Decentralized Finance (DeFi): opportunities, challenges and policy implications

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1. Update on DeFi market trends

1.1 Specificities of DeFi

Decentralised finance (DeFi) refers to financial applications which are run on a permissionless blockchain, such as Ethereum, and use smart contracts automating the provision of financial services without the need for intermediaries[1]. DeFi facilitates investment in cryptoassets on decentralised crypto exchanges (DEX) and also the provision of a certain number of financial services (lending, asset management, derivatives, insurance…) in a peer-to-peer mode and without the use of financial intermediaries potentially creating an alternative decentralised and open source financial system based on cryptoassets.

The use of smart contracts facilitating the automation and programmability of DeFi services and the decentralised nature of the operation and governance of the platform are the two main features that distinguish DeFi from centralised blockchain systems. The composability of DeFi protocols allowing different programmatic components to be combined to create new financial services thanks to their interoperability is another specific feature of these platforms. The non-custodial nature of DeFi is another defining characteristic, as users maintain custody of their keys – and therefore of their assets.

Some regulators have however pointed out that decentralisation is not a reality for most DeFi platforms[2], at least in their current stage of development, because their administration and governance remains in the hands of a limited group of individuals who tend to hold a majority of governance tokens, or due to other points of centralisation in DeFi platforms (*e.g.* admin keys, oracles[3]). This may nevertheless evolve as DeFi platforms expand and implement further decentralisation notably in terms of governance. Indeed, decentralisation is by nature on a spectrum and not a binary issue, and the level of decentralisation of DeFi applications can follow the path of the protocol development cycle, starting from very centralised projects at the inception and software development phase and becoming increasingly decentralised as it is deployed and shared with users[4].

The importance of stablecoins such as Tether (USDT) or USDCoin (USDC) for the operation of DeFi platforms has also been pointed out. Stablecoins are used on all crypto platforms since they allow the connection between bank deposits in fiat currency and cryptocurrencies, act as a bridge between different crypto platforms and allow investors to reduce their exposure to cryptoasset volatility by exchanging unbacked cryptoassets for stablecoins, but they play a particularly important role on DeFi protocols where they are used for the execution of most DeFi services, *e.g.* allowing the payment of interest or facilitating lending and trading activities, with stablecoins used as collateral or settlement asset.

1.2 Recent market trends

DeFi experienced a significant surge of activity in 2021, with the total value of cryptoassets locked in DeFi applications built on Ethereum reaching $ 86 Bio at the end of 2021[5] (down from a record $ 110 Bio at the peak of the market in November 2021) compared to $ 10 Bio at the beginning of 2020[6]. But the value locked into these DeFi applications has since gone down to around $ 40 Bio in July 2022. This downward trend during the first semester of 2022 is confirmed by BIS statistics covering a broader scope of DeFi activity, that show that the total value locked in DeFi across all cryptoassets has gone down to around $ 100 Bio in Q2 2022 compared to more than $ 160 Bio at the end of 2021[7].

Another trend that has been highlighted by regulators, notably the OECD[8], is the increasing institutionalisation of DeFi (and more generally of crypto markets) *i.e.* the increased direct or indirect investment of institutional investors such as dedicated crypto funds, venture capital, hedge funds and family offices in DeFi markets and related companies. This evolution is driven by search for yield and asset diversification objectives and the additional opportunities of unrestricted leverage allowed in DeFi activities. There is also the perception among certain

1. The functioning of DeFi platforms and the opportunities and challenges associated with DeFi were described in a previous note written by Eurofi in February 2022 - Decentralized Finance (DeFi): opportunities, challenges and policy implications https://www.eurofi.net/wp-content/uploads/2022/05/eurofi_decentralized-finance-defi_opportunities-challenges-and-policy-implications_paris_february-2022.pdf
   A recent report from the EU Blockchain Observatory and Forum (EUBOF) also provides a detailed description of the functioning and implications of DeFi https://www.eublockchainforum.eu/sites/default/files/reports/DeFi%20Report%20EUBOF%20-%20Final_0.pdf
2. See DeFi risks and the decentralisation illusion - BIS Quarterly Review December 2021
3. Oracle services allow data and content external to the blockchain (*e.g.* asset prices needed to execute transactions or to price derivatives), to be incorporated into the DeFi transaction flow, enabling the execution of smart contracts
4. OECD 2022, Why Decentralised Finance (DeFi) Matters and the Policy Implications https://www.oecd.org/daf/fin/financial-markets/Why-Decentralised-Finance-DeFi-Matters-and-the-Policy-Implications.pdf
5. Source defipulse.com
6. A WEF report (DeFi policy-maker toolkit – June 2021) also estimates that between mid-2020 and mid-2021 the number of user wallets was multiplied by 11 reaching 1.2 million and the number of DeFi applications reached more than 200
7. Source BIS Bulletin N°57 DeFi lending : intermediation without information? 14 June 2022
8. See OECD (2022), Institutionalisation of crypto-assets and DeFi–TradFi interconnectedness, OECD Publishing, Paris, https://doi.org/10.1787/5d9dddbe-en

investors that cryptoassets may be uncorrelated to capital markets or may provide a hedge against the impacts of inflation. However, market evolutions in 2022 have shown cryptoasset volatility to be strongly correlated with other risky assets, including equities, and such correlation has further intensified during the recent downturn, according to assessments by the OECD. Institutional participation in DeFi markets peaked in May-June 2021 when institutional transactions represented more than 80% of total transactions in DeFi[9], but has since gone down. Other signs of institutionalisation are the plans of traditional banks and stock exchanges to develop activities in the broader crypto-asset and decentralised finance space, including custody and customer facilitation, research and other dedicated services and also partnerships developing between asset managers and cryptoasset service providers to facilitate access to digital asset markets.

2. Main opportunities, risks and challenges associated with DeFi

2.1 Opportunities of DeFi

In theory, DeFi has the potential to create an alternative financial ecosystem based on cryptoassets providing a wide range of financial services with potentially higher levels of efficiency, transparency and integration than the traditional financial system. Efficiency may indeed be brought by the use of smart contracts and related automation and also the non-custodial and peer-to-peer nature of DeFi that can reduce the need for intermediaries and infrastructures and lead to a reduction of transaction costs and delays. Public blockchains on which DeFi platforms are built are also transparent by design, offering supervisors the opportunity to monitor risks more effectively, notably AML / CFT risks, and providing users with improved transparency. The non-custodial nature of DeFi and the interoperability of DeFi applications may also facilitate the cross-border development of DeFi services. Finally, DeFi may also contribute to enhancing resilience by removing single points of failure.

At present, however, DeFi services are not used as alternatives or complements to traditional financial services in most cases, but mainly as an additional source of speculative investment for investors in cryptoassets. In 2021 decentralised cryptoexchanges (DEX) and crypto lending were the largest DeFi activities by far, representing around two-thirds of total DeFi activities. Investors in DeFi bet on the new lending and staking opportunities offered by DeFi platforms offering high yields and use the increased leverage capacity and arbitrage options across cryptoassets available on DeFi platforms (*e.g.* between centralised and decentralised platforms and between different DeFi platforms). Some recent failures of centralised crypto lending platforms have revealed for example that some of these platforms were investing a significant portion of customer deposits in DeFi activity in search of higher returns.

Some observers also point out that the main added value of DeFi for the wider financial system and economy lies in its underlying technical features, which may open finance to the potentialities of Web3[10] and support the digitalisation of existing financial value chains, with all the potential benefits of tokenisation for financial markets and their participants, including atomic settlement of transactions[11]. These features include smart contracts which may help to improve existing financial value chains, potentially supporting for example the settlement of securities transactions[12], coupon payments or market making activities. New types of services have also emerged on DeFi platforms, such as automated margining mechanisms for bitcoin futures[13] and flash loans supporting arbitrage activities[14]. Some of these services may represent a significant risk at the current stage of development of the DeFi market, also considering their unregulated nature, but could possibly lead to new ways of designing certain financial products and services in the future.

2.2 Risks associated with DeFi activities

The assessment of the risks associated with DeFi activities has continued over the last few months with several new reports published notably by IOSCO, the OECD and the BIS. The recent failures of certain unregulated crypto lending platforms and algorithmic stablecoins that were not backed by sufficient reserves[15] have also made the potential risks posed by DeFi more tangible, given the importance of stablecoins[16] and lending activities in the DeFi ecosystem, although the activities concerned by these failures were not particularly decentralised.

9. See OECD (2022), Institutionalisation of crypto-assets and DeFi–TradFi interconnectedness, OECD Publishing, Paris, https://doi.org/10.1787/5d9dddbe-en. The share of institutional transactions in this analysis corresponds to the share of investors executing transactions abover $ 1 million, with transaction size used as a proxy
10. Web3 is considered to be the future of the internet, a decentralized form of the internet, where users become owners. Rather than using centralised platforms and apps to connect to the internet, browse, interact, and make transactions online, as with the current internet (Web2), users in the future Web3 phase will be able to participate in the creation, operation, and governance of the protocols and apps themselves
11. OECD (2020), The Tokenisation of Assets and Potential Implications for Financial Markets https://www.oecd.org/finance/The-Tokenisation-of-Assets-and-Potential-Implications-for-Financial-Markets.pdf
12. For example, blockchain platforms have recently been experimented by central banks including the Banque de France for the settlement of securities transactions in tokenised form against wholesale CBDCs issued on the blockchain using smart contracts in order to enhance the efficiency of such processes and their capacity to be operated cross-border
13. FTX, a crypto-exchange has for example recently sought approval from the CFTC for offering bitcoin futures contracts with an automated margining mechanism. Under the FTX proposal, customers would deposit collateral in FTX accounts — cash or crypto — and be responsible for keeping enough on hand to cover margin requirements at all times. Margin levels would be calculated every 30 seconds. If the margin falls too low, FTX would start liquidating the position in seconds, selling it off in 10 per cent increments or, in worst-case scenarios, offering it to "backstop liquidity providers who agree ahead of time to accept a set amount". This would allow the bypassing of brokers who currently collect margin and make sure that customers have enough to support their positions and may also allow platforms to function 24/7. Source FT "Blockchain and financial markets: will computers push out brokers?" 5 April 2022
14. Flash loans are a type of uncollateralised lending that allows assets to be borrowed and repaid with interest within the same blockchain transaction and are used in particular to support arbitrage activities. Flash loans use smart contracts that do not permit the exchange of funds unless the borrower can repay the loan before the transaction ends, otherwise the smart contract cancels the transaction
15. For example the Terra / Luna ecosystem. Stablecoins that are not backed by sufficient reserves may lose their peg to the dollar and be the victims of a run
16. See Nassr (2022), Not-so-stable coins: a double-edged sword for decentralised finance and the key bridge linking DeFi to TradFi https://oecdonthelevel.com/2022/05/30/not-so-stable-coins-a-double-edged-sword-for-decentralised-finance-and-the-key-bridge-linking-defi-to-tradfi/

A majority of the risks from DeFi are common to all unregulated cryptoasset activities and investments. Such risks include market risks, excessive leverage, liquidity and counterparty risks, risk of illicit financing activity and money laundering, hack risks and other operational risks, as well as risk of market manipulation. These may be amplified by the pseudo-anonymity on DeFi platforms and certain features of DeFi platforms such as the automaticity of smart contracts, the immutability of code once deployed and the potential absence of central service providers. The potential conflicts of interest that exist on crypto and DeFi platforms have also been pointed out by regulators[17]. These stem from the usual concentration of tokens in the hands of the core development team or the VC/other funders backing the project. The combination of activities performed on the same crypto platforms, including *e.g.* third-party trading, proprietary trading, margin lending and token issuance, may also potentially lead to market-manipulation risks such as the front-running of trades[18] by miners who help to validate transactions on the digital ledger.

The possible spill-over risks between stablecoins and DeFi activities and also between DeFi activities and traditional finance have also been emphasized in recent reports[19]. The failure of a major stablecoin 'breaking the buck' due to solvency issues could impair the collateral and liquidity on DeFi platforms, potentially leading to significant liquidations and stress, in addition to the impact of possible stablecoin run risks on underlying commercial paper or bond markets (similar to certain MMFs). The growing interconnectedness also between DeFi and traditional finance (*e.g.* with institutionals investing in cryptoassets and DeFi, and banks potentially developing custody and customer facilitation services), as well as the contagion risks between different crypto activities (*e.g.* shown by users of centralised platforms lending crypto assets to DeFi platforms for a return) are additional sources of vulnerability. Regulators however generally consider that at this stage these risks do not have financial stability implications due to the limited volumes concerned[20].

Some risks are more specific to the DeFi ecosystem. These include technology risks resulting from the specific features of DeFi platforms such as smart contracts or oracles and from specific services provided in DeFi such as flash loans. In addition the pseudo-anonymity of DeFi platforms may amplify illicit activity risks and DeFi platforms may be more exposed than centralised crypto platforms to stablecoin risks due to the structural role played by stablecoins in the DeFi ecosystem. The existence of specific governance risks regarding DeFi applications has also been highlighted by regulators[21] more particularly in two areas: the control of administrative keys (used by the project core team to *e.g.* upgrade smart contracts on which protocols are based, perform emergency shutdowns if needed) and the functioning of the governance structures of DeFi platforms based on governance tokens that may lead to a high concentration of voting control in certain hands and a possible misalignment of incentives.

2.3 Operational challenges facing DeFi

Certain assessments notably performed by the BIS have also demonstrated intrinsic limitations in the cryptoasset and DeFi ecosystems in the present state of development of the market, which may limit the development of this alternative ecosystem.

One issue is the over-collateralisation that is needed for DeFi lending[22]. With no ability to screen borrowers due to the pseudo anonymous nature of DeFi platforms, these platforms rely on collateral mostly consisting of cryptoassets. The high volatility of these assets means that there is often over-collateralisation, which may lead to an inefficient use of capital and foster procyclicality. In booms, appreciating prices of collateral values increase the capacity to borrow, while in busts declining collateral value reduces lending activity. Some observers have also suggested that over-collateralisation goes against one of the initial objectives of DeFi which is to widen access to finance.

A second issue is the inherent fragmentation of the crypto ecosystem[23] leading to congestion and high fees, which is due to the existence of a large number of competing blockchains that do not interoperate, the limited scalability of crypto platforms compared to traditional centralised market infrastructures and also the system's current incentive structure. Validators on pseudo-anonymous crypto platforms, where reputation cannot play a role, are indeed incentivised through monetary rewards and for these to be kept high enough the capacity of the blockchain is limited, leading to congestion and higher fees. Users are inclined to switch to alternative blockchains in order to transact at lower fees, a trend which is sustained at present by VC investments in new DeFi projects. As a consequence, as more users enter the DeFi system, more and more competing blockchains are used according to the BIS[24], reducing the efficiency of the overall system and also increasing risks, since this leads to the creation of bridges across blockchains with a higher exposure to hacks.

3. Policy implications of DeFi

Generally speaking, regulators aim to regulate crypto activities and assets, including DeFi, with a 'same activities, same risks, same rules' approach and with an appropriate balance between risk mitigation and allowing innovation in this area. At present policy initiatives concerning

17. IOSCO Decentralised finance report March 2022 https://www.iosco.org/library/pubdocs/pdf/IOSCOPD699.pdf
18. *i.e.* trading ahead of transactions in the queue of transactions to be validated in order to gain advantage
19. OECD (2022), Institutionalisation of crypto-assets and DeFi–TradFi interconnectedness, OECD Publishing, Paris, https://doi.org/10.1787/5d9dddbe-en; IOSCO Decentralised finance report March 2022
20. FSB (2022) Assessment of Risks to Financial Stability from Crypto-assets https://www.fsb.org/2022/02/assessment-of-risks-to-financial-stability-from-crypto-assets/
21. IOSCO Decentralised finance report March 2022
22. Source BIS Bulletin N°57 DeFi lending : intermediation without information? 14 June 2022
23. See BIS Bulletin – Blockchain scalability and the fragmentation of crypto – 7 June 2022 and BIS - 2022 annual economic report
24. In contrast to traditional financial infrastructures where network effects lead to a higher level of concentration

cryptoassets cover two main areas – AML / CFT rules and the regulation of cryptoassets and cryptoasset service providers – and take a relatively "centralized" or "entity-based" perspective. It is therefore still unclear how the specificities of DeFi platforms that would work in a fully decentralised way may be taken into account in these regulations.

3.1 AML / CFT regulation

AML / CFT requirements are being reviewed at the EU and global levels to adapt them to financial activities involving crypto-assets and the service providers and users concerned.

In October 2018 and June 2019, the Financial Action Task Force (FATF) adopted changes to its international AML/CFT recommendations to clarify that they apply to financial activities involving virtual assets such as cryptoassets, and virtual or crypto-asset service providers (VASPs) and this was followed in October 2021 by the publication of a more detailed risk-based guidance[25].

In the EU, AML / CFT rules are also being revised in order to extend their scope to cryptoassets, their holders and related service providers[26]. The EU institutions reached at the end of June 2022 a provisional agreement on the proposal to extend the rules on information accompanying transfers of funds (the so-called "travel rule") to cover transfers in cryptoassets (TFR regulation). This rule requires that information on the source of the asset and its beneficiary travels with the transaction and is stored on both sides of the transfer. There will be no minimum threshold or exemptions for low-value transfers of cryptoassets, except for transactions from un-hosted wallets (*i.e.* wallets held directly by their owners without using a cryptoasset service provider (CASP)) to which a 1000€ threshold will apply. In addition CASPs will be required to verify that the source of the asset is not subject to restrictive measures or sanctions and a public register for non-compliant CASPs will be set up under the EU MiCA (Markets in Cryptoassets) regulation.

While these rules are due to apply to DeFi platforms, the potential lack of a central entity to implement these rules raises some questions in terms of enforcement. The FATF suggests that where a legal person has sufficient influence on the operation of the protocol and the provision of services offered by it, then such person may be considered a VASP (virtual asset service provider)[27], however how this may be implemented in a decentralised DeFi platform remains to be clarified.

3.2 Regulatory approach to DeFi activities

At the global level, a regulatory policy agenda concerning cryptoassets was published by IOSCO in July 2022 aiming to respond to the market integrity and investor protection concerns raised by crypto activities and also identify potential systemic risks. Concerning DeFi, the aim is to publish policy recommendations by the end of 2023. In this context, the DeFi working group of IOSCO will examine in particular how IOSCO principles and standards can apply in DeFi and also assess the links between DeFi, stablecoins and cryptoasset trading, lending and borrowing platforms, as well as the interactions of DeFi with broader financial markets.

In the EU, cryptoasset activities, are due to be regulated by the Markets in Crypto-Assets (MiCA) regulation[28]. MiCA proposes a new EU legal framework for cryptoassets (including stablecoins), that do not fall under existing EU legislation[29], which is the case of most tokens issued, traded or used as collateral on DeFi platforms. MiCA aims to provide legal certainty for cryptoasset issuers and providers, enhance consumer protection and ensure financial stability, while supporting innovation.

MiCA adopts a technology-neutral approach (same activities, same risks, same rules), which means that it should normally apply to DeFi eventually. However at this stage it is not clear how this will be implemented. DeFi platforms and services are not explicitly mentioned in MiCA[30] and MiCA takes an 'entity-based' approach which may be challenging to apply to truly decentralized DeFi activities. MiCA indeed requires cryptoasset service providers to be authorised and physically present in the EU and mandates the implementation of a certain number of 'entity-based' safeguards such as capital requirements and the segregation of client's assets, the supervision of cryptoasset issuers and service providers and disclosure requirements. Regulators have however suggested that different forms of centralisation in DeFi or controlling stakeholders could be used as entry points for the regulation and supervision of these platforms: for example organised governance structures when they exist, the holders of controlling shares of governance tokens or the on- and off-ramps used to access or exit DeFi systems when exchanging fiat for cryptocurrency.

Different options, which need to be further assessed, have been suggested for including DeFi in the scope of regulated financial activities. For platforms that do not operate in a fully decentralised way, key specificities related to DeFi services could be introduced in the Level 2 requirements of MiCA, possibly completed by the application of existing financial regulations for services that perform similar functions to traditional finance (*e.g.* lending services). In addition, MiCA transparency requirements could ensure that sufficient information is provided regarding the specific governance and operational arrangements used on DeFi platforms (*e.g.* the attribution of governance

25. Greater guidance from the FATF is provided in 6 key areas: (i) clarification of the definition of VA and VASP (virtual assets and virtual asset service providers), (ii) guidance on how the FATF standards apply to stablecoins and the range of entities the standards apply to, (iii) additional guidance on the risks and tools available to address AML/TF risks for peer-to-per transactions, (iv) updated guidance on the licensing and registration of VASPs, (v) additional guidance on the implementation of the 'travel rule', and (vi) principles for information-sharing and cooperation among VASP supervisors. Source FATF - Updated guidance: a risk-based approach to virtual assets and virtual asset service providers October 2021
26. The current AML/CFT rules only apply to exchanges of crypto-assets for money
27. See Eurofi Magazine February 2022 – Robert Ophèle page 272
28. The Digital Operational Resilience Act (DORA) should moreover help to mitigate ICT risks such as cyber-risks that may affect crypto and DeFi platforms and their different components among others
29. Some derivatives may for example qualify as financial instruments and be regulated under MiFID II / MiFIR, and therefore be out of the scope of MiCA
30. In terms of service providers for example, cryptoasset exchanges, trading platforms and wallet providers are the main service providers explicitly mentioned in the MiCA legislative text

tokens, voting schemes, the use of admin keys...). Investor protection disclosure is another possible area of action for policy-makers.

Another complementary option would be to regulate some key components of DeFi such as stablecoins and smart contracts, which are considered to be key potential points of vulnerability of DeFi. Stablecoins are already clearly in the scope of MiCA and regulatory proposals are being made in several other jurisdictions such as Japan and the US to regulate stablecoins and their issuance, but their connections to DeFi and their use on DeFi platforms remain to be further addressed. Smart contracts and other technical features of DeFi are more difficult to regulate as such because they are pieces of software specifically coded for each platform, but standards could be implemented to ensure that reliable audits and due diligence of codes are being conducted for example.

A further approach is to ensure that an appropriate oversight of DeFi platforms is in place, the challenge being that oversight should not be conducted on a single entity but at the overall system level. While enforceability of requirements may be more difficult than in traditional infrastructures due to the possible lack of a central operator (unless the central development team can be used as a point of entry), the monitoring of risks could be facilitated by the fact that data are public on a permissionless blockchain. In passing it can be noted that the Commission has announced in its strategy on supervisory data in EU financial services its intention to launch a pilot project on the technical foundations of DeFi supervision embedded in blockchain in 2022[31].

3.3 Possible further evolutions for reaping the benefits of DeFi technology

In some reports by public authorities[32] it has been suggested that regulation and supervision, however desirable, will not be sufficient to allow the reaping of the full benefit of DeFi technology, such as programmability, composability and tokenisation, because of the inherent fragmentation and fragility hampering DeFi platforms. The suggestion has been made that this would require building further scale on DeFi platforms, necessitating interoperability and network effects and ensuring sufficient safety in the DeFi system. One way to do this, according to the BIS and OECD would be to use central bank digital currency (CBDC), if these become available, in DeFi instead of private stablecoins in certain instances, in order to increase the safety of settlements and mitigate potential contagion risks from stablecoins.

Some observers have also emphasized that the lack of accountability is a major impediment for a wide-scale institutional adoption of DeFi[33], suggesting that protocols using a permissioned pool of participants who may be legally identifiable and accountable could be a way forward.

Operational developments and advances in the underlying infrastructure of DeFi, for example relating to throughput and transaction costs, could also possibly allow for potential benefits of financial inclusion and 'democratisation of finance' that have been claimed by the DeFi system without being achieved at the moment.

31. See European Commission - European Financial and Stability Review 2022
32. For example BIS Annual Economic Report 2022 – The future monetary system; OECD (2022), Institutionalisation of crypto-assets and DeFi–TradFi interconnectedness, OECD Publishing, Paris, https://doi.org/10.1787/5d9dddbe-en
33. See Eurofi Magazine February 2022 – page 274 – Jos Dijsselhof, SIX Group; Remarks by L. Brainard on cryptoassets and decentralized finance through a financial stability lens 8 July 2022