

DeFi deciphered:
Navigating disruption within
financial services

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Top takeaways

- 1.** DeFi is creating seismic shifts in the global financial system. As the crypto and digital asset space rapidly evolves, organizations have the opportunity to harness these technologies and redefine their own business strategies for the future.
- 2.** DeFi, in particular, represents a rapidly growing market capitalized at over \$130 billion as of December 2021. As the DeFi market continues to grow, organizations should seek to better understand the opportunities presented by DeFi technology, as well as the accompanying risks, as they consider forward-looking business strategies and position themselves appropriately in the digital asset economy.
- 3.** Despite the largely undefined and evolving nature of digital assets and the DeFi regulatory environment, recent regulatory issuances and statements reflect increasing attention to this space. As agencies reckon with the expanding rate of retail and institutional adoption, it raises the possibility that future regulatory actions may serve to impact potential opportunities.

DeFi's rapidly evolving disruption

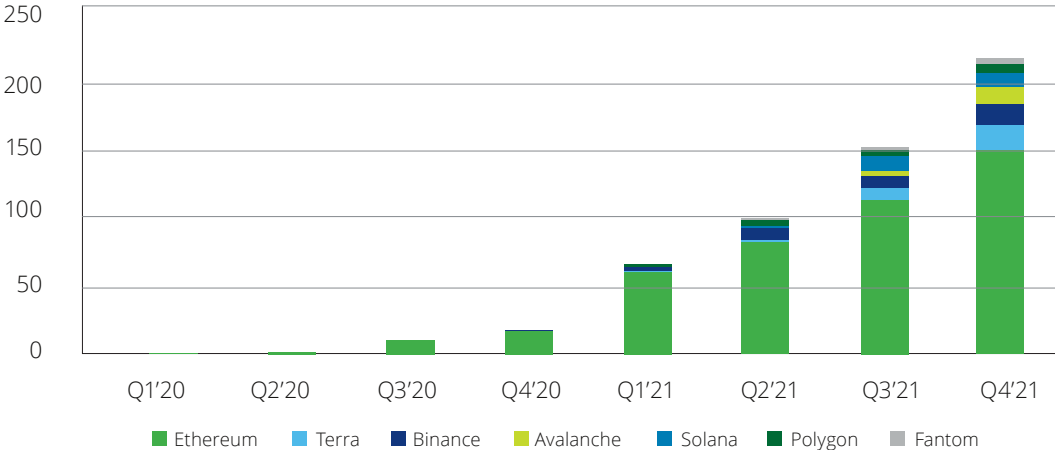
The past year has brought on a disruptive change to the financial services industry.

With the rapid emergence of blockchain technology, digital assets, and decentralized finance (DeFi), traditional financial services face a potentially existential moment that may challenge traditional business models while also presenting new growth opportunities. As the crypto and digital asset space continues to evolve rapidly, organizations have a chance to harness these emerging technologies and redefine their own business strategies into the future.

As the digital ecosystem continues to grow, adoption of these emerging technologies has become a prevalent theme within both legacy financial institutions as well as nontraditional entrants.¹

While the topics of blockchain and crypto continue to have a wide-ranging influence over the zeitgeist, it is perhaps DeFi that represents the most significant disruptive force on the global financial system. The technologies and opportunities are still unfolding, but the foundation for DeFi has been established and continues to rapidly evolve. Amid such seismic shifts, organizations will need to tailor an approach that considers the risks involved as well as the opportunities related to their future business strategy.

Figure 1: DeFi - Total value(USD) of assets locked in smart contract platforms (\$billion)



Defining DeFi

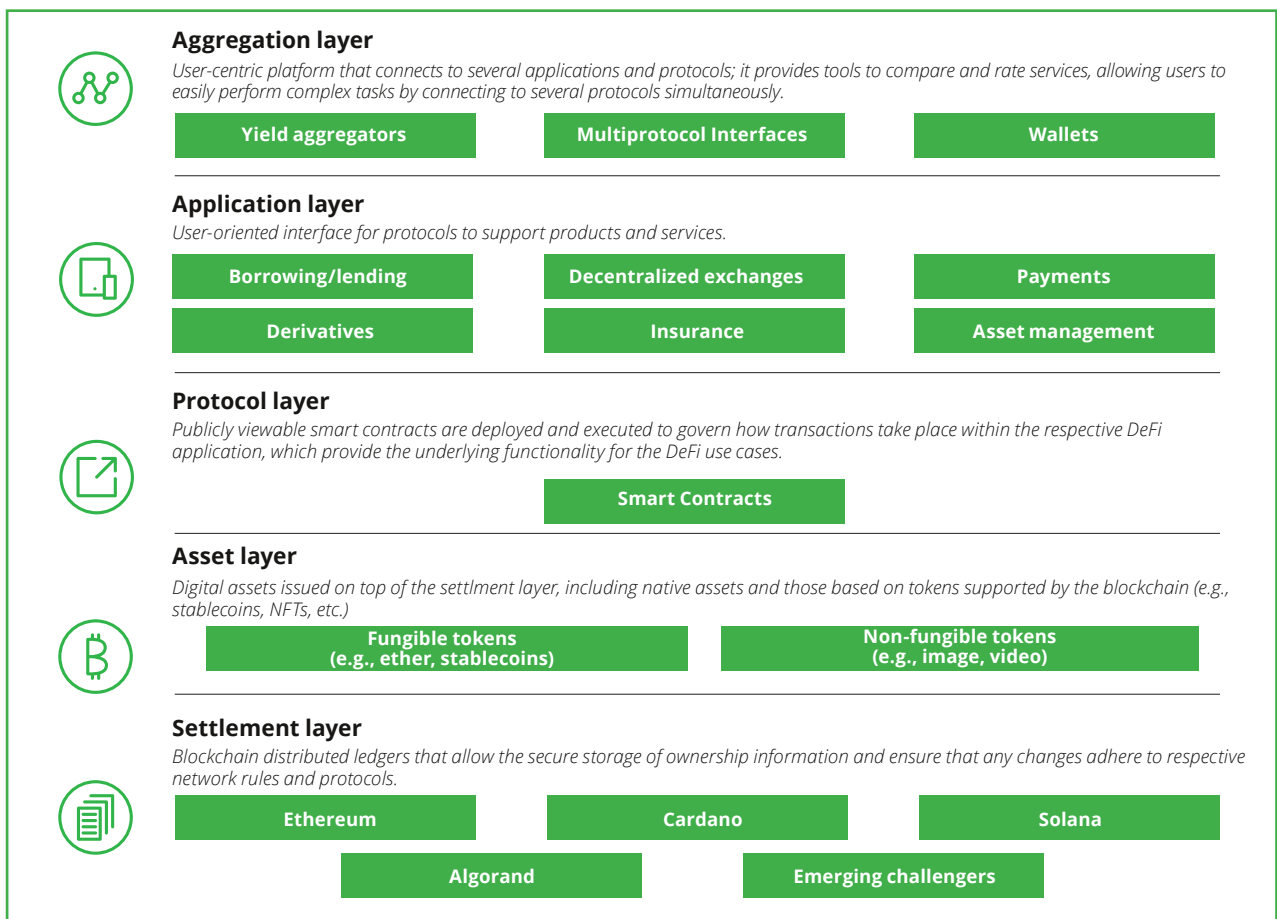
While there is no commonly accepted definition of DeFi, it is considered a collective term for financial services built upon the decentralized foundations of blockchain technology. It is an emerging and evolving area in the broader digital asset, crypto, and blockchain space, with a goal of enabling financial services without reliance on central financial intermediaries and traditional financial services institutions, instead replicating some financial services in a potentially open, decentralized (no central authority), and transparent way. DeFi utilizes decentralized applications² (“dapps”), a blockchain-based infrastructure, and an open, permissionless, and often interoperable protocol stack built on public smart contract³ platforms to provide financial services.⁴ This architecture allows for transactions to be executed in a secure and

verifiable way, with agreements enforced by code and legitimate changes existing on a public blockchain. The result is that DeFi allows for an immutable and highly accessible financial system with unprecedented transparency, equal access rights, and little need for intermediaries such as central clearing houses or escrow services.

The DeFi infrastructure, built upon a blockchain with multiple layers (see Figure 2), is ultimately enabled by smart contracts, which form the foundation for the rule set and governance protocols and applications that drive DeFi. These layers create an open, permissionless, highly composable infrastructure allowing innovation and growth opportunities in both the institutional and retail sector.

Figure 2: DeFi stack

This figure provides an indicative view of DeFi architectural elements, focusing on the various on-chain components. It is not intended as a complete representation of all technological or off-chain DeFi capabilities (e.g., the Internet, data analysis tools).





Smart contracts

Smart contracts are computerized transaction protocols that automatically execute the terms of a contract, essentially making it self-executing. While a typical contract uses language to establish legally relevant events or actions according to the terms of the agreement, a smart contract establishes events through lines of code that run when predetermined conditions are met. The code allows the execution to be carried out among parties without the need for a central authority, legal system, or external enforcement mechanism. These predetermined conditions and supporting programs are stored on a distributed, decentralized blockchain and executed in parallel across a network designed to validate and verify the correct execution of any operation, which ensures that transactions are trackable and irreversible.

While processing speeds of smart contracts are still somewhat inefficient compared to traditional centralized computing, smart contracts also offer several advantages. For example, smart contracts provide a high degree of trust, as they are always executed according to their specified terms and allow any individual to verify changes independently. Furthermore, where traditional server-based applications do not allow the user to observe the application's internal logic or to control the execution environment, smart contracts allow the user to do both. When implemented securely, smart contracts are highly transparent and minimize the risk of manipulation and arbitrary intervention. They are flexible, as they allow the programmer the ability to develop a tailored instruction set, through code, tailored to fit the specific desired outcome. They can also store and manage crypto assets and thereby assume the role of a custodian, with entirely customizable criteria for how, when, and to whom these assets can be released. This allows for a large variety of novel applications.

Distinguishing DeFi

Blockchain and crypto, two foundational components of DeFi, are already disrupting the financial services industry in profound ways. Traditional finance (“TradFi”), which refers to conventional banks and other financial institutions that are regulated by various national agencies and that work with central bank-issued fiat currency, has started to evolve. While TradFi remains the foundation of the global financial system, and provides overall stability, it has already started to evolve as a result of digital advancements. For example, blockchain and crypto innovations have given way to centralized finance (“CeFi”), which uses blockchain to serve customers while still operating under the control of various regulatory governing bodies. CeFi systems are regulated like TradFi, with centralized governing bodies maintaining the responsibility for safeguarding transactions. Although its

services may mirror or overlap with those of TradFi and CeFi, DeFi operates in a largely decentralized manner. While varying degrees of decentralization exist, DeFi’s peer-to-peer structure limits the ability of any single stakeholder to make changes to the application and reduces intermediaries within the transaction. As DeFi is now serving customers in areas that have been historically dominated by TradFi, such as borrowing, lending, and exchanges, its impact and influence stands to continue to grow, subject to supervisory limitations.

A high-level summary of differences between TradFi, CeFi, and DeFi is given in Figure 3.⁵

- High alignment with defined factors
- Moderate alignment with defined factors
- Low alignment with defined factors

Figure 3: Summary of differences between TradFi, CeFi, and DeFi

| | TradFi | CeFi | DeFi |
|--|---|--|---|
| Accessibility The ease with which people can access and use the type of financial service. | Operates via local/regional/national branches and depends on intermediaries to provide services | Supports global reach and minimal or no intermediaries' requirements to provide 24/7 services | Supports global reach and minimal or no intermediaries' requirements to provide 24/7 services |
| Compliance The degree to which the offered service is impacted by regulatory requirements and the extent to which it operates within the regulatory perimeter. | High compliance expectations including licensing requirements from primary regulatory agencies | Must acquire licenses like BitLicense, Virtual Money Transmitter License, etc. and are more regulated than DeFi | DeFi entities have less regulations currently but face the highest regulatory uncertainty |
| Tokenization features The extent to which tangible and non-tangible assets can be converted to blockchain tokens. | Tokenization is limited to securities only | Highly prevalent and is seen in forms like utility tokens, governance tokens, stablecoins, NFTs, etc. | Highly prevalent and is seen in forms like utility tokens, governance tokens, stablecoins, NFTs, etc. |
| Liquidity The ability to demonstrate sufficient liquidity with a robust pricing mechanism, liquidity forecasting, and contingency funding plan. | Most of the financial markets (i.e., stock, bond, and currency markets) see high liquidity | Exchanges for cryptocurrencies are liquid, even though not as liquid as traditional financial markets | Due to its emerging nature as well as limited industry-adopted and time-tested mechanisms, DeFi applications often have a lesser ability to reliably demonstrate sufficient liquidity |
| Governance The strength of governance structures including presence of board, committees, and defined protocols for intercompany services and operations. | Well-defined traditional governance structures are seen with board, management, and staff along with intermediaries | Majority decision-making rests with stakeholders | Governance may exist in the form of tokens that enable decision-making through voting rights; however, it is largely decentralized with a risk of asymmetrical concentration. |
| Transparency The extent of availability and symmetry of information available in the type of financial service. | Periodic financial information is publicly available | CeFi has an opaque system where a centralized entity keeps most of the information with minimal publicly available information | All transactional data is publicly available making DeFi highly transparent |
| Smart contracts The use of smart contracts in providing services to customers. | No or very limited use of smart contracts | Utilize smart contracts to a limited extent in certain areas | Extensive use of smart contracts, the coding of which controls how the DeFi application works |

Real-world applications of DeFi

While DeFi replicates existing aspects of financial services, it does so through blockchain-enabled technology and automation, offering a wide variety of modified applications, as illustrated in the diagram below.

Market-making

DeFi applications can be used to provide market-making functions. The trade happens against a liquidity pool of digital assets maintained by the application rather than potential counterparties. Smart contracts can be used to monitor the liquidity of the digital assets being traded and provide pricing accordingly.

Use case: Development of a liquidity pool for a certain token, which can be automatically traded through an algorithm versus the traditional order book.

Crypto "savings/deposits"

Crypto assets owned by individuals can be added to liquidity pools maintained by DeFi applications to earn a yield. Smart contracts record the addition of an asset to the liquidity pool, managing the duration of such assets and the corresponding principal and yield repayment in due time.

Use case: Individual maintains crypto assets in DeFi application wallet, which earn a yield.

Custody

While some applications allow users to self-custody digital assets, others provide custodial services within the application, placing control over asset management within the smart contracts governing the application itself.

Use case: Users store digital assets within the DeFi application, mitigating the risk of private keys being lost, stolen, or otherwise compromised.

Trading

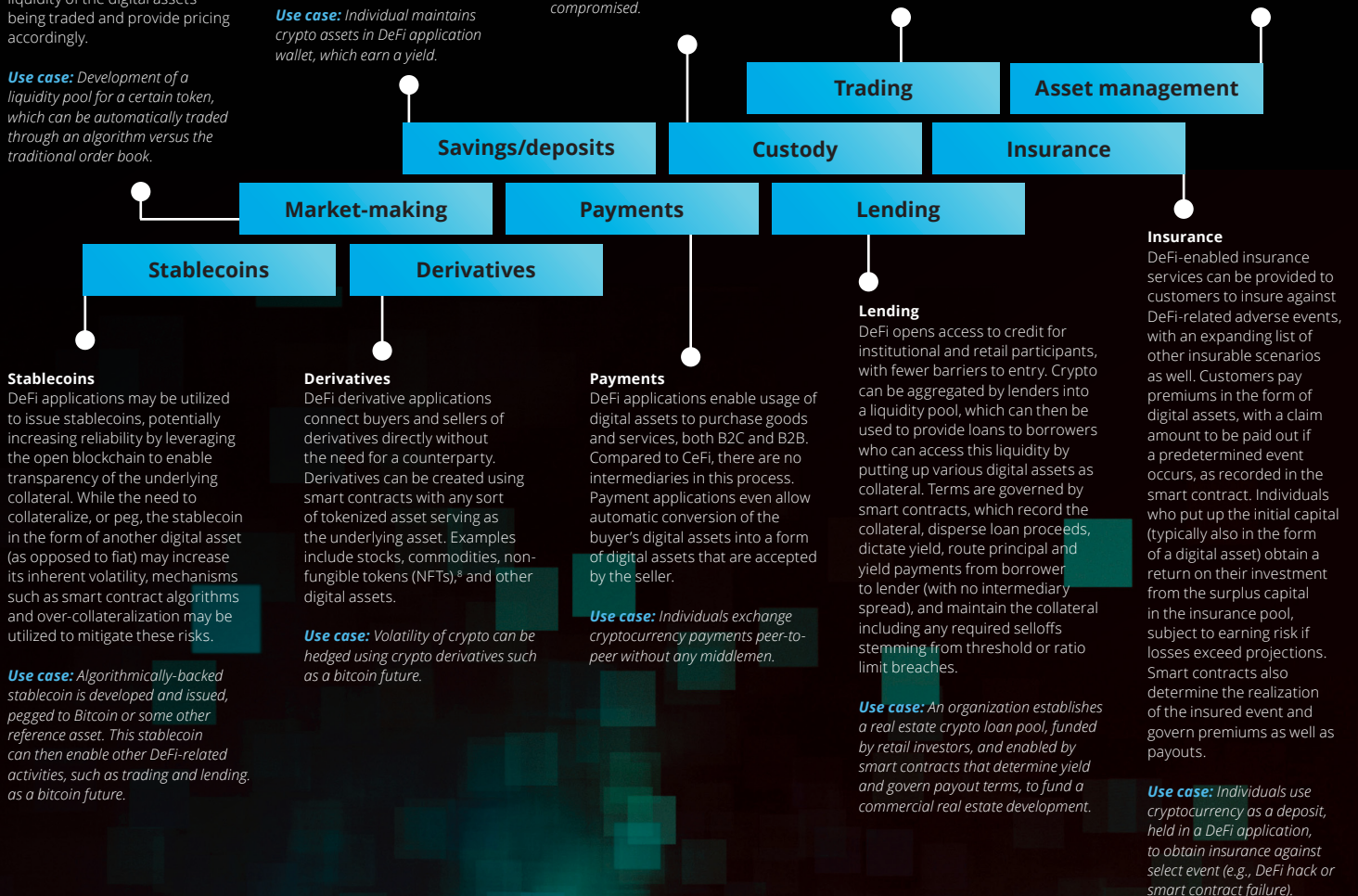
DeFi exchanges are accessed by users with noncustodial digital wallets.⁷ Pricing is dynamic based on the supply and demand of the digital assets being traded. Smart contracts manage the exchange of one digital asset for another without the need for a counterparty.

Use case: Trade tokenized securities in an open marketplace, facilitated by smart contracts, without the need to clear trades through a central authority.

Asset management

DeFi asset management protocols are implemented using smart contracts that pool crypto deposited by individuals into a portfolio of digital assets. It could also include tokens, which track the price movements of external assets like stocks and real estate that depend on oracles⁶ for price information. Compared to traditional asset management, this promises greater transparency and efficiency.

Use case: Asset manager facilitates tokenization of commercial real estate property and trades as a fractionalized token to obtain access to additional liquidity previously unavailable to them.



Stablecoins

DeFi applications may be utilized to issue stablecoins, potentially increasing reliability by leveraging the open blockchain to enable transparency of the underlying collateral. While the need to collateralize, or peg, the stablecoin in the form of another digital asset (as opposed to fiat) may increase its inherent volatility, mechanisms such as smart contract algorithms and over-collateralization may be utilized to mitigate these risks.

Use case: Algorithmically-backed stablecoin is developed and issued, pegged to Bitcoin or some other reference asset. This stablecoin can then enable other DeFi-related activities, such as trading and lending, as a bitcoin future.

Derivatives

DeFi derivative applications connect buyers and sellers of derivatives directly without the need for a counterparty. Derivatives can be created using smart contracts with any sort of tokenized asset serving as the underlying asset. Examples include stocks, commodities, non-fungible tokens (NFTs),⁸ and other digital assets.

Use case: Volatility of crypto can be hedged using crypto derivatives such as a bitcoin future.

Payments

DeFi applications enable usage of digital assets to purchase goods and services, both B2C and B2B. Compared to CeFi, there are no intermediaries in this process. Payment applications even allow automatic conversion of the buyer's digital assets into a form of digital assets that are accepted by the seller.

Use case: Individuals exchange cryptocurrency payments peer-to-peer without any middlemen.

Trading

Custody

Asset management

Insurance

Market-making

Payments

Lending

Stablecoins

Derivatives

Lending

DeFi opens access to credit for institutional and retail participants, with fewer barriers to entry. Crypto can be aggregated by lenders into a liquidity pool, which can then be used to provide loans to borrowers who can access this liquidity by putting up various digital assets as collateral. Terms are governed by smart contracts, which record the collateral, disperse loan proceeds, dictate yield, route principal and yield payments from borrower to lender (with no intermediary spread), and maintain the collateral including any required selloffs stemming from threshold or ratio limit breaches.

Use case: An organization establishes a real estate crypto loan pool, funded by retail investors, and enabled by smart contracts that determine yield and govern payout terms, to fund a commercial real estate development.

Insurance

DeFi-enabled insurance services can be provided to customers to insure against DeFi-related adverse events, with an expanding list of other insurable scenarios as well. Customers pay premiums in the form of digital assets, with a claim amount to be paid out if a predetermined event occurs, as recorded in the smart contract. Individuals who put up the initial capital (typically also in the form of a digital asset) obtain a return on their investment from the surplus capital in the insurance pool, subject to earning risk if losses exceed projections. Smart contracts also determine the realization of the insured event and govern premiums as well as payouts.

Use case: Individuals use cryptocurrency as a deposit, held in a DeFi application, to obtain insurance against select event (e.g., DeFi hack or smart contract failure).

DeFi opportunities and risks

Opportunities

DeFi replicates existing financial services found in the TradFi system, including core banking, lending, and trading activities, and implements these services through innovative technology and automation. The decentralized peer-to-peer model provides unique opportunities for retail and institutional participants to unbundle traditional finance, retain control over their own assets, and innovate to tailor services without the need of any intermediaries. As the financial industry continues to adopt DeFi-related solutions, organizations have the opportunity to harness DeFi's various unique attributes. While the extent to which DeFi will disrupt TradFi services remains to be seen, organizations may want to consider the ways in which its applications can potentially enable existing as well as future business models.

Figure 4: Financial and non-financial opportunities with DeFi



Process simplification: DeFi may reduce reliance on intermediaries, which are currently required to maintain the trust between the participants in a financial transaction, and may enable transactions to be directly settled between the participants. By reducing the number of parties involved and streamlining operations, efficiency of financial processes can be increased.

Process automation: Smart contracts allow organizations to automate processes and services through a self-executing protocol layer. This functionality provides organizations with the ability to scale certain services previously dependent on human execution (e.g., loan approvals, yield payments, etc.), and better tailor services to meet the needs of customers through the flexibility of the source code.

Reduced transaction costs: The simplified interaction model between transaction participants (e.g., a borrower and a lender), managed by the underlying protocols embedded in the smart contracts, may reduce transaction costs for the participants. This model may help financial institutions lower the cost of service, offering a competitive advantage in acquiring customers. Rates of return may be more attractive than with traditional banks,⁹ and the barrier to entry (e.g., a borrower's credit rating) to borrow is often lower compared with that of a traditional system. While transacting often requires participants to pay a fee in order to transact on a network, this "gas fee" is often lower than common fees and other access requirements imposed by TradFi institutions today.

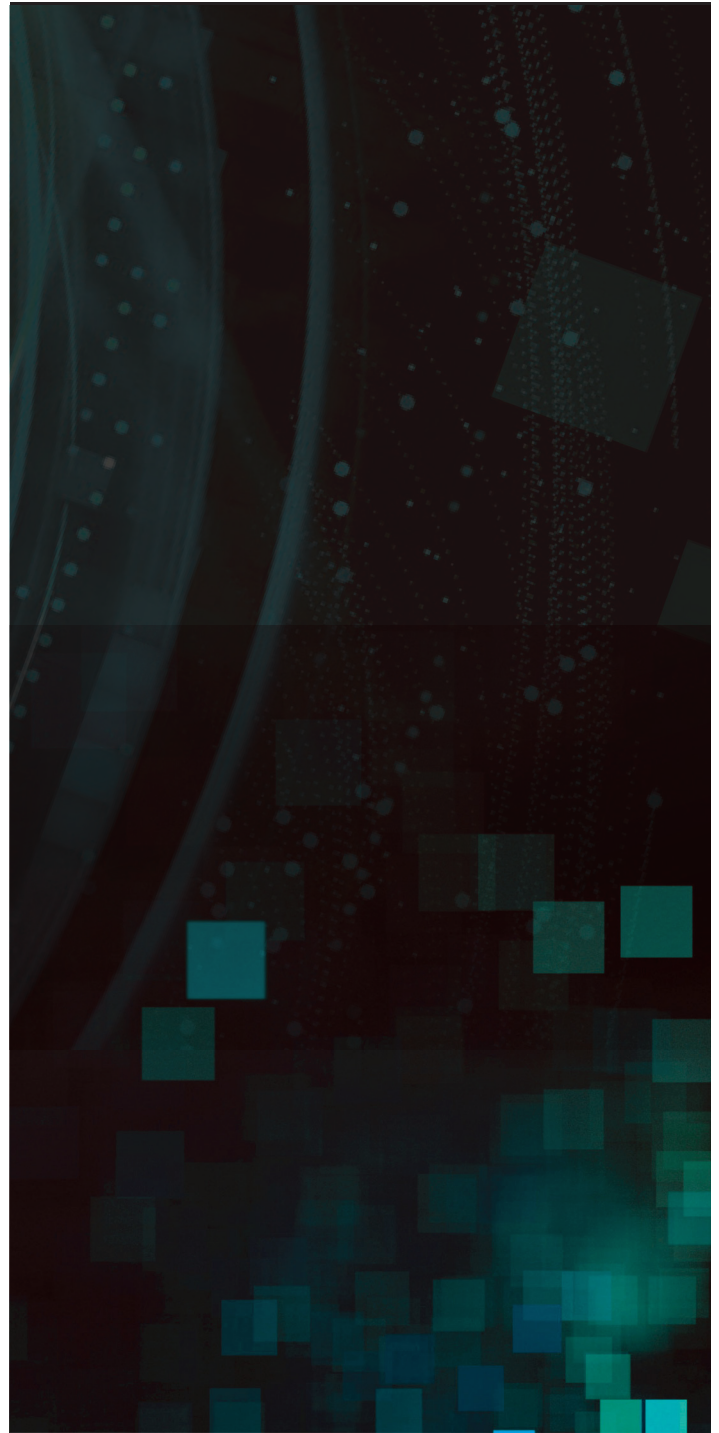
Increased control: Assets are stored in accounts (i.e., wallets) that are un-hosted or self-hosted, allowing users greater autonomy, the ability to control their own assets, and direct interaction with a digital currency system instead of through an intermediary. While DeFi increases organizational security mechanisms, cyberthreats remain as a material risk.

Transparency: DeFi's decentralized autonomous structure (DAO)¹⁰ enhances transparency by ensuring that the underlying blockchain remains public, while private wallets provide users with full control of their money via nonpublic, privately held "keys." Increased transparency may allow financial institutions to enhance their user experience and offer a more tailored suite of information and products to customers.

Faster settlements: Blockchain technology enables "instant" real-time settlement, offering the ability to eliminate settlement waiting times. In many traditional forms, settlement can take up to three days despite the actual clearing transaction only taking a few seconds. DeFi applications can drastically decrease the time for settlement, with an objective of taking the settlement time from T+1 to T+0 (i.e., instantaneous).

Liquidity: DeFi may promote financial inclusion, with extensive reach to the underbanked or unbanked population through permissionless and borderless access to services. This increased global connectivity, coupled with the ability to tailor services to anyone with an internet connection, could also allow institutions to access liquidity pools not previously available. It could also potentially serve to streamline credit verification and loan approval. Tokenization would further allow organizations to trade across a spectrum of assets (e.g., real-world assets), introducing the flexibility to meet market needs and allowing organizations to unlock capital and enable the ability to generate additional revenue.

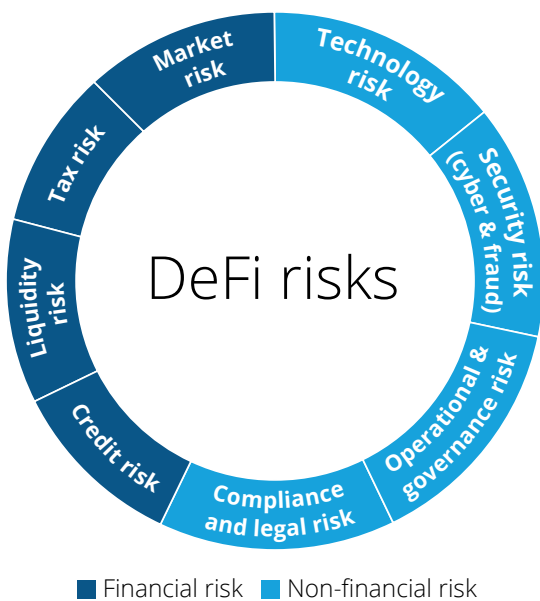
Innovation enablement: DeFi's open, programmable, and permissionless architecture provides participants with an ability to view and verify protocols and "fork code" (i.e., take source code and develop an independent use over the top), providing an opportunity to create alternative and derivative services and products. Access to the source code for DeFi protocols allows users to compose various components to create financial services and instruments that meet their specific need.



Risks and challenges

The benefits presented by DeFi also introduce a higher degree of inherent risk. By prioritizing decentralization, applications are susceptible to certain risks that would typically be mitigated by a centralized entity. Additionally, reliance on programming risk management into smart contracts through logic, code, and algorithms has limits, as radical transparency and trust minimization make DeFi vulnerable to malicious behavior and an inability to react to unanticipated risks/outcomes. While DeFi provides numerous potential advantages for its customers, it is also important to understand its various accompanying risks.

Figure 5: Evolving risk issues related to DeFi



Technology risk: The technological complexity and the immaturity of DeFi increases its vulnerabilities. DeFi's blockchain foundation makes it susceptible to failures or attacks on the underlying network, which become magnified as these networks scale at a rapid pace without the commensurate technological safeguards and redundancies in place. This also presents real-time processing challenges due to the complex nature of these transactions and blockchain's physical capacity limit. Additionally, reliance on smart contracts exposes DeFi applications to software malfunctions and programming flaws, which have the ability to create compounding risks on a stacked network supporting a significant amount of assets across many users. This is further exacerbated by frequent reliance on oracles for external data (without the commensurate third-party risk management in place), with any inaccuracies in this data potentially resulting in broader issues for the application itself. In fact, the complexity required to enable the effective execution of DeFi applications presents it with a commensurate level of risk, which is often operating in an untested and unregulated environment. The lack of standardization, or regulatory-driven/industry-adopted quality control mechanisms, poses significant uncertainties within the custody and settlement process. This risk is increased by the fact that code may be developed by individuals who lack the expertise to employ robust development practices or who are not otherwise incentivized to embed robust risk management mechanisms.

Security risk (i.e., cybersecurity and fraud): Security risks from DeFi arrangements include fraud, misappropriation, conflicts of interest, money laundering, and terrorist financing as well as market integrity risks resulting from manipulative or deceptive trading activity.¹¹ Smart contracts, which are self-executing and developed manually, are susceptible to coding errors that have a potential for misuse by users on an open-source network.¹² Weaknesses in the smart contract source code may permit malicious actors to exploit the application by syphoning assets from the network unilaterally. Additionally, private keys may be susceptible to mismanagement or theft if the appropriate processes for recovery and controls for security are not established. While security risk may be mitigated through preemptive audits of smart contract models (including independent third parties) and multiple layers of coding review, which are becoming industry best practices, there still remains a general lack of regulatory oversight and time-tested control mechanisms to provide sufficient safeguards.

Operational and governance risk: DeFi-related operational risks stem from the potential dependence and overreliance on the digital asset trading platforms or on the digital assets themselves, as well as unique aspects of distributed ledger-based arrangements including governance, interoperability, scalability, protocol and smart contract vulnerabilities, and cybersecurity.¹³ These arrangements also pose risks related to market abuse and information asymmetries resulting from inaccurate, limited, or nonstandard information (e.g., trading and price reporting) that could adversely affect users.¹⁴ These risks are further exacerbated by a dependency on founders or protocol owners, whose departure might negatively impact the application.

While publicly available code theoretically makes the mechanics available to all users, the reality is that many retail customers would not have the requisite knowledge or resources to effectively interpret the code and assess any inherent risk or impropriety, leading to the potential abuse of these customers by insiders or sophisticated players.¹⁵ The lack of a single point of failure and an identifiable actor also means that there is no clear point of accountability or redress related to problems that arise. In fact, the lack of the centralized management, typically present within TradFi institutions, limits corresponding governance mechanisms, imbuing DeFi services and products with an inherent degree of riskiness and lack of accountability. Governance mechanisms, which may be programmed into the respective DeFi service, often introduce a degree of imprecision and uncertainty. Although certain governance capabilities may be enabled through DAOs, such as governance tokens that provide voting rights on certain governance-related decisions, the inherent structure of DeFi also provides certain users or programmers with asymmetrical control over the system.¹⁶

While consensus-driven mechanisms could serve as a safeguard, the absence of robust control and governance mechanisms could lead governance token holders themselves to engage in fraud, especially if a large number of these tokens became concentrated among a small set of individuals (including the initial developers), which could then lead to manipulation of the blockchain or smart contract for financial gain. The result is democratization and effective governance existing on different points of a DeFi spectrum, inhibiting both from fully being achieved.

Compliance and legal risk: Regulatory uncertainty is one of the most significant challenges facing the digital asset space, as the inherent riskiness of DeFi is compounded by an absence of a comprehensive regulatory framework. The regulatory environment,

which is built around the existence of single organizations, intermediaries, and jurisdictions is ill-equipped to oversee a disintermediated, globalized market structure. Not only does the decentralized nature of DeFi make it difficult to regulate any single entity, it also makes it difficult to identify responsible parties or enforce regulatory actions. As such, DeFi may be used to bypass legal or regulatory obligations and *de facto* increase the possibility of nefarious activity. This is especially true with fraud, market manipulation, and financial crime regulations (such as BSA/AML, which is built around Know Your Customer requirements and activity monitoring), the monitoring and detection of which is limited by the pseudonymous users and natively digital assets.¹⁷ The absence of mandatory or standard disclosure requirements in DeFi applications further exacerbates these existing risks.¹⁸ Increased supervisory scrutiny, tailored to address the DeFi system, may eventually address some of these risks; however, the nuance involved with retrofitting legacy regulation to an emerging space may prove ineffective, at least in the near term.

Financial risk: While financial risks are typically managed through various mechanisms contained within TradFi and CeFi, driven by government regulatory agencies, the current lack of a generally applicable regulatory regime for DeFi (laws; regulations; regulatory agencies with interpretive, supervision, examination, and enforcement authority) exposes DeFi applications to a higher degree of financial risks. As DeFi continues to grow, the risks presented could potentially pose threats that could destabilize the financial system as a whole. The key financial risks driving such undesired outcomes are credit risk, liquidity risk, market risk, and tax risk.¹⁹

- **Credit risk:** A lack of traditional underwriting protocols generally infuses DeFi with a high credit risk profile. The anonymity of a DeFi network makes it difficult to adequately assess risk, conduct due diligence, determine creditworthiness, and calibrate appropriate interest rates of borrowers as well as pursue recourse beyond the collateral provided. An ease of credit creation and volatility of underlying digital assets also leads to a higher risk of under-collateralization while simultaneously inhibiting margin call processes to account for any drop in collateral. While these risks can be mitigated through over-collateralization requirements, this approach fails to adequately account for the root cause of the issue (e.g., lack of credit underwriting regarding or recourse against the borrower) and is often difficult to effectively scale across a portfolio.

- **Liquidity risk:** With no centralized exchange or counterparty in place, DeFi services often rely on incentivizing market-makers to liquidate undercollateralized loans. While these mechanisms are often baked into the structure of the DeFi program, reliance on predetermined governance logic and programmatic design limits the ability of DeFi applications to respond to unanticipated market conditions or consumer behavior. This may leave original counterparties and liquidity providers with unanticipated default risk stemming from an inability to meet their own liquidity obligations. The decentralized nature of these applications also increases the risk of an asset-liability mismatch, which would typically be managed in TradFi through intermediaries. This is further compounded by the lack of controls in place around utilizing the same collateral across multiple transactions, increasing leverage, and compounding the potential for a liquidity crisis during adverse events. This also increases potential exposure to flash loans,²⁰ creating artificial liquidity and enabling manipulation of pricing, which is further exacerbated by a lack of shock absorbers, such as banks, which could otherwise provide liquidity in times of stress. While these risks can be mitigated through dynamically controlling the flow of “lender deposits” and managing loan portfolios through algorithms and smart contracts, these are often inherently imperfect solutions.
- **Market risk:** DeFi’s inherent structure increases the possibility of various market abuses, whether by creators of DeFi protocols, operators of exchanges, or other manipulators. The speculative nature of crypto has subjected DeFi to greater volatility, as sudden drops in digital asset values may have an asymmetrical impact on DeFi applications (e.g., rapid selling of DeFi tokens could cause a decline in the value of those tokens). Additionally, the pseudonymity of trade and smart contract owners makes it difficult to identify sources of market manipulation or incorrect pricing.²¹ DeFi may also be susceptible to excessive leverage facilitated by the use of cryptocurrencies or stablecoins as collateral on DeFi trading platforms (which may be unregulated, or may be operating out of compliance with potentially applicable regulatory regimes).²² While over-collateralization may help mitigate market risk to an extent for some DeFi applications such as lending, the system as a whole is not currently structured to cope with sudden price shocks.
- **Tax risk:** There remains little guidance on the taxation of digital assets and even less guidance on the implications of transactions using DeFi protocols. This requires users to analyze each leg of the transaction to determine which may be a recognition (taxable) event for tax purposes. Additionally, with its varied architecture and lack of any legal agreements, DeFi users are relegated to having to analyze the rules set forth in the code in determining tax treatment. There also remains uncertainty around the character and sourcing of the yield, as well as the timing at which the yield is recognized into revenue. The timing of revenue recognition for tax purposes may also dictate the amount of revenue to recognize given the volatile nature of the valuations of digital assets.



Regulatory environment

Regulators have prioritized DeFi as one of their key areas of focus, given its unique set of risks for both institutional and retail organizations. With a vested interest in the protection of investors/consumers, market efficiency and integrity, capital formation, financial inclusion, prevention of illicit activity, safety and soundness, and financial stability, financial industry regulatory involvement remains an inevitability. Regulatory challenges facing DeFi may appear insurmountable given its decentralized nature, which is designed to avoid central oversight and rulemaking; nevertheless, its inherent attributes (e.g., existence of centralized application developers) and links with the traditional financial system (e.g., conversions of crypto into fiat) may also provide a natural entry point for regulation. While regulatory guidance has been largely limited to date, agencies are starting to foreshadow a more active engagement in this space.²³

The SEC's recent announcement that it was defining certain crypto borrowing services as a security brings that activity directly within the agency's remit.²⁴ Multiple state attorneys general are also making similar arguments to bring crypto lending platforms under their purview.²⁵ To further highlight its focus, the SEC has started investigating certain decentralized exchanges.²⁶ SEC Commissioner Caroline A. Crenshaw has also urged DeFi development teams to collaborate with the SEC to identify appropriate product jurisdiction and determine how new technologies may be integrated into the existing regulatory regime.²⁷

The CFTC has also recently stressed the riskiness of DeFi applications, highlighting the absence of legal protections and the potential illegality of unlicensed DeFi markets.²⁸ Meanwhile, the OCC has issued its own warnings, comparing crypto and DeFi to the gold rush that led to the 2008 financial crisis.²⁹ In alignment with its third-party risk management guidance, the OCC also plans to increase its focus on the banks that provide services to large fintechs and facilitate synthetic banking outside of the bank regulatory perimeter.³⁰ Other federal authorities could also find themselves with jurisdiction over aspects of DeFi, including the Department of Justice, the Financial Criminal Enforcement Network, the Internal Revenue Service, and the Commodity Futures Trading Commission, and various state authorities.³¹ Perhaps most notably, President Biden's "Executive Order on Ensuring Responsible Development of Digital Assets" served to further legitimize the asset class while simultaneously bringing it to the forefront of the US federal government agenda, setting into motion a series of regulatory activities with both near- and long-term implications for the industry.³²

Foreign supervisors, such as the FSB, are also taking note, warning of the potentially negative consequences that DeFi may have on the functioning of and confidence in the broader financial system.³³ Even nongovernmental organizations have become involved, with the Financial Action Task Force (FATF) updating its guidance to Virtual Assets and Virtual Asset Service Providers, addressing DeFi considerations for the first time and providing some considerations around arrangements that may fall under the FATF definition.³⁴ As regulators, watchdog groups, and international organizations look to maintain market trust, fairness, and transparency to manage the DeFi risks, they will likely focus their attention on certain existing regulatory challenges faced by the ecosystem participants, including the following themes:

- The lack of regulatory clarity poses risk in defining timely regulatory responses to DeFi.
- Certain aspects of DeFi arrangements, such as the absence of intermediaries and absence of centralized governance mechanisms, create challenges in conducting regulatory assessments based on accountability, and thus delay regulatory scrutiny.
- Uncertainty in roles of various regulatory bodies in regulating DeFi, driven by the complexity of the defining products and treatment of instruments while reporting them in financials; this is further exacerbated by the borderless nature of DeFi, which also overlays cross-jurisdictional challenges and complicates issuance of guidance.

To combat these unique challenges, regulatory bodies have started considering frameworks and guidance.³⁵ While the existing DeFi ecosystem remains largely undefined and unregulated, the industry can likely expect a number of issuances and actions from the US federal and state legislatures, as well as regulatory agencies focusing on various high-interest topics, such as providing a cross-agency, cross-jurisdictional coordination strategy resulting in a consolidation of existing regulations, or an amendment of current/new regulations required to effectively regulate the DeFi space. Such coordinated government action may ultimately result in new charter licensing requirements, regulatory sandboxes, prohibitive measures, or even enforcement actions. However, as the digital asset and DeFi space comes further into the regulatory purview, and with the outcomes of these emerging rules still largely an uncertainty, organizations should be prepared to develop a coherent business strategy that factors in regulatory considerations.

Conclusion

As organizations consider the implications of the evolving DeFi landscape, they will need to develop a coherent, overarching strategy for managing this unique set of cross-disciplinary, cross-organizational challenges and evaluating potential opportunities. This will require organizations to manage the known while simultaneously forecasting and anticipating the unknown. Much like with other emerging technologies, organizations will need to learn about and engage with DeFi, understand its impacts, and ultimately determine the extent to which DeFi may fit within their organizational strategy. Such unique challenges may be met by individuals capable of connecting the dots across functions and tapping into the various potential opportunities while simultaneously managing the respective risks. While organizations may not yet be prepared to reckon with the notion of DeFi, it is nevertheless critical that they bring the concept into their strategic purview as they consider the future of financial services and their own positioning within the industry.

As the market leader in digital assets, blockchain technology, business model optimization, and regulatory strategy, Deloitte is uniquely positioned to assist organizations in navigating the complexities of this rapidly-evolving space.

About Deloitte's Blockchain and Digital Assets Practice

At Deloitte, our people work globally with clients, regulators, and policymakers to understand how blockchain and digital assets are changing the face of business and government today. New ecosystems are developing blockchain-based infrastructure and solutions to create innovative business models and disrupt traditional ones. This is occurring in every industry and in most jurisdictions globally. Our deep business acumen and global industry-leading audit, consulting, tax, risk, and financial advisory services help organizations across industries achieve their blockchain and digital asset aspirations. Reach out to our leaders to discuss harnessing the momentum of blockchain and digital assets, prioritizing initiatives, and managing the opportunities and challenges associated with blockchain adoption effort.

About Deloitte's Business and Entity Transformation (BET) Practice

Deloitte's Business and Entity Transformation Practice exists at the forefront of an evolving market. Disruptive forces, such as digitalization, technological innovation, and regulatory expectations are fundamentally shifting the paradigm under which financial services operate and challenging organizations to adapt their business models and strategies to capture these evolving opportunities. Whether it is through the lens of creative product development, response to new regulatory requirements, emerging technologies, the acquisition of innovative capabilities, or enhancement of existing operations, the BET Practice leverages its cross-industry expertise and global footprint help guide businesses through their strategic objectives. We combine our breadth of knowledge and experience, as well as a suite of industry-tested tools and accelerators, into a broad approach to business model strategy to help organizations navigate this future-defining process.

Endnotes

1. Examples include [custodian banks have started preparing for providing crypto custody](#), [OCC released guidance stating that banks can participate in stablecoin payment activities](#), [companies are taking crypto onto their balance sheets](#), and [central banks are exploring CBDCs](#).
2. Decentralized apps (dapps) are applications that are built on a decentralized network.
3. Smart contracts are agreements on blockchain that are self-executing and programmable. Using predefined rules, smart contracts carry out transactions, potentially eliminating third parties, making processes more cost efficient and with shorter settlement times.
4. Wharton School, University of Pennsylvania, DeFi beyond the hype: The emerging world of decentralized finance, Wharton Blockchain and Digital Asset Project in collaboration with World Economic Forum, May 2021.
5. Acting Comptroller of the Currency Michael J. Hsu, "[Cryptocurrencies, decentralized finance, and key lessons from the 2008 financial crisis](#)," remarks at the Blockchain Association, September 21, 2021; Jamie Crawley, "[DeFi not immune to SEC oversight, Gensler says: Report](#)," CoinDesk, updated September 14, 2021; US Treasury, "[President's Working Group on Financial Markets releases report on recommendations on stablecoins](#)," press release, November 1, 2021; New York State Department of Financial Services, "Virtual currency businesses," accessed January 13, 2022; [OCC Heightened Standards](#); Alexander Lee, Brendan Malone, and Paul Wong, "Tokens and accounts in the context of digital currencies," Board of Governors of the Federal Reserve System, December 23, 2020; Financial Stability Board, "[Decentralized financial technologies](#)," June 6, 2019; Federal Reserve, SR 21-3/CA 21-1: "[Supervisory Guidance on Board of Directors' Effectiveness](#)," February 26, 2021.
6. Oracles are Application Programming Interfaces (APIs) that feed external data (data from outside the blockchain ecosystem) into the smart contracts within the blockchain in DeFi applications.
7. Digital wallets help store and establish ownership of digital assets. They also act as a gateway to help execute the transactions via smart contracts. Digital wallets can be custodial or noncustodial. For custodial digital wallets, the assets are held by a custodian, usually crypto exchanges. For noncustodial digital wallets, the user has sole control of the digital wallet with no third party involved.
8. NFT (non-fungible token) is a unique and non-interchangeable unit of data that is stored on a blockchain. For example, NFTs might represent unique assets such as an image or video.
9. DeFi Rate, "[Crypto lending interest rates for January 2022](#)," accessed January 13, 2022.
10. Decentralized autonomous organization (DAO) is the organization that controls the protocols of most of the DeFi applications. It is not single-handedly run by a centralized entity or company but consists of programmers, owners of applications, and its users, which ensures that control over the DeFi application is decentralized.
11. President's Working Group on Financial Markets, the Federal Deposit Insurance Corporation, and the Office of the Comptroller of the Currency, "[Report on stablecoins](#)," US Department of the Treasury, November 2021.
12. Ethereum, the second-largest crypto platform, reportedly [has more than 34,200 smart contracts that are vulnerable to hacking](#). For example, a DAO on the Ethereum blockchain [was hacked for \\$60 million worth of ether in 2016](#), due to code vulnerabilities, which was remedied by the controversial forking of Ethereum network into Ethereum & Ethereum Classic. Additionally, in August 2020, a flaw in one of the DeFi protocols, YAM protocol, [led to a loss of \\$750,000](#).
13. Ibid.
14. Ibid.
15. Caroline A. Crenshaw, "[Statement on DeFi Risks, Regulations, and Opportunities](#)," US Securities and Exchange Commission (SEC), November 9, 2021.
16. This was highlighted by [SEC Chairman Gary Gensler](#) who warned that DeFi applications are not exactly decentralized: "There's still a core group of folks that are not only writing the software, like the open source software, but they often have governance and fees. There's some incentive structure for those promoters and sponsors in the middle of this."
17. From a [CNBC article](#): "While DeFi protocols may offer similar functionality in financial transactions, they offer virtually none of the oversight that regulators require to ensure safe and efficient financial markets," Rick McDonnell, former executive secretary of FATF, told CNBC. "The lack of effective surveillance creates a substantial risk for fraud, money laundering, sanctions evasions and other criminal activity within these markets."
18. SEC Commissioner Caroline A. Crenshaw has talked about [the absence of mandatory disclosure requirements and information asymmetries that will likely advantage rich investors and insiders at the expense of the smallest investors and those with the least access to information](#). Developers should build systems that are compliant with important regulatory and policy frameworks so that investors have all material information, including about the potential risks, and are protected from misconduct that puts them at a disadvantage.

Endnotes

19. Regulators are linking lessons from the 2008 financial crisis to the DeFi space, and one research publication goes as far to showcase that [a financial crisis can stem from DeFi](#).
20. Flash loans are uncollateralized loans where digital assets are issued and settled within the span of adding a new block to the blockchain (for example, it takes around 10 minutes on Bitcoin and 13 seconds on Ethereum). The borrower requests and repays the funds with interest within the same block. In case the borrower fails to repay within that time, the entire transaction is cancelled and the entire borrowed amount is returned to the lender.
21. Ibid.
22. Ibid.
23. Some examples of recent activity in this field are the [President Working Group Report on Stablecoins](#), [Federal bank regulatory agencies statement on Crypto-Asset Policy Initiative](#), and [SEC Commissioner's statement on DeFi](#)
24. https://www.sec.gov/news/press-release/2022-26?utm_medium=email&utm_source=govdelivery
25. Examples include actions by [New York Attorney General Letitia James](#) and [New Jersey Acting Attorney General Andrew J. Bruck](#).
26. Dave Michaels, "[Crypto funds trade in coins that are under SEC scrutiny](#)," *Wall Street Journal*, September 24, 2021.
27. Ibid.
28. Commodity Futures Trading Commission (CFTC), "[Keynote Address of Commissioner Dan M. Berkovitz Before FIA and SIFMA-AMG, Asset Management Derivatives Forum 2021](#)," June 8, 2021.
29. Acting Comptroller of the Currency Michael J. Hsu also [compared the boom to cryptocurrencies and DeFi to the gold rush that led to the 2008 financial crisis](#).
30. Hsu explicitly states that the [OCC is increasing its focus on banks that provide services to firms at or outside of the regulatory perimeter](#) and calls for "leveling up" their supervision.
31. Crenshaw, "[Statement on DeFi Risks, Regulations, and Opportunities](#)."
32. <https://www.whitehouse.gov/briefing-room/presidential-actions/2022/03/09/executive-order-on-ensuring-responsible-development-of-digital-assets/>
33. <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/risk/us-advisory-digital-asset-regulatory.pdf?nc=42>
34. Financial Action Task Force (FATF), [Updated guidance for a risk-based approach to virtual assets and virtual asset service providers](#), FATF, Paris, 2021.
35. Ibid; FinCEN proposed private wallet AML rule.

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