Cryptocurrency began as a peer-to-peer payments system “without going through a traditional financial institution.”¹ Today, cryptocurrency has evolved into decentralized finance (DeFi) to offer more comprehensive financial tools that further bypass the cumbersome aspects of the existing financial system. There are some, however, who do not recognize the potential for crypto to streamline the financial system, and are calling for a blanket ban². As of September 30, 2021, approximately $80B of cryptocurrencies are tied to DeFi contracts (a 4x increase from one year ago).³

Proponents of DeFi envision a powerful tool for the unbanked and underbanked, as well as people living in countries with authoritarian regimes, hyperinflation, and weak financial institutions. Communities of color in the United States, for example, could access alternative forms of lending in the face of predatory loans or high fees.⁴ Version 1.0 of DeFi, however, has thus far been primarily aimed at crypto whales, people who already have access to the financial system, and users in markets with robust financial institutions.⁵ This makes sense given the

---

³ DeFi Pulse, https://defipulse.com/.
inherent risks of DeFi and the fact that a liquid financial market requires market makers. But to truly remake the financial system, the next iteration of DeFi must be developed toward an intentional vision for financial inclusion. Financial inclusion means that everyone has the tools to not only meet their daily needs, but to also build wealth for themselves, their families, and their communities. And in turn, greater financial inclusion supports more resilient and robust economies.⁶

**An Overview of DeFi**

DeFi refers to decentralized applications that provide financial services without relying on a centralized intermediary, such as payments, lending, and insurance. These applications operate on blockchain technology and deliver financial services based on specific rules and protocols through decentralized networks and digital tokens. DeFi can vary in function but several key archetypes include stablecoins, exchanges, credit, derivatives, insurance, and asset management.⁷

DeFi is best explained by comparing it to what is often referred to as “CeFi,” centralized financial products in crypto. Take Coinbase, a centralized crypto exchange, which offers users the ability to exchange fiat currency and cryptocurrencies. Like any traditional exchange platform, Coinbase holds all user funds to pool together liquidity, utilizes a matchmaking algorithm to connect supply with demand, and manages an order book to internally record and validate every transaction.⁸ Furthermore, Coinbase determines what cryptocurrencies to list. Coinbase features about $2B

---


7 Stablecoins are digital assets pegged to stable value assets such as fiat currency or a basket of goods. “DeFi Beyond the Hype: The Emerging World of Decentralized Finance,” Wharton Blockchain and Digital Asset Project, May 2021, [https://wifpr.wharton.upenn.edu/wp-content/uploads/2021/05/DeFi-Beyond-the-Hype.pdf](https://wifpr.wharton.upenn.edu/wp-content/uploads/2021/05/DeFi-Beyond-the-Hype.pdf).

Designing Decentralized Finance for Financial Inclusion

to $3B in daily trading volume and generates profits by charging a transaction fee.  

In comparison, the largest decentralized crypto exchange is Uniswap with daily trading volume of about $1B to $2B. Uniswap is not owned by a central company or operating on centralized IT infrastructure. Instead, the entire open source application sits on the Ethereum blockchain. Uniswap's open architecture and decentralized nature give it four key features:

1. Anyone can use it.
2. Users retain custody over their account and assets.
3. Anyone can list a new crypto token.
4. Anyone can copy the Uniswap code to create a new version or port it to another blockchain.

Uniswap's two key novel features are its liquidity mechanism and method of exchanging digital assets. Uniswap's automated protocol incentivizes everyday users and institutions to become liquidity providers. In exchange, they receive a token that represents the percentage of their respective stakes in the pool.

When users tap into this liquidity pool to exchange cryptocurrencies, smart contracts (software code) carry out and document the exchange of tokens. During the entire exchange process, no central party or owner controls the transaction, obtains revenues, or collects data. The Uniswap protocol charges a 0.30 percent transaction fee for facilitating the exchange of tokens. When a liquidity provider removes their stake in the liquidity pool, they receive their original crypto assets along with fees collected by the Uniswap protocol based on the percentage of their stake in the liquidity pool.

Uniswap’s decentralized model, however, poses risks. First, the protocol’s smart contracts have technical risks. Bugs in the smart contracts or malicious actors taking advantage of vulnerabilities could result in funds being stolen or the inability to access funds. Even if Uniswap’s smart contracts are well-designed and audited, broader dangers to the blockchain on which Uniswap operates pose risks to the decentralized exchange. For example, the recent Solana outage meant that its decentralized exchanges were also inaccessible. Any losses incurred from these technical risks are not protected, unlike transactions on Coinbase. Second, users’ only protection of their assets is the passcode for their private wallet. In the scenario that a malicious actor gains access to a person's private wallet, little can stop them from draining all assets held in the wallet. Once this happens, it is difficult to find the culprit and get back stolen assets. In comparison, if money is stolen from a Coinbase wallet, Coinbase as a company is able to provide support and potentially cover the losses. Third, risky tokens may be added to the Uniswap exchange. Unlike Coinbase, which decides what tokens to list, decentralized exchanges’ more open infrastructure means risky tokens without strong development teams and protocol fundamentals can be more easily listed. Fourth, liquidity providers face economic risks known as impermanent loss in which the price of an asset put into a liquidity pool changes. This is best illustrated by the following example:

1. Jane deposits 1 ETH ($100) and 100 DAI ($100) for 10 percent of the Uniswap pool (10 ETH and 1,000 DAI).
2. The price of ETH increases to 400 DAI and the pool changes to 5 ETH and 2,000 DAI.
3. If Jane withdraws her stake, she receives 0.5 ETH and 200 DAI for $400. If she held 1 ETH and 100 DAI she would have made $500.

Uniswap is but one example of DeFi. A host of other DeFi applications deliver different financial services. For example, people can borrow and lend crypto through Aave—a powerful tool given the fact that this bypasses financial institutions that have historically been the gatekeepers of credit. Another popular DeFi application is MakerDAO through which people convert their volatile crypto assets to Dai, a stablecoin pegged to the US dollar. Anyone can access DeFi and any developer can build a new or interconnected DeFi application. And all of this technology can be accessed while also giving users the ability to control their data exhaust. The result of this open architecture has been an explosion of new financial tools built on blockchains and an opportunity for a more inclusive ecosystem.

Transforming DeFi to Promote Financial Inclusion

As of 2017, 1.7 billion people do not have access to a bank account and many more are underbanked. Women, communities facing poverty, and young people are disproportionately excluded from the financial system. Much of this, of course, is tied to generations of systemic exclusion, violence, and economic extraction. DeFi could afford access, especially to those who do not have formal identification or who live in places without robust institutions or stable

12 “DeFi Beyond the Hype: The Emerging World of Decentralized Finance.”
Designing Decentralized Finance for Financial Inclusion

In order to fulfill this vision for economic prosperity and go beyond the overplayed DeFi talking point of “banking the unbanked,” DeFi will need to prioritize four goals: (1) cater to everyday use-cases; (2) offer easy to use products; (3) promote intentional risk-taking; and (4) account for mobile phones and internet accessibility.\(^{19}\)

**Cater to everyday use-cases**

The crypto economy has undergone tremendous growth surpassing $2 trillion in market capitalization.\(^{20}\) For it to be meaningful, it will need to connect to the non-crypto world and provide retail solutions. Much of DeFi today looks like the same old market making and speculative finance, but decentralized, with technical jargon such as “yield farming,” “liquidity protocols,” and “governance tokens.” By “democratizing” finance, DeFi has moved from the financial institutions of the world to crypto enthusiasts and crypto whales.

The work of these DeFi protocols and crypto specialists, however, cannot be dismissed. Without the liquidity offered by the current iteration of DeFi, new retail use cases would be impossible. But today’s crop of DeFi protocols assume that users are interested in remaining within the crypto economy and fail to provide the critical retail financial tools offered by traditional banks. The result is limited grassroots activity.\(^{21}\) Not enough DeFi products as of yet help the corner shop owner in Buenos Aires get a small business loan or the small-scale farmer in Kenya get insurance to protect their harvest—much of this has been early-stage pilots.\(^{22}\)

Moving forward, Defi needs to be deliberate in three things to claim a better and more inclusive financial system.

---


Designing Decentralized Finance for Financial Inclusion

First, the average person needs more retail financial solutions, like those by Centrifuge and DuniaPay. These can include microfinance, small business loans, savings accounts, fixed income interest rates, and community investment funds. Accessibility and participation cannot hinge upon having large amounts of capital. Additionally, most DeFi protocols require overcollateralization, which undermines the purpose of borrowing and lending in the first place. Second, DeFi projects and foundations promoting blockchains (e.g., Ethereum Foundation and Tezos Foundation) will need to engage with payment providers, merchants, and exchanges to enable seamless and efficient on- and off-ramps between blockchains, fiat currencies, and cryptocurrencies. For example, DeFi products can partner with payment platforms like PayU and Visa so that users can make real-world purchases using their crypto assets. Third, blockchain developers should promote interoperability between blockchains. This is especially important for users who are making small transactions and need applications with low transaction fees (gas prices). At the moment, high gas prices on Ethereum keep DeFi from being feasible for smaller transactions. In an interoperable and multichain world, users can more easily move across blockchains to access applications with low gas fees.

**Offer easy-to-use products**

Ethereum co-founder Vitalik Buterin recommends that people stay out of DeFi unless they truly understand the applications. The notorious complexity is due to two characteristics. First, DeFi’s decentralized nature requires users to interface with a multitude of applications and cryptocurrencies, each of which offer different financial tools, services, and yield rates (that fluctuate). Second, applications are generally designed for crypto natives who have the ability to take risks and the capacity to invest their time. The result is complex user interfaces with many moving parts and no clear documentation. The lack of intermediaries and government support in DeFi leaves users to fend for themselves. In traditional finance, intermediaries (e.g., asset managers and banks) help navigate the complexity and charge a fee for their services. Government agencies from the federal level, such as the FDIC, to the local level, such as the San Francisco Office of Financial Empowerment, also provide financial guidance. In addition, creative banking solutions such as Community Development Financial Institutions (CDFI), credit unions, community-based commercial banks, and nonprofits address banking deserts across the United States.

Looking forward, DeFi developers should take on a more inclusive design approach. This includes designing integrated dashboards that make it easy for users to compare financial options across applications and blockchains. DeFi builders can also better assist users of their products by providing resource hubs and peer-to-peer customer support. Education resources, both centralized and decentralized, will be critical to helping the average person understand the digital transformation offered by cryptocurrency and take advantage of its potential.

advantage of new solutions. Additionally, developers will need to be proximate to the people who most need DeFi.\textsuperscript{34} This begins with extensive user research (going beyond crypto natives) and honest partnership with community organizations and communities to design easy-to-understand solutions (and translations to other languages). Furthermore, developers will also need to establish and normalize diversity, equity, and inclusion commitments in the workplace across levels while also promoting belonging in which end users and team members are accepted and valued for their differences.\textsuperscript{35} DeFi developers are in the best position to put in place the conditions for financial inclusion. An inclusive design-centric approach is a good first step to helping more people navigate the complexity of DeFi.

**Risk-taking with intent**

DeFi is a risky business as evidenced by its high yields.\textsuperscript{36} The rise of DeFi was driven by “crypto degens,” or self-described degenerate gamblers.\textsuperscript{37} Crypto degens are willing to put in large amounts of capital, take on high risk, and face substantial losses. Their strategy pushes the frontiers of DeFi and tests the limit of use cases. But in a world of “meme coins” (coins based on jokes or memes rather than a product), fear of missing out, Twitter, Reddit, and generations of structural inequality, the crypto degen mentality can encourage others with less capital and experience to take on unnecessary

\begin{footnotesize}
\begin{itemize}
\end{itemize}
\end{footnotesize}
Designing Decentralized Finance for Financial Inclusion

risks. Already, crypto-hacks have inflicted serious harm on people who simply cannot afford these types of dangers. Consumers face a precarious world of loss in token values, market manipulation, and fraud. To mitigate these dangers, users need to examine DeFi protocol whitepapers, research the developers, determine if the protocol has been audited, assess the level of decentralization, and keep a lookout for other red flags (e.g., unsustainable marketing). Much of this, however, is an art rather than science, and still puts people with limited financial experience—or a safety net—at risk.

Risk-taking must be done with intention. Given the lack of regulatory clarity, it is DeFi developers’ responsibility to help users manage their risks while policymakers catch up. The World Economic Forum’s most recent DeFi Policy Maker’s Toolkit outlines five areas of risks—market risk, counterparty risk, liquidity risk, transaction risk, smart contract risk—for policymakers to consider that are also relevant for DeFi developers. For example, developers can begin working with user experience (UX) designers to flag the financial risks in easy to understand terms and add warning signs prior to any transaction. In addition, developers should ensure their code is sound through third-party auditors and clearly communicate how decentralized the protocol actually is.

Most importantly, developers in the crypto industry should be realistic in their rhetoric. Pushing forward narratives of outsized returns without pointing out the underlying risks will damage long-term growth of the crypto economy and only add to regulators’ concerns. At best this rhetoric can be misleading and at worst predatory, especially as more people without prior crypto experience enter the market. The risks posed by DeFi can be particularly dangerous when considering market and liquidity risk. People can face substantial losses in a downturn or an illiquid market if they put their savings into cryptocurrency during a financial bubble. Financial institutions are required by law to manage risks, but the everyday purchaser of crypto assets may not be as sophisticated in their risk management. Certain coins also hold outsie influence over the overall crypto ecosystem. Tether (USDT), for example, underpins many cryptocurrency purchases and a loss of trust in USDT would pose a “severe liquidity shock to the broader cryptocurrency market.”

Sustainable long-term growth should be valued over quick returns if DeFi is to promote an inclusive system. Looking back at the traditional finance industry, a major barrier to banking solutions offered by financial institutions is a lack of trust—particularly among low-income communities and communities of color. This is unsurprising given the financial industry’s history of predatory and misleading practices. DeFi could offer a fresh start. Developers can put their best foot forward by helping people use the financial tools that serve their respective needs and risk profile.

Account for mobile phone usage and internet accessibility

People do not all access the Internet in the same way—devices, costs, and bandwidth vary. If DeFi is to expand access to a broader base of users that include those who have been financially excluded, developers will need to account for these differences. Approximately 60 percent of the world has access to the Internet as of January 2021. Of this group, over

90 percent of people also access the Internet through their smartphone, especially those who are financially excluded.47 The costs for access to the Internet still varies greatly between emerging and established markets.48 Despite this, the largest blockchain for DeFi, Ethereum, primarily focuses on computer users.49 Developers must focus more on mobile. Specifically, financial inclusion will hinge upon application development for cheaper smartphones rather than only the latest iPhone or Samsung Galaxy. Additionally, DeFi applications need to be designed to operate in low-bandwidth areas and allow for some level of offline functionality. Otherwise, DeFi developers risk further entrenching a digital divide by adding onto existing forms of inequality and failing to reach those who need DeFi the most.50

While the crypto world has naturally been skeptical of governments when it comes to financial innovation, it should not happen at the cost of ignoring key public sector sponsored changes that would expand access to DeFi. Lost within the recent debate between policymakers and the crypto industry over the crypto tax provision in the US infrastructure bill, which showed a seriously limited understanding of crypto, was how the infrastructure bill set aside $65 billion to expand access to DeFi. Lost within the recent debate between policymakers and the crypto industry over the crypto tax provision in the US infrastructure bill, which showed a seriously limited understanding of crypto, was how the infrastructure bill set aside $65 billion to expand

---

47 Statista, “Global digital population as of January 2021.”
internet access. Internet infrastructure is perhaps one of the most critical building blocks to expanding the reach of DeFi to financially excluded people. The DeFi industry, however, has been largely silent when it comes to advocating for policies that address structural access such as internet infrastructure. Instead, the newfound lobbying power of the greater crypto industry has focused on protecting existing users and developers. The DeFi industry and developers must engage with governments (both in the United States and abroad) to address policies that would improve access to the Internet, especially for historically marginalized communities. By doing this, DeFi can help create a novel financial system that is truly decentralized and more inclusive for all people.

The Private and Public Sectors are Responsible for DeFi’s Future

DeFi protocols offer an alternative for people to access financial tools. While development has thus far focused on crypto native users, its future can push the frontiers of financial inclusion. For this, responsible development falls upon private organizations and developers as well as public sector entities.

Private sector serves as the frontline to the evolution of DeFi. Developers must be intentional in their work to address everyday use cases, create user-friendly applications, communicate risks, and navigate the different ways people access internet technology. This requires an honest and accountable approach to innovation as well as educating the public to make sense of this new form of digital innovation. Blockchain technology serves novel use cases and simply cobbling together schemes to make quick returns does more harm than good in the long term.

Public sector regulators and central banks establish the guardrails to protect users. These organizations can frame DeFi as a competitive alternative to traditional finance and test its integration with central bank digital currencies through various policy tools. The public sector must look at cryptocurrency and DeFi beyond the lens of speculation and illicit finance because there are in fact many more possible use cases. This requires taking time to holistically understand the technology. The current payments system, designed precisely within the regulatory frameworks set by the public sector, has failed immeasurably. Of particular note, two major problems in the United States include a last-mile problem and a payments ecosystem that is incapable of quickly getting COVID stimulus to people.

DeFi in its decentralization, however, holds us all accountable. We cannot look to intermediaries to solve the most pressing financial problems. Instead, it falls upon each of us, public and private sectors, to design the frameworks and applications that ensure DeFi prioritizes expanding everyday use cases, offering user-friendly products, promoting intentional risk taking, and accounting for internet access. DeFi has so far been directed toward crypto enthusiasts. Next, more intentional design and execution is needed to reach all people.

Nikhil Raghuveera is a nonresident fellow at the GeoTech and GeoEconomics centers and works on strategy and innovation at the Celo Foundation. The views, thoughts, and opinions expressed here are the author’s alone and do not necessarily reflect or represent the views and opinions of any affiliated organization.

**CHAIRMAN**  
*John F.W. Rogers

**EXECUTIVE CHAIRMAN**  
**EMERITUS**  
*James L. Jones

**PRESIDENT AND CEO**  
*Frederick Kempe

**EXECUTIVE VICE CHAIRS**  
*Adrienne Arsht
*Stephen J. Hadley

**VICE CHAIRS**  
*Robert J. Abernethy
*Richard W. Edelman
*C. Boyden Gray
*Alexander V. Mirchev
*John J. Studzinski

**TREASURER**  
*George Lund

**DIRECTORS**  
Stéphane Abrial  
Todd Achilles  
*Peter Ackerman  
Timothy D. Adams  
*Michael Andersson  
David D. Aufhauser  
Barbara Barrett  
Colleen Bell  
Stephen Biegun  
*Rafic A. Bizri  
*Linden P. Blue  
Adam Boehler  
Philip M. Breedlove  
Myron Brilliant  
*Esther Brimmer  
R. Nicholas Burns  
*Richard R. Burt  
Teresa Carlson  
James E. Cartwright  
John E. Chapoton  
Ahmed Charai  
Melanie Chen  
Michael Chertoff  
*George Chopivsky  
Wesley K. Clark  
*Helima Croft  
Ralph D. Crosby, Jr.  
*Ankit N. Desai  
Dario Deste  
*Paula J. Dobriansky  
Joseph F. Dunford, Jr.  
Thomas J. Egan, Jr.  
Stuart E. Eizenstat  
Thomas R. Elbridge  
Mark T. Esper  
*Alan H. Fleischmann  
Jendayi E. Frazer  
Courtney Geduldig  
Meg Gentle  
Thomas H. Glocer  
John B. Goodman  
*Sherri W. Goodman  
Murathan Gündüz  
Amir A. Handjani  
Frank Haun  
Michael V. Hayden  
Tim Holt  
*Karl V. Hopkins  
Andrew Hove  
Mary L. Howell  
Ian Ihnatowycz  
Mark Isakowitz  
Wolfgang F. Ischinger  
Deborah Lee James  
Joia M. Johnson  
*Maria Pica Karp  
Andre Kelleners  
Henry A. Kissinger  
*C. Jeffrey Knittel  
Franklin D. Kramer  
Laura Lane  
Jan M. Lodal  
Douglas Lute  
Jane Holl Lute  
William J. Lynn  
Mark Machin  
Mian M. Mansha  
Marco Margheri  
Michael Margolis  
Chris Martin  
William Marron  
Gerardo Mato  
Timothy McBride  
Erin McGrain  
John M. McHugh  
Eric D.K. Melby  
*Judith A. Miller  
Dariusz Mioduski  
*Michael J. Morell  
*Richard Morningstar  
Georgette Mosbacher  
Dambisa F. Moyo  
Virginia A. Mulberger  
Mary Claire Murphy  
Edward J. Newberry  
Thomas R. Nides  
Franco Nuschese  
Joseph S. Nye  
Ahmet M. Ören  
Sally A. Painter  
Ana I. Palacio  
*Kostas Pantazopoulos  
Alan Pellegrini  
David H. Petraeus  
W. DeVier Pierson  
Lisa Pollina  
Daniel B. Poneman  
*Dina H. Powell McCormick  
Ashraf Qazi  
Robert Rangel  
Thomas J. Ridge  
Gary Rieschel  
Lawrence Di Rita  
Michael J. Rogers  
Charles O. Rossotti  
Harry Sachinis  
C. Michael Scaparrotti  
Ivan A. Schlager  
Rajiv Shah  
Gregg Sherrill  
Ali Jehangir Siddiqui  
Kris Singh  
Walter Slocombe  
Christopher Smith  
Clifford M. Sobel  
James G. Stavridis  
Michael S. Steele  
Richard J.A. Steele  
Mary Streett  
*Frances M. Townsend  
Clyde C. Tuggle  
Melanne Verveer  
Charles F. Wald  
Michael F. Walsh  
Ronald Weiser  
Olin Wethington  
Maciej Witucki  
Neal S. Wolin  
*Jenny Wood  
Guang Yang  
Mary C. Yates  
Dov S. Zakheim

**HONORARY DIRECTORS**  
James A. Baker, III  
Ashton B. Carter  
Robert M. Gates  
James N. Mattis  
Michael G. Mullen  
Leon E. Panetta  
William J. Perry  
Colin L. Powell  
Condoleezza Rice  
Horst Teltschik  
William H. Webster

*Executive Committee Members List as of August 26, 2021*