will be essential to explore solutions that support equitable access for all participants.

5.4. Volatility of Cryptocurrencies

The final risk factor has already been mentioned; the extreme volatility of cryptocurrencies, where prices can quickly rise and fall rapidly (Qin, 2021; Taskinsoy, 2022; Ozili 2022). For instance, Bitcoin, the largest cryptocurrency, experienced a 99% price drop in a single day in 2011and as recently as 2021, the price cratered by 53% in a single week when Elon Musk reneged on a promise to accept payment for Tesla cars in Bitcoin (Cunha, et al., 2021) while China announced a crypto crackdown (Yahoo!Finance n.d.). This level of instability can deter individuals and institutions from investing in cryptocurrencies, particularly if they may need access to the money in the short term.

While stablecoins provide stability due to their pegged value as well as providing some benefits of other cryptocurrencies such as fast transactions, they lack the potential for significant price appreciation, making them unsuitable for investors seeking to profit from speculative gains. However, this also demonstrates that volatility isn't always a negative, as it allows some investors to capitalize on rapid gains in a short period of time.

While the risks in DeFi pose real challenges for individuals and institutions, they also reveal the deeper tensions underlying this financial revolution. Decentralized finance is built on the principles of financial autonomy, peer-to-peer interaction and global accessibility, all of which stand in sharp contrast to traditional government-regulated systems. This inherent clash between government control and the decentralized vision of DeFi raises fundamental questions about the future of financial systems the autonomy of the individual. Understanding this conflict is key to grasping both the potential and the limitations of DeFi as it seeks to redefine global finance.

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6. The Inherent Clash: Centralized Government Control vs. Decentralization

Governments worldwide are wary of DeFi, not only because it has the potential to disrupt traditional financial systems, but also due to the potential threats it poses to economic stability, regulatory oversight, and political control (Zetzsche et al., 2020). Central to government concerns is the need to protect consumers from financial risk. In traditional finance, strict regulations ensure that banks, brokers, and insurers meet standards to safeguard conumers from fraud, predatory practices, and mismanagement. DeFi, however, often lacks these protections. With many DeFi platforms, there is little recourse for individuals who are victims to scams, hacking or even technical failures. The lack of regulatory safety raises alarms for governments, as citizens' financial security could be at greater risk without full regulation.

Preventing financial crime is another concern (Wronka, 2023). Conventional financial institutions must comply with anti-money laundering (AML) and know-your-customer (KYC) regulations that help authorities track and prevent illegal financial activities, from tax evasion to terrorism (Kapsoulis, 2020). For governments, the lack of checks on some DeFi platforms poses security risks and undermines broader efforts to track criminal activities.

In a DeFi dominated financial world, the government's control over the money supply and the economic stability of the nation is also at risk. Central banks play a critical role in regulating the money supply to manage inflation, stabilize currencies and respond to economic downturns. DeFi, however, operates outside of these controls. Cryptocurrencies, for example, are not subject to inflationary policies in the way that traditional fiat currencies are, which means that they can't be regulated through interest rate adjustments or government stimuli. If DeFi grows too dominant, governments could lose economic policy tools that have long been used to stabilize national and global markets, potentially leading to unpredictable economic fluctuations.

Additionally, governments often view DeFi as a threat to their political control, both domestically and internationally. Sanctions, asset freezing, and other financial measures are critical economic tools of foreign policy, used to influence other nations. DeFi's borderless nature makes enforcing such measures difficult, as transactions on the blockchain are not controlled by any specific country. Governments and citizens of sanctioned nations may use DeFi to circumvent economic restrictions, reducing the effectiveness of those sanctions and diminishing nations' international economic power (Zetzsche et al., 2020).

Another significant issue is tax collection. Traditional financial systems enable authorities to monitor transactions and track earnings, which ensures accurate tax reporting. DeFi, in contrast, may be viewed as providing greater anonymity, leading to the fear of widespread tax evasion. This could result in a reduced revenue stream, placing additional financial strains on governments.

The rapid development of DeFi technology presents significant challenges for governments and regulatory bodies that must struggle to regulate them. New DeFi platforms, products, and tools are emerging at an unprecedented rate, with thousands of decentralized applications (dApps) now available. This rapid evolution creates a regulatory lag, where enforcement agencies are unable to address new risks and develop rules for compliance as quickly as new systems arise. Traditional financial oversight mechanisms are ill-equipped to handle the quickly evolving nature of DeFi.

Despite these concerns, many individuals are drawn to DeFi, as it offers benefits that traditional financial systems fail to deliver. DeFi allows customers the ability to carry out financial activities without limits placed by opening times of markets and providers such as a banks. Additionally, DeFi is seen as a hedge against inflation with cryptocurrencies like Bitcoin offering a potential store of value as fiat currencies lose purchasing power (Choi & Shin, 2022). Lastly, DeFi provides financial autonomy by allowing individuals to control their assets through government interference, which is especially useful in politically unstable regions or under restrictive regimes.

As these opposing forces of government resistance and individual interests clash, the question of whether DeFi can achieve mainstream adoption becomes more complex. The tension between the two sides sets the stage for an ongoing battle that pits traditional structures of power against an emerging financial revolution that seeks to reshape the landscape of money, authority and individual freedoms.

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7. Notable Government Responses to DeFi

It would, however, be an oversimplification to say that governments are against the progress of DeFi and that individuals who are pro-DeFi want to do away with the services and protections provided by the world of traditional finance. The reality is far more nuanced, as governments worldwide exhibit a wide spectrum of responses to DeFi, ranging from progressive experimentation to outright rejection. While some nations have explored paths to integrate or regulate DeFi while embracing it, others have imposed strict limitations. Adding to this complexity is the rapidly evolving nature of DeFi itself, which often outpaces the ability of governments to establish clear and consistent policies. As DeFi continues to grow, these different approaches highlight the tension between innovation and regulation, offering a fascinating lens through which to examine the future of global finance.

7.1. El Salvador

One of the more notable positive responses to DeFi is El Salvador's, with President Bukele in 2021 making the country to first to adopt Bitcoin as legal tender (Argente & Van Patten, 2024). The move was part of his administration's strategy to modernize the country's economy and increase financial inclusion among a largely unbanked population (Krause, 2024). Bitcoin was also framed as a tool to provide low-cost alternatives for sending and receiving remittances, which make up a significant part of the country's GDP.

The government provided the Chivo Wallet with $30 worth of Bitcoin to any citizen who wanted to participate. Retailers were told that they had to participate by accepting Bitcoin for payment. It is unclear whether this action has incited Salvadorans to make long-term changes in their payment habits (Krause, 2024). Regardless, the government began accumulating Bitcoin as part of its national reserves in 2021 and currently purchases one additional Bitcoin per day.

While the long-term effects of this policy remain uncertain, Bukeles' decision has sparked intense international debate. Proponents hail it as a visionary step toward a decentralized financial future, while skeptics, including the IMF, warn of the risks associated with exposing an already fragile economy to the volatility of cryptocurrencies (Rosales et al., 2024). Nonetheless, El Salvador's experiment continues to unfold, providing valuable insights into the potential and pitfalls of integrating decentralized finance into a national economy.

7.2. United States

The regulatory landscape towards cryptocurrencies and DeFi in general by the United States government is in constant development (Garnett, 2024), often presenting a lack of clear regulatory guidelines (Burgess, 2024). A central point of contention lies in determining whether cryptocurrencies should be classified as securities or commodities. Securities, such as stocks and bonds, represent ownership or debt interests in an organization, while commodities are tangible goods such as oil, crops or gold whose value is tied to their physical characteristics and market demand. This unresolved categorization creates ambiguity around whether cryptocurrencies should fall under the jurisdiction of the Security and Exchange Commission (SEC), which oversees securities with rigorous regulatory standards, or the Commodity Futures Trading Commission (CFTC), which regulates commodities with comparatively less stringent oversight. Currently, Bitcoin and Etherium are considered as commodities, although other cryptocurrencies might be considered as securities. However, financial products derived from Bitcoin and Etherium such as futures and ETFs are now subject to SEC approval and regulation, showing them to be securities, at least for the time being. The rapidly evolving nature of cryptocurrency regulation is highlighted by the development of websites such as the Cryptocurrency Regulation Tracker website (https://www.atlanticcouncil.org/programs/geoeconomics-center/cryptoregulationtracker/) which tracks updates in 60 countries.

President-elect, Donald Trump, expressed intentions to replace SEC Chairman Gary Gensler upon taking office in 2025. Trump has criticized Gensler's regulatory approach, particularly his tough

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stance on cryptocurrency, which includes classifying certain digital assets as securities. Gensler has since announced his intention to leave the position. Trump, a proponent of deregulation, has announced his intention to nominate Paul Atkins, as his replacement (Reuters, 2024). Such a move signals a shift towards a less restrictive regulatory environment, offering clearer guidelines for the DeFi sector. Should Trump's plans come to fruition, the regulatory landscape could undergo significant changes in the US, potentially accelerating DeFi's growth and integration into the broader financial system.

7.3. China

China's response to decentralized finance (DeFi) has been decidedly restrictive, with the government taking strong measures to curtail the influence of cryptocurrencies and blockchain technologies beyond its control. In 2017, China banned initial coin offerings (ICOs) and cryptocurrency exchanges, citing concerns over financial stability, investor protection, and the risk of capital outflows (Riley, 2021). This move was emblematic of a broader strategy to maintain dominance over the country's financial systems and prevent decentralized financial assets from competing with state-run channels. By 2021, China escalated its crackdown, focusing on cryptocurrency mining (Alekseenko, 2022), an industry that had once flourished within its borders, contributing to over 75% of global Bitcoin mining (Riley, 2021).

China's repression of DeFi is rooted in the fear of losing control over its economic and financial systems. The decentralized nature of blockchain technology undermines the central authority the government has worked so diligently to maintain. Furthermore, China's position as the second-largest holder of Bitcoin globally highlights its influence within the digital currency market, even as it restricts the use of these currencies domestically (CoinGecko, n.d.). Despite the government's crackdown, it continues to engage with blockchain technology in a more controlled, centralized form, focusing on applications such as digital governance and supply chain management.

This duality of embracing blockchain while rejecting decentralized digital currencies underscores China's broader strategy to preserve economic control. In parallel with its opposition to DeFi, China has accelerated its efforts to develop a digital yuan (Fullerton & Morgan, 2022). As a central bank digital currency (CBDC), the digital yuan offers a way to digitize the country's currency while ensuring complete state oversight over financial transactions. This contrasts sharply with the decentralization inherent in Bitcoin and other cryptocurrencies, offering the government the ability to monitor and regulate digital transactions both within China and beyond its borders. This shift toward a government-backed digital currency is a key example of the state's vision for the future of finance, which we will explore in more depth in the next section.

8. Development of Central Bank Digital Currencies (CBDC)

The responses to DeFi discussed so far represent only a tiny fraction of the diverse approaches taken by countries worldwide. Countries across the globe are navigating their own unique challenges regarding digital currencies, financial sovereignty and economic stability. One key focus emerging across many nations is the development of central bank digital currencies (CBDCs). According to the Atlantic Council's Geoeconomic Center's CBDC tracker, the trend is widespread with 134 countries and currency unions, representing 98% of global GDP, are exploring them thus far. This number was 35 as recently as 2020 (Atlantic Council, n.d.). Three countries, the Bahamas, Jamaica and Nigeria have already launched a CBDC and 19 out of the 20 G20 countries are in the advanced stages of CBDC exploration with 13 of these already being in the pilot phase.

In the following section, we will explore what CBDCs are, why they are being explored and developed, and how they fit into the global financial landscape in response to DeFi and the increasing digitization of money.

CBDCs have characteristics of both traditional and decentralized finance. While the currency is digital and typically runs on a blockchain like most cryptocurrencies, it is a form of the nation's fiat currency and is issued and controlled by its central bank. CBDCs are meant to offer benefits to its users such as sending and receiving money more quickly and with less expense, serving the

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unbanked population and providing protection from volatility while retaining the government's ability to influence the economy through the creation and control of the CBDC.

China, with the largest CBDC pilot to date, has demonstrated both the potential and the risks associated with these currencies. Its digital yuan, already used extensively, includes features such as "programmable money", allowing authorities to dictate how, where and when funds can be spent. For example, the Chinese government has experimented with issuing digital cash that expires after a certain period, compelling recipients to spend their money instead of saving it (Areddy, 2021). While this innovation may help stimulate economic activity during downturns, it also illustrates the invasive level of control governments can exert over individuals' financial behaviors using CBDCs.

Such privacy risks are not confined to specific countries. Across the globe, governments using CBDCs may be tempted to leverage these digital currencies for increased surveillance, potentially tracking every transaction within their purview. In more extreme cases, individuals could be targeted financially for expressing dissent regarding their government. Even in democratic countries, the centralization of data gathered from CBDCs raises alarms about potential misuse. Furthermore, individuals may resist CBDCs given their shared vulnerabilities with fiat currencies, such as susceptibility to inflation, creating a growing debate over their acceptability as their government adoption grows.

9. Discussion on the Future of DeFi

The question of how traditional finance and decentralized finance will co-exist in the future is a difficult one, given the layers of political complexity and the speed of technological development. From a positive perspective, the two systems show potential for a complementary relationship instead of an adversarial one. The continuing development of hybrid systems appears likely, blending the strengths of both traditional with decentralized finance. Traditional finance offers established international systems, trust built over centuries, regulatory frameworks and safeguards for consumers and investors. DeFi, in contrast, brings innovations, such as providing access to unbanked populations through an internet connection, a reduction of costs and time in transaction processing, and the transparency and finality of the blockchain.

Yet, important concerns exist over the concentration of wealth and influence that DeFi may create. Between nations, uneven adoption and regulation of DeFi risk the amplification of global wealth disparities, as technologically advanced nations leverage these innovations faster than others. DeFi's promise of the democratization of finance could be undermined by the accumulation of cryptocurrencies in the hands of large corporations, governments, and affluent individuals. This extreme concentration could grant large political and economic power to a select few, exacerbating existing inequality. For example, corporations with significant crypto holdings could potentially influence regulatory frameworks, undermining the egalitarian ideals that underpin DeFi.

The growing tensions between centralized and decentralized systems reflect deeper, more profound shifts in the global financial landscape. As nations grapple with the introduction of decentralized finance, the risk of disrupting long-standing economic structures becomes more apparent. Governments, international organizations, and decentralized actors all have stakes in this evolving paradigm, and their competing visions will influence the stability of financial systems at both national and international levels. Financial power is becoming more distributed, potentially challenging traditional governance and control mechanisms. These tensions between centralization and decentralization, equality and concentration of power, and stability versus innovation will shape the trajectory of global finance. The outcomes remain uncertain, leaving the future of money uncertain and deeply contingent on how these challenges are navigated.

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