

Crypto CeFi And DeFi Must Strike A Balance To Thrive

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This report does not constitute a rating action



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Key Takeaways

- Although crypto technology promises a decentralization of the financial system, most adoption so far has taken place through centralized finance (CeFi) intermediaries.
- The failure of several CeFi entities in 2022 highlighted their risk management weaknesses, governance issues, and the contagion risks between CeFi entities.
- In contrast, decentralized finance (DeFi) protocols largely weathered the storm, with minimal loan losses on the major collateralized lending platforms and continued growth in the use of decentralized exchanges. Yet DeFi still carries risks, and the lack of a regulatory framework and know-your-client/anti-money-laundering functionality hinders its adoption by traditional financial institutions.
- Future growth in use cases for the technology will require some elements of centralization in tandem with the use of DeFi technology, alongside a focus on the benefits of on-chain asset ownership and transactions.

The crypto winter has exposed CeFi's vulnerabilities, whereas DeFi has weathered the storm but faces obstacles to its further growth.

Crypto CeFi entities' failings are not failings of crypto technology. Yet some concessions to centralization may be essential if DeFi is to fulfill its growth potential.

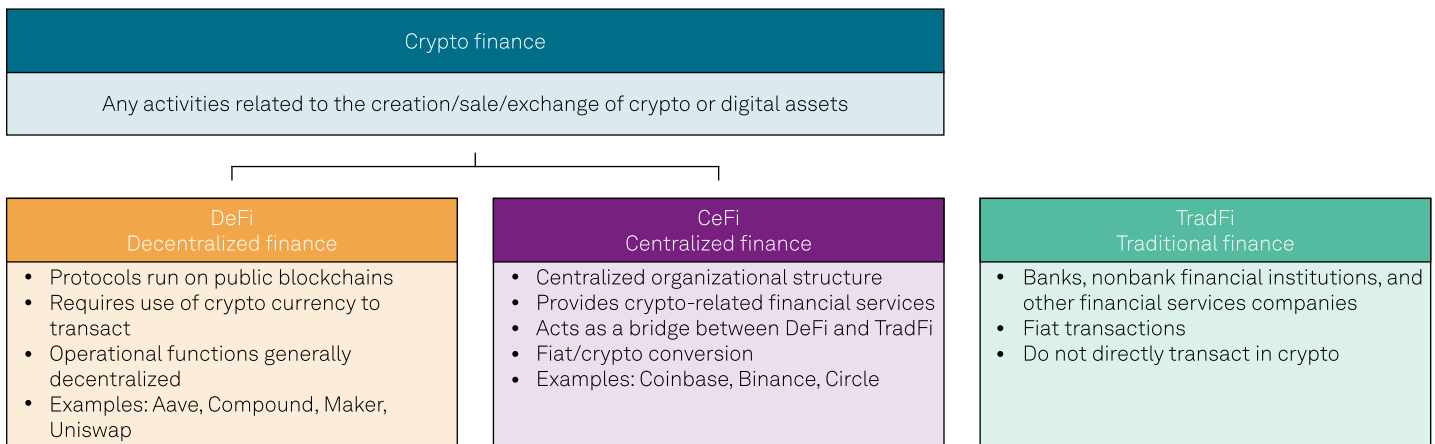
Over a year into the "crypto winter" of depressed cryptocurrency prices triggered by the Terra-Luna ecosystem's collapse, market participants' crypto conversations are as polarized as ever, and sometimes amalgamate the failures of centralized crypto finance entities with DeFi. In this report we explain why CeFi entities have so far dominated crypto finance; how weak risk management led to the demise of some of these CeFi entities; how Defi protocols weathered the storm, but continue to present significant risks and obstacles to greater adoption; and our view on the future of crypto innovations.

CeFi Has Been The Main Crypto Gateway So Far

The crypto sector has generated ever more negative headlines over the past year. The terms "crypto" and "DeFi" are often used interchangeably, which leads to confusion around the risk drivers and contributes to the polarization of opinions in this space. Let's start with our interpretation of DeFi, CeFi, TradFi, and crypto finance.

Chart 1

Defining CeFi and DeFi



Source: S&P Global Ratings.

Economic activity began with bartering between individuals and evolved over time to supplant exchange with more standard means of payment. The "trust" in those means of payments as an acceptable way to acquire goods and services was derived from the common understanding that they were either made of or backed by something that had a recognized intrinsic value (e.g., shells, gold, or other precious metals). In recent decades, fiat currencies moved the main basis of trust in the world economy from trusting "something" to trusting "someone"--for example, sovereigns, central banks, and other financial institutions; in other words, traditional finance, or TradFi).

DeFi brings the focus back to trusting "something" (in this case, the code behind a smart contract) rather than "someone" (a known and accountable intermediary). It has therefore encountered skepticism from many traditional market participants, accustomed to ultimately relying on "who" not "what". TradFi intermediaries (such as banks, custodians, market makers, liquidity providers, and financial services providers in general) play a crucial role in maintaining and upholding the necessary trust in financial markets. DeFi attempts to replace these functions and address the risks they mitigate, but its ability to do so has yet to be proven. In addition, there are practical impediments to a broader embracing of DeFi by the public. As crypto gradually garnered attention after the invention of bitcoin in 2009, most entrants struggled to find a way into the new ecosystem due to a lack of confidence in interacting with blockchains directly. A single error in a transfer can lead to an irremediable loss. Unsophisticated users have been victims of phishing and hacks time and time again. In 2017, in the middle of the initial hype around decentralized exchange offerings and the birth of many projects that would become known as DeFi, CeFi companies such as Binance, Celsius, Voyager, BlockFi, and many more were launched, while FTX followed in 2019. All these companies served the same purpose: to simplify access to crypto finance and crypto investing. CeFi has been the easier and faster way for most market participants to come into the crypto ecosystem, even though it sits at odds with crypto's original purpose of decentralization.

There are several key areas that we believe inhibit widespread acceptance of DeFi, which CeFi has attempted to address to varying degrees of success (see "[How DeFi's Operational Risks Could Influence Credit Quality](#)," published June 7, 2023).

Chart 2

CeFi offers solutions to DeFi challenges

DeFi challenges	CeFi solutions
Technological complexity	User-friendly interface and tech support
Anonymous counterparties	KYC and AML protocols
Governance, hacks, and errors	Centralized entity/responsible party
Regulatory uncertainty	Compliance infrastructure

Source: S&P Global Ratings.

CeFi solutions have acted as the main gateway between TradFi and the crypto and DeFi ecosystem, with far fewer users choosing to interact with DeFi directly. For end-users, CeFi intermediaries perform tasks that the end-user would otherwise, in a fully decentralized environment, need to carry out themselves (for example, custody of private keys, understanding of smart contract/technology, or bridging across platforms and networks.) For financial regulators, it is more familiar to approach regulating CeFi intermediaries than a DeFi protocol on

a blockchain; in other words, it feels easier to regulate CeFi than DeFi. And for developers of DeFi protocols, CeFi provides access to a much broader universe of users and investors, enabling them to scale far more rapidly.

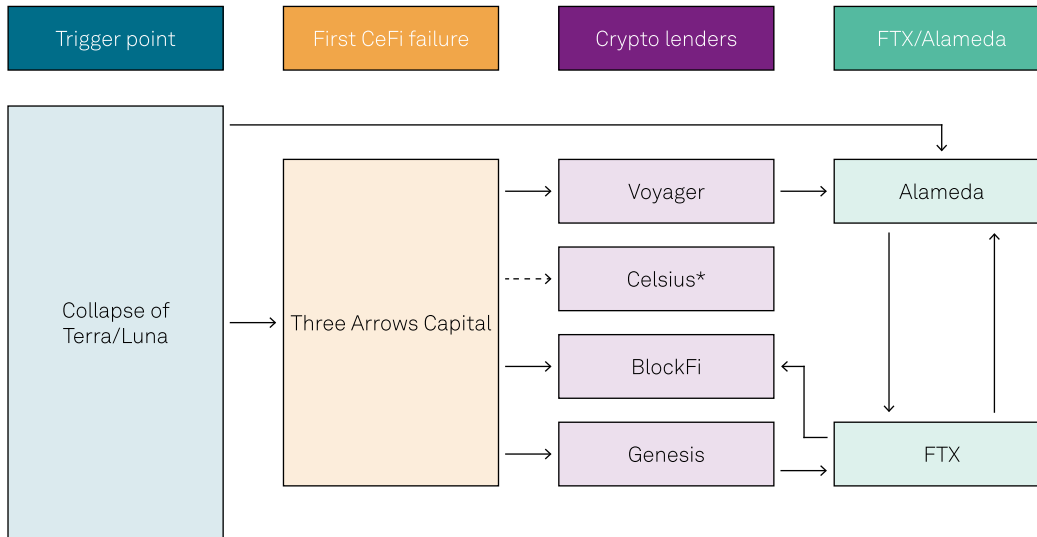
CeFi's Vulnerabilities Exposed

Although CeFi entities have benefited from more rapid and widespread adoption than DeFi protocols, when the tide went out under crypto markets in 2022, some CeFi entities proved to be centralized points of failure and contagion that amplified their investors' losses beyond the drop in value of their crypto assets. Here we take a closer look at how weaknesses in risk management and governance, as well as the interconnectedness between these entities, culminated in a string of bankruptcies and customer losses.

Chart 3

Contagion throughout CeFi

A simplified overview



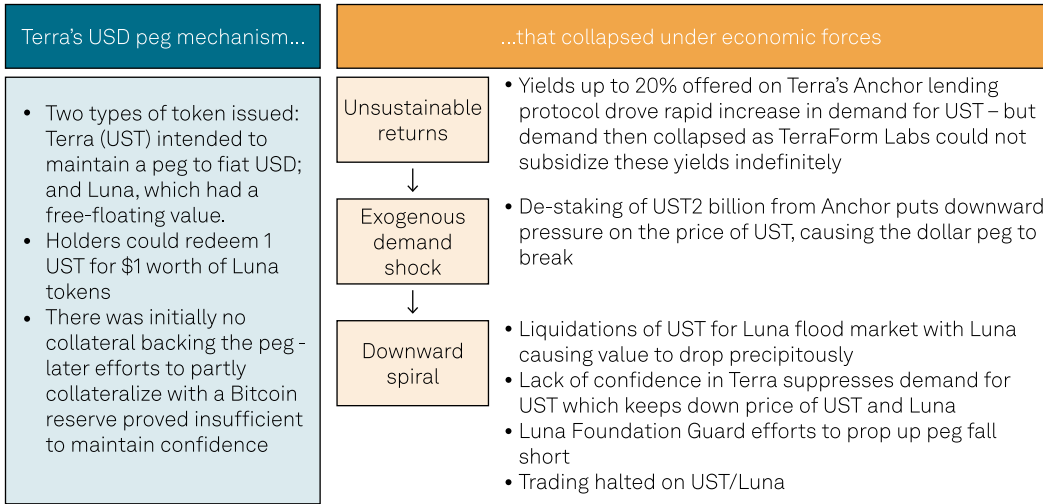
*Celsius had exposure to Three Arrows Capital, but was primarily affected by other factors such as aggressive trading strategies as described below. Sources: The Block, public reports, S&P Global Ratings.

The collapse of the Terra-Luna stablecoin provided a catalyst

The Terra protocol grew very quickly, from its inception in late 2020 to a total value locked in its algorithmic stablecoin, UST, exceeding \$20 billion by the time it collapsed in May 2022. Its associated token, Luna, had a peak market capitalization of approximately \$40 billion. This was a young protocol using an experimental algorithmic approach to peg UST to fiat U.S. dollars (USD). Despite this, CeFi entities such as hedge fund Three Arrows Capital (3AC) and trading firm Alameda Research had very large holdings in the protocol (in 3AC's case, estimates differ, but are in the hundreds of millions of dollars, and range from 10% to 20% of its total assets), and the failure of Terra-Luna led directly to the failure of 3AC. Alameda's exposure may have resulted from its provision of liquidity to its sister exchange FTX to cover large liquidations.

Chart 4

How the collapse of Terra-Luna unfolded



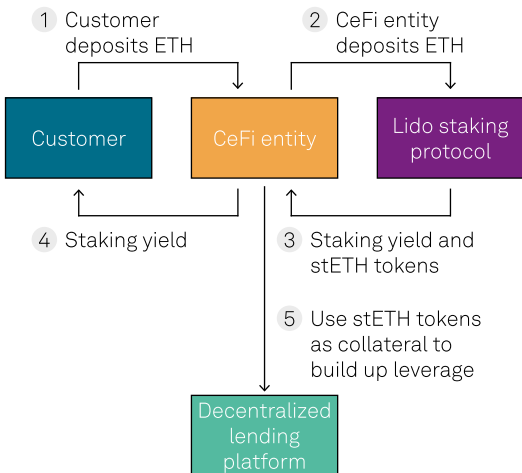
Source: S&P Global Ratings.

CeFi entities' strategies created traditional financial risks...

CeFi entities aimed to generate a return for their investors through various trading strategies. They exposed themselves (and ultimately, their investors) to traditional asset-liability mismatch risks under a new veneer. We break down two key risk patterns in the charts below: the staking of ether (ETH) deposits, and depositing bitcoin (BTC) in the Grayscale Bitcoin Trust (GBTC). In addition to large holdings of Terra and Luna, 3AC was significantly exposed to both liquid staking and the drop in value of GBTC relative to the underlying BTC. It also provided GBTC as a share of the collateral backing a loan from BlockFi, exacerbating contagion risk. Liquidity concerns resulting from liquid staking were also a driver that led Celsius to halt customer withdrawals.

Chart 5

Asset-liability mismatch risk through liquid staking

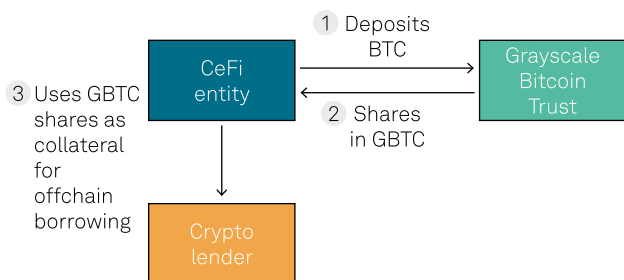


- Staked ETH are used to validate the Ethereum blockchain. Lido is the primary example of a protocol allowing users to stake ETH. CeFi entities used the Lido protocol to earn yield for their customers.
- Stakers earn a yield on staked assets, but in 2022 could not withdraw these assets immediately, as withdrawals were not permitted on the Ethereum blockchain until April 12, 2023.
- Lido users also receive “stETH” tokens representing their staked ETH deposit. These tokens can be traded, sold or used as collateral to borrow in DeFi.
- In theory, CeFi entities could sell stETH tokens for ETH to meet any customer withdrawal requests. However, stETH's value depegged from that of ETH, and its liquidity was insufficient to allow entities to exit their positions without driving further significant value drops.
- As market sentiment shifted, customer withdrawal requests created significant liquidity pressure due to the mismatch between customers' ETH deposits and CeFi entities' stETH assets.

Source: S&P Global Ratings.

Chart 6

GBTC: Borrowing against illiquid collateral



- CeFi entities used BTC to purchase shares in the Grayscale Bitcoin Trust (GBTC), with a six-month lock-in period.
- This was a popular strategy as initially GBTC shares traded at a significant premium to the value of the underlying BTC. However, the value of GBTC fell to a discount to the underlying BTC, driven in part by a failure to obtain regulatory approval to convert the trust into an exchange-traded fund.
- In some cases, CeFi entities used these GBTC shares as collateral to borrow stablecoin loans from crypto lenders, as an alternative to BTC. The GBTC collateral dropped further in value than the underlying BTC. It was also far less liquid, meaning that lenders could not rapidly realize the value of the collateral against a backdrop of collapsing crypto asset prices.
- The use of GBTC as collateral therefore amplified contagion risks from borrowers to lenders.

Source: S&P Global Ratings.

...while concentrated counterparty exposures exacerbated contagion risks

3AC was able to build up large leverage by borrowing from CeFi crypto lenders. According to public filings, upon 3AC's insolvency, its largest unsecured creditors were Genesis and Voyager, with exposures of \$2.4 billion and \$686 million, respectively. BlockFi reportedly had an exposure of \$1.2 billion to FTX and Alameda, representing over half its total assets, and it relied on FTX for a bailout resulting from its exposure to 3AC and the broader run on CeFi crypto lenders that ensued.

The failures of exchanges and lenders highlighted investors' custody risks...

These events shone a light on investors' exposure to CeFi entities' credit risk, in cases where these entities hold custody of their assets. A key promise of crypto technology is to allow self-custody of assets in a digital wallet, therefore eliminating any counterparty exposure. In some cases, investors had the ability to transact through these entities, but keep custody of their assets, either through an individual online wallet offered by the entity, or through their own self-custody wallet. However, many investors chose to give custody over their assets to these entities, or to invest in their yield-earning products. While bankruptcy proceedings are ongoing, these investors may be treated as unsecured creditors of the bankrupt entity in legal proceedings that are very much untested.

...and recent regulatory actions in the U.S. are a setback for some dominant CeFi players

On June 5 and 6, 2023, the U.S. Securities and Exchange Commission (SEC) announced lawsuits against two major crypto exchanges, Binance and Coinbase. Both cases allege that some of the digital assets traded on these exchanges are securities, and therefore these entities have operated as unregistered securities exchanges. These lawsuits will require a court to decide whether the relevant digital assets are securities. If the court concurs with the SEC, one consequence will be that these exchanges will need to delist the relevant assets, with some impact on their trading volumes (see "[For Coinbase, The SEC's Lawsuit Is Another Regulatory Setback](#)," published June 7, 2023).

The Binance case includes further allegations that Binance misused U.S. customer funds to finance related entities and engage in transactions to artificially boost trading volume numbers on its U.S. exchange. No such allegations are made in the case against Coinbase. The allegations against Binance are similar to those made against FTX and Alameda Research, and if proven in court may seriously harm Binance's operations in the U.S. and affect investor trust in the organization globally.

The current regulatory situation in the U.S. contrasts with that of other jurisdictions--particularly the EU, where the Markets in Crypto Assets (MiCA) framework will come into force in 2024. MiCA provides a dedicated framework for crypto assets and related activities and service providers, recognizing that most digital assets do not fall under the scope of existing financial securities regulation (see "[Europe's Crypto Regulation Lead Could Attract Followers](#)," published May 5, 2023).

The situation in the U.S. may evolve. On June 2, 2023, the House Financial Securities Committee and House Committee on Agriculture released a draft bill intended to clarify the legal and regulatory framework for digital assets (see Digital Asset Market Structure Discussion Draft). The draft bill would allow the issuers of digital assets to petition for their asset to be classified as a commodity, in which case it would fall under the regulatory umbrella of the Commodity Futures Trading Commission (CFTC). The bill would also allow the SEC to appeal for a given digital asset to be classified as a security, but would require the SEC to provide a specific rationale for each asset. Notably, the bill would also provide a transition period to allow entities to come into compliance. Although this draft bill is at a very early stage, it is indicative of broader legislative efforts to clarify the treatment of digital assets and related activities.

Major DeFi Protocols Have Proven Resilient

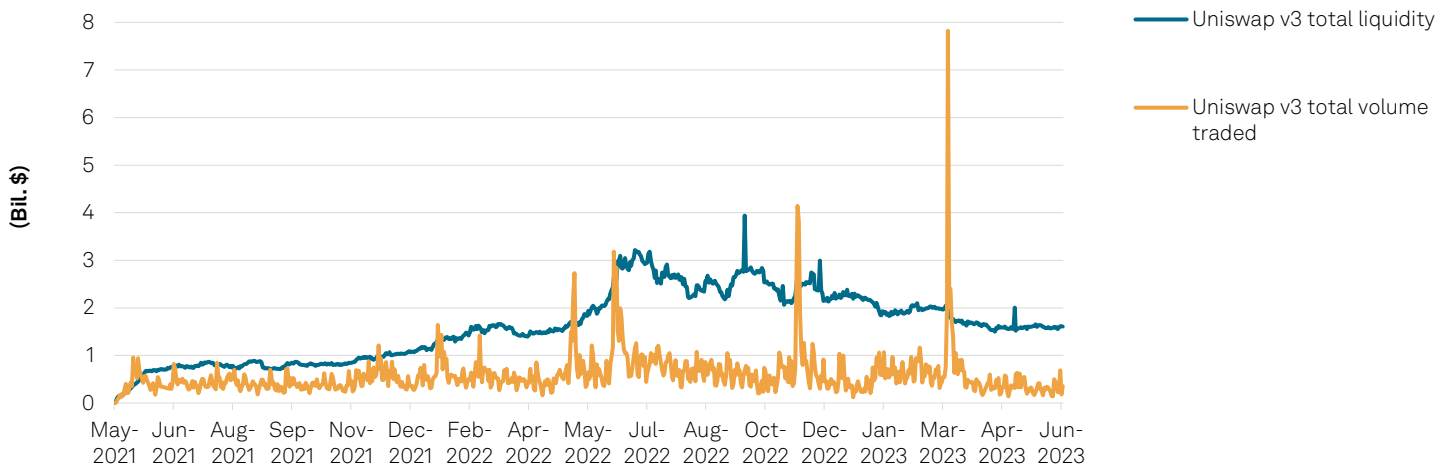
While the levels of speculation and leverage in crypto markets fueled the 2022 downturn, it is notable that the underlying technological infrastructure and network of smart contracts that underpin the DeFi ecosystem continued to perform as expected despite market volatility. Prime examples of this are decentralized exchanges (DEXs) and decentralized collateralized lending protocols.

DEX adoption has grown through the market turbulence

DEXs are protocols that allow users to swap one crypto asset for another through a smart contract. Major DEXs, including Uniswap, the largest DEX by user count, use an automated market maker (AMM) mechanism, which allows users to trade digital assets against a liquidity pool. Transactions occur on a noncustodial basis; in other words, users do not hold funds on a DEX (although they may contribute assets to liquidity pools in exchange for a return.)The collapse of FTX highlighted the potential risks resulting from holding assets on an account at a centralized exchange and contributed to boosting interest in DEXs. Liquidity on Uniswap has remained steady, including at times of peak turbulence and trading volume (see chart, with volume peaks corresponding to the collapse of 3AC in June 2022, the bankruptcies of Celsius and Voyager in July 2022, the collapse of FTX in November 2022, and the failure of Silicon Valley Bank and resulting depegging of stablecoins. See also "[Stablecoin Depegging Highlights DeFi's Exposure To TradFi Risks](#)," published March 15, 2023).

Chart 7

Activity and liquidity on Uniswap v3



Source: Glassnode.

Project Mariana, a potential TradFi use case for DeFi technology

Launched in November 2022, Project Mariana is a joint initiative between the Switzerland, Singapore, and Eurosystem BIS Innovation Hub Centres, the Bank of France, the Monetary Authority of Singapore, and the Swiss National Bank. It aims to explore the use of blockchain-based AMMs to operate an interbank foreign exchange market based on decentralized trading and settlement, using (currently hypothetical) wholesale central bank digital currencies (CBDCs). Such a use case will not reach the real world for some time, because the relevant countries would first need to decide to issue a CBDC, and second agree to a common technical standard. However, this illustrates the potential for DeFi technology to disrupt traditional financial activities; in particular, more frictional and less cost-effective activities such as cross-border payments.

Decentralized collateralized lending protocols weathered the storm

In a DeFi collateralized lending protocol, users typically borrow a loan (denominated in a stablecoin pegged to the U.S. dollar) against crypto assets pledged as collateral. If the value of the collateral drops such that the loan's loan-to-value (LTV) ratio falls below a certain threshold, the collateral is liquidated to repay the loan. LTV thresholds are set at a level that is intended to allow for the full repayment of a loan through liquidation in a stressed market environment, based on risk parameters for each collateral asset. This mechanism was tested to the extreme through the volatility in crypto asset prices in 2022. Through May and June 2023, the value of the two most common assets pledged as collateral in these protocols--ETH and wrapped bitcoin (WBTC)--dropped by 66% and 52%, respectively. The protocols continued to operate as intended through this collapse in market values, with large amounts liquidated but minimal loan losses and no interruption.

Chart 8

Total daily liquidations on selected DeFi collateralized lending protocols



Sources: Dune, Glassnode.

A favored maxim among DeFi proponents is "the code is the law". In other words, the terms on which collateral may be liquidated are set and enforced by a smart contract; there is no need to seek enforcement of the collateral. This is true in practical terms--a smart contract will execute, there is no dependency on a counterparty to perform its obligations--but remains to be tested in a court of law. The ongoing bankruptcy proceedings involving some of the CeFi entities mentioned in the previous section will be a first opportunity for a U.S. court to opine on such matters. Of course, the benefit of the automatic liquidation of collateral can also be a risk factor. The smart contract will execute automatically and irreversibly; therefore, if it behaves unexpectedly (whether due to a coding error, a circumstance not contemplated in the coding, or a misunderstanding by the user) remediation may be challenging.

There is also a risk that liquidations in DeFi collateralized lending protocols create downward price spirals in crypto assets, particularly if liquidated amounts test the available market liquidity for a given crypto asset. However, the occurrence of such large liquidations, as occurred through the failure of 3AC, are driven primarily by the build-up of leverage and risk management weaknesses at CeFi entities, rather than the technological construct of these protocols.

Other DeFi lending use cases are nascent and exhibited both risks and opportunities

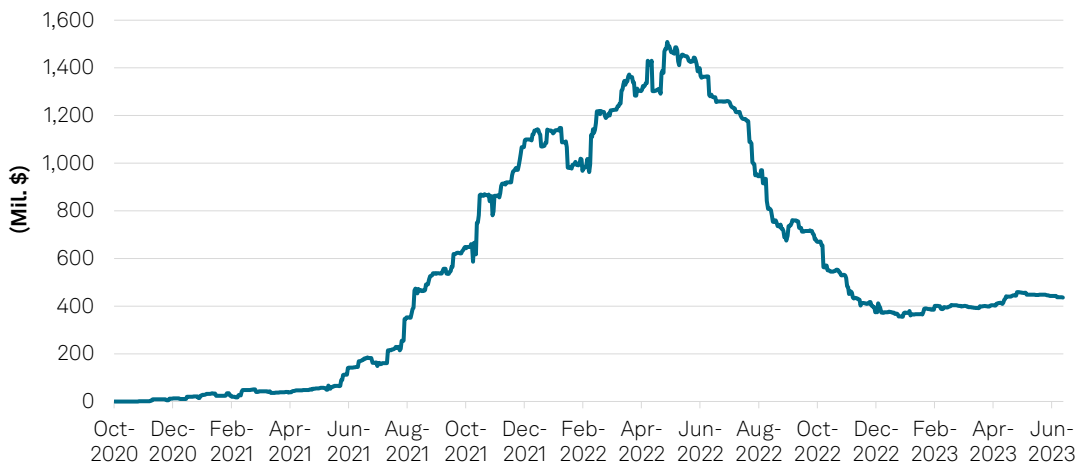
The utility of protocols that lend against crypto collateral is limited, and other lending protocols have emerged that aim to provide uncollateralized loans or loans backed by real world assets. These protocols require some additional reliance on an intermediary to assess borrower credit quality or the value of any collateral; the anonymity of crypto-collateralized lending is not possible. Maple Finance is an example of such a protocol. Loan originators ("pool delegates") set up a pool on the protocol and underwrite the credit quality of borrowers. Each pool set up on the protocol has a different credit risk profile depending on the underwriting standards of the pool delegate; the Maple protocol only provides the underlying smart contract technology. Investors can choose which pool to lend to on the protocol.

The Maple protocol's early adopters focused primarily on short-term lending to crypto-related entities. This led to a significant growth in active loans, followed by a sharp fall when the crypto winter hit. Borrower defaults also led to limited credit losses in some pools. Furthermore, Maple

cut off a major pool delegate, Orthogonal Trading, in December 2022, alleging misrepresentations of the pool delegate's financial position, highlighting the risk profile of participants in a still-immature market. However, the Maple protocol also highlights some opportunities that DeFi can bring to the lending space, particularly in terms of transparency, with real-time information on pool composition and borrower performance.

Chart 9

Active loans value on selected lending protocols*



*Included protocols: Maple, Centrifuge, Credix, TrueFi, Goldfinch. Source: rwa.xyz

Despite DeFi's resilience, key risks continue to inhibit greater adoption

Regulatory risk

The permissionless nature of DeFi protocols on public blockchains--one of the key benefits in the eyes of DeFi natives--is perhaps the main obstacle to institutional engagement. For regulated institutions, it remains impracticable to meet their know-your-client (KYC) and anti-money-laundering (AML) requirements if they were to transact through a protocol where the other side of the transactions could include anyone in the world with an internet connection. For example, in August 2022, U.S. authorities made it illegal in the U.S. to use Tornado Cash, a "crypto-mixing" protocol that is designed to anonymize transactions, alleging that the protocol was used by criminals to launder money. The nature of Tornado Cash means there is a readily identifiable illegitimate use case, which is less apparent for most DeFi protocols. Nonetheless, this highlights the risk that authorities may act against a protocol, which could lead to allegations of illegal activity for any entity that uses that protocol in the relevant jurisdiction.

In the medium term, the development of regulatory frameworks governing DeFi could address uncertainties around regulatory risk and boost institutional adoption. Thus far, regulatory efforts in the crypto space have focused on CeFi. The EU's upcoming MiCA framework provides for the European Commission to produce a report addressing the potential regulation of DeFi activities. Meanwhile, the French regulators Autorite de Controle Prudentiel et de Resolution (ACPR) and Autorite des Marches Financiers (AMF) published consultations on potential approaches to regulating DeFi (see ACPR discussion paper "['Decentralised' or 'disintermediated' finance: What](#)

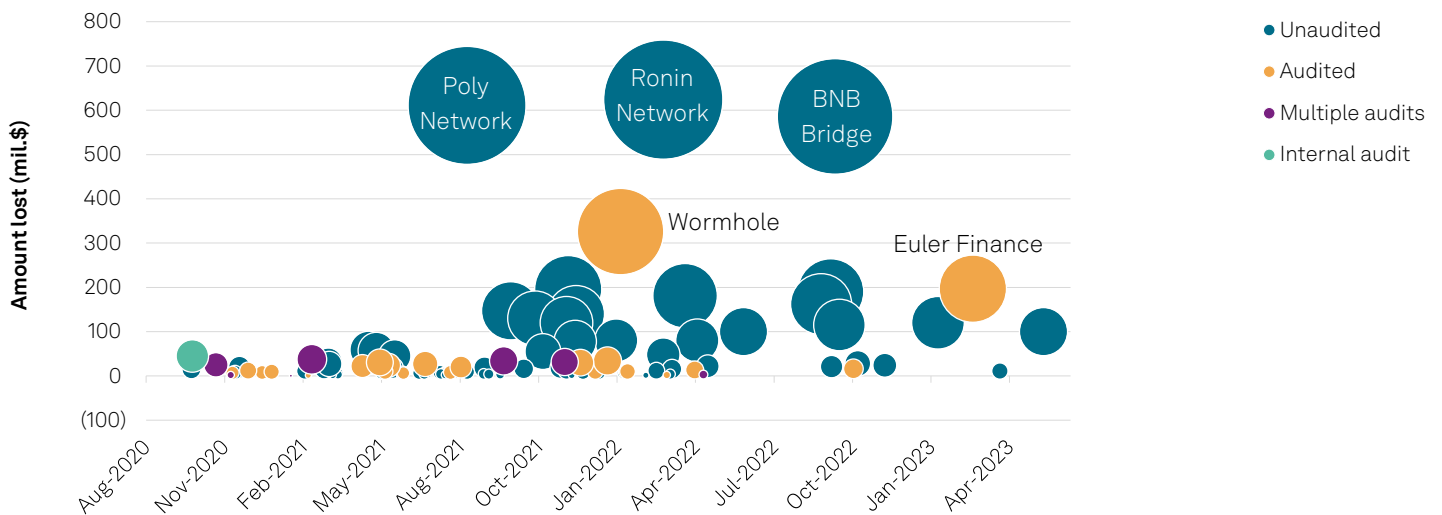
[regulatory response?](#)" published in April 2023, and AMF discussion paper "[Decentralised finance \(DeFi\), trading protocols and governance issues](#)," published in June 2023).

Hacks and exploits

Any weaknesses in the coding of smart contracts can be exploited by hackers. Smart contract audits by reputable auditing firms provide some mitigation, but the short track records and rapid growth of DeFi protocols mean that vulnerabilities may emerge as they scale up and operate in different market environments. A lack of audits has been a significant factor in some of the most significant DeFi protocol hacks and exploits, but audits have not eliminated the risk (see chart). Exploits have persisted in 2023, with one example being the exploit of the Euler Finance protocol in March. Initially about \$200 million was drained by a hacker because of a vulnerability in the smart contract. This episode highlighted both the potential vulnerability of smart contracts, and the benefit of traceability on blockchains, because the hacker was rapidly identified and the funds substantially recovered. It also shone a light on potential contagion risks in DeFi, because other DeFi protocols reportedly had funds tied up in the Euler protocol. Losses were limited on this occasion, but interconnectedness between DeFi protocols can be a risk contagion vector; for example, because protocol treasuries use other protocols to invest or hold other protocols' governance tokens, or because development teams for nascent protocols seek financing through other protocols.

Chart 10

Documented timeline of DeFi protocol exploits and exchange hacks



Bubble size represents the amount lost. Top five DeFi hacks named. Source: rekt.news.

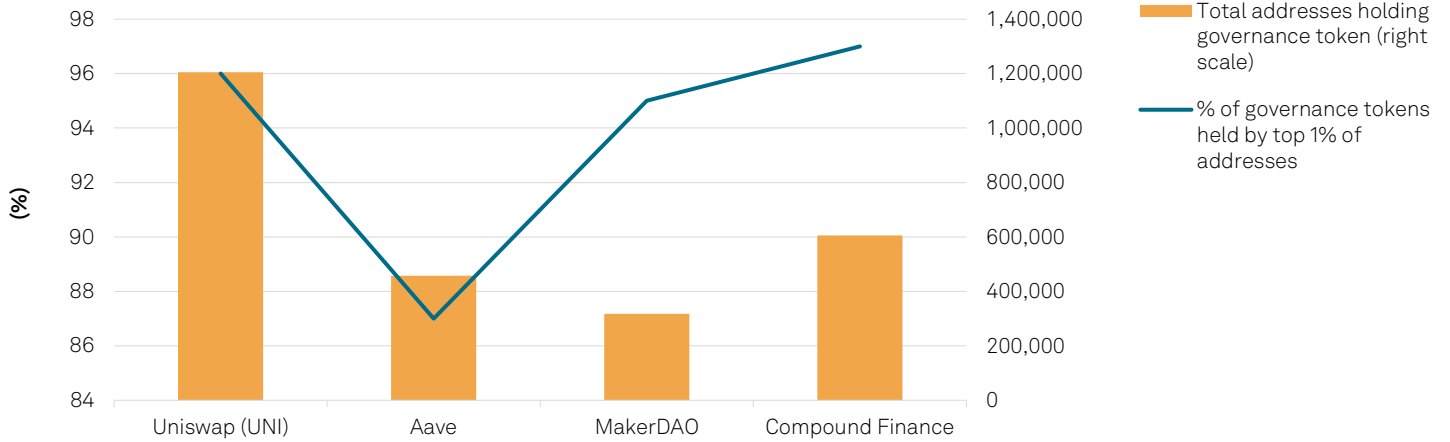
DeFi In Name Only?

DeFi aspires to support a peer-to-peer financial system without any reliance on centralized entities. In practice, DeFi protocols are created by a team of developers, who usually hold significant governance rights, particularly in the early stages of a project. Concentrations in the holdings of governance tokens can persist as a project matures. The chart below shows the concentration in holdings of the outstanding supply of governance tokens for four well-established DeFi protocols. In each case, the top 1% still represents thousands of wallets.

Nonetheless, this does highlight that concentration of governance rights exists and DeFi users need to understand its impact on the future direction of each protocol.

Chart 11

Concentration in holdings of DeFi protocol governance tokens

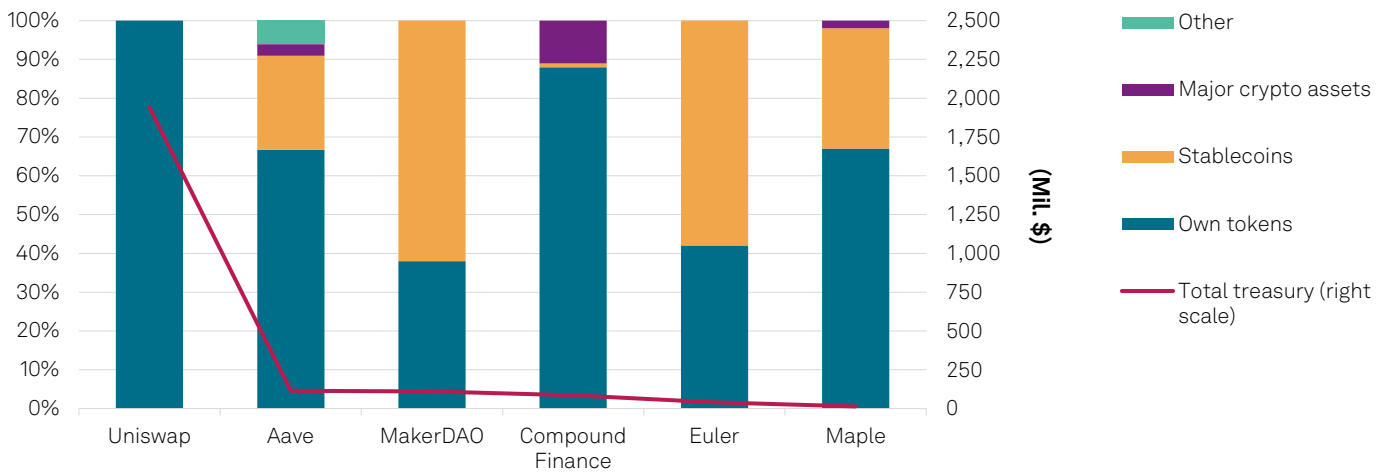


Source: Glassnode.

Furthermore, the treasuries behind these protocols, which provide financial resources to support their operation, often hold significant balances in the protocol's own token (see chart). While these treasuries are usually not the only risk buffer available to users of the protocol, there is a clear vulnerability to a sudden drop in value of the protocol's native token.

Chart 12

Selected DeFi protocols' treasury composition



The Future Of CeFi And DeFi

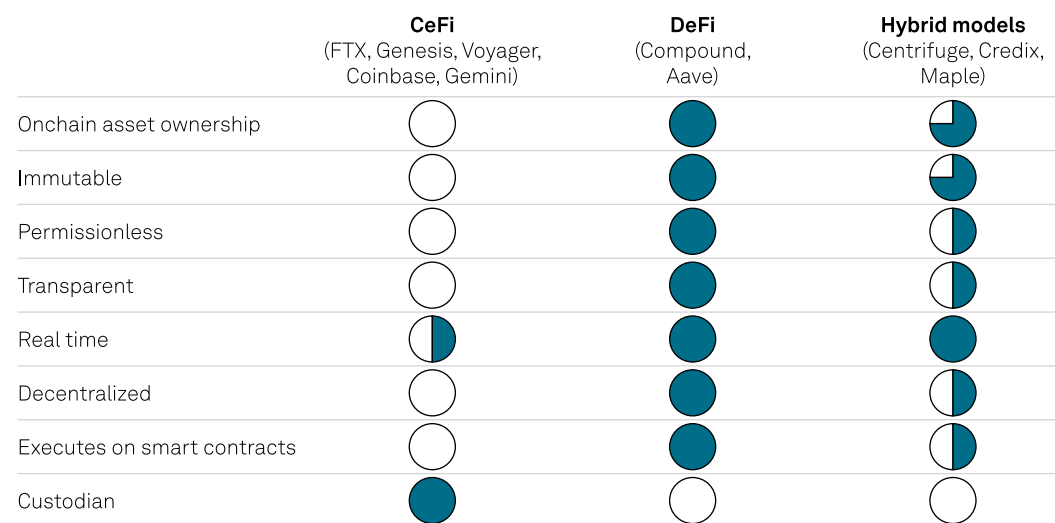
A year into the crypto winter, can crypto innovation still disrupt financial markets and challenge TradFi as it aspires to? Crypto has made very limited progress toward its ambition to meaningfully disrupt financial markets and challenge TradFi. In some ways, its progress mirrors that of driverless cars. The cars themselves exist and there are beneficial use cases, but key elements of the surrounding ecosystem--the roads, passengers, pedestrians, and traffic control--are not yet ready to adopt them. They may allow a system where we no longer need to trust the ability and behavior of other drivers, but would instead need to trust the technology--and ultimately its builders and the legal environment around it. How can crypto innovation progress from here?

CeFi has shown its limitations through serious failures in risk management as well as a focus on allowing customers to ride the wave of crypto asset speculation, rather than make significant use of the underlying crypto technology. The resilience of DeFi protocols has highlighted the technology's opportunities, but future growth depends on some elements of centralization. Key to institutional adoption will be solutions that address KYC/AML obligations. Private blockchains operated by financial institutions have enabled entities across different sectors to issue digital bonds (see "[Digital Bonds: The Disruption Is Underway](#)," published Feb. 27, 2023), and permissioned protocols are emerging that allow the vetting of all transaction participants.

There will remain a need for centralized entities to provide a gateway to DeFi, but this may focus on CeFi entities using crypto technology in a different way; mainly, by supporting on-chain ownership of assets (see chart below.) An example of this is Coinbase's announcement in February 2023 that it will launch Base, its own layer 2 blockchain (a scaling solution that aims to improve transaction throughput) on the Optimism network. While initially Coinbase will act as a centralized transaction sequencer on Base, over time it aims to decentralize sequencing and act mainly as a gateway, bringing KYC'd users to the apps built on the Base chain. Centralized underwriting and permissioned protocols will also be necessary for the growth of lending use cases beyond crypto-collateralized lending. Such protocols are emerging that aim to facilitate securitization (see "[DeFi Protocols For Securitization: A Credit Risk Perspective](#)," published Feb. 7, 2023) and more broadly in the financing of the real economy.

Chart 13

DeFi's future requires some centralized functions



Shaded area represents the degree to which each characteristic is supported. Source: S&P Global Ratings.

Related Research

- [How DeFi's Operational Risks Could Influence Credit Quality](#), June 7, 2023
- [For Coinbase, The SEC's Lawsuit Is Another Regulatory Setback](#), June 7, 2023
- [Europe's Crypto Regulation Lead Could Attract Followers](#), May 5, 2023
- [Stablecoin Depegging Highlights DeFi's Exposure To TradFi Risks](#), March 15, 2023
- [Digital Bonds: The Disruption Is Underway](#), Feb. 27, 2023
- [DeFi Protocols For Securitization: A Credit Risk Perspective](#), Feb. 7, 2023

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