The Application of the Markets in Crypto-asset Regulation to Decentralised Finance
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Introduction

The Markets in Crypto-assets Regulation[1] has been passed by the European Union in June 2023. This Regulation will come into effect from the middle of 2024. The Regulation affects crypto-asset offers of utility tokens made in the EU, as well as asset-referenced stablecoins and e-money tokens issued in the EU, and a range of crypto-asset service providers. This paper will focus on a much narrower scope, noting that there is plenty of existing commentary and literature on the main coverage of the Regulation.[2] In particular the question that we want to focus on is whether and to what extent the Regulation applies to decentralised finance (DeFi) applications that are peer-to-peer in nature. These applications have been developed in vast numbers on the popular Ethereum blockchain and other permissionless blockchains such as Polygon and Solana. They allow 'financial' functions to be carried out on crypto-assets, and are used extensively by crypto-asset holders to hedge, invest and generate yield on their crypto-assets.

It has been doubted that the Regulation applies squarely to DeFi applications[3] and this paper teases out the uncertainty as to whether DeFi applications would fall within the definition of 'crypto-asset service provider'. Nevertheless, being caught within the scope of the Regulation does not necessarily mean that regulation over DeFi is either appropriate or optimal. Indeed, if MiCA is extensible to DeFi but fits awkwardly with DeFi business models, the market for DeFi applications in the EU could be strangled by MiCA's application, paving the way for centralized types of crypto-financial intermediaries (which are comfortably covered within MiCA's scope) to gain major market share. In this manner, there may be a case to argue for a regulatory update that works with DeFi's innovative features while governing the precise risks they give rise to.

A Brief Primer on DeFi

'DeFi' encompasses many types of automated or algorithmically matched/executed transactions, usually between crypto-assets, with a view to generating 'yield' for holders of crypto-assets. What this means is that crypto-asset holders are able to 'financialise' their assets by deploying them in a manner similar to conventional financial functions, such as market-making, lending, fund management, insurance and so on.[4] Crypto-asset holders can

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[1] Regulation 2023/1114, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R1114&pk_campaign=todays_OJ&pk_source=EURLEX&pk_medium=TW&pk_keyword=Crypto%20assets&pk_content=Regulation&pk_cid=EURLEX_todaysOJ.

[2] Dirk Zetzsche, Douglas W Arner and Ross P Buckley, 'Decentralised Finance' (2020) 6 Journal of Financial Regulation 172; Fabian Schär, 'Decentralised Finance: On Blockchain- and Smart Contract-based Financial Markets' (2020), https://ssrn.com/abstract=3571335; Linn-Anker Sørensen and Dirk A Zetzsche, 'From Centralised to Decentralised Finance: The Issue of 'Fake-DeFi'' (2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3978815. A dedicated commentary on the EU's Markets in Crypto-assets Regulation is forthcoming with Edward Elgar in 2024.

[3] Filippo Annunziata, 'The Licensing Rules in MiCA' in Dário Moura Vicente et al (eds), Fintech Regulation and the Licensing Principle (EBI, 2023); Ilya Kokkorin, 'The Anatomy of Crypto Failures and Investor Protection under MiCAR' (2023) Capital Markets Law Journal, forthcoming, https://ssrn.com/abstract=4555081.

[4] Vincent Gramlich et al, Decentralised Finance (2023), https://ssrn.com/abstract=4535868.

participate in automated protocols that allow their crypto-assets to be financialized, and in the process, earn a profit. These automated protocols also work on the basis of pooling participation from many crypto-asset holders, hence being called 'Decentralised Finance' or DeFi.

A fundamental tenet of DeFi's business model is to attract pooled participation by many individual crypto-asset holders contributing their crypto-assets according to a protocol. Pooled participation brings about network effects, allowing DeFi protocols to enable transactions quickly and easily amongst crypto-asset holders, such as swapping, trading, lending, borrowing, hedging and so on. In this manner, there is no centralised intermediary bringing assets onto its own balance sheet or investing proprietarily-managed pools of funds. Intermediaries who perform such functions often act as market makers or risk clearing-houses and they extract a rent from other participants for carrying out their roles. DeFi protocols 'defy' the need for centralised intermediaries by facilitating pooled arrangements and offering automated protocols to enable peers to transact, within the defined parameters and rules of algorithmically coded functions. Hence, DeFi is usually non-custodial, as participants retain control over their assets, but their rights to their assets are subject to dealing according to the protocols of DeFi systems. Participants also fully retain their own financial risks. In this manner, financial risks are diffused amongst the many willing participants and are not, as in conventional finance, concentrated upon a centralised financial intermediary (which may become too important or systemic to fail).

Not all crypto-asset service providers are DeFi. Centralised exchanges such as Binance are not DeFi as they take on the custody of users' crypto-assets upon their own balance sheets. Many crypto-exchanges also issue their own tokens against users' deposits, such as the Binance token BNB or the now bankrupt exchange FTX's own token. Issuance of own tokens against users' deposits is often a way to capture market share, and such tokens are often issued with many attractive privileges to incentivise uptake. These centralised crypto-exchanges therefore do centralise financial risks upon their balance sheets, and are not DeFi in nature. The now insolvent entities such as Celsius and BlockFi are also not DeFi. They were business models for lending against crypto-asset collateral. They were in nature innovative banks catering for customers with non-traditional crypto-asset collateral. Lenders like these run the familiar credit risks that banks incur. Customer default or the collapse of crypto-asset prices can create losses on their own balance sheets. These lenders essentially take customers' crypto-assets into custody and intermediate the financial risks of lending on their own balance sheet.

An example of a DeFi project is the automated market maker Uniswap, on the Ethereum blockchain, boasting of 30 million users to date.[5] This is how the automated protocol for market-making in crypto-assets works. The Uniswap protocol allows users to collectively create liquidity pools for crypto-assets and to contribute their assets to the pools. Users can then trade amongst each other in the liquidity pools.

[5] 'Uniswap Smashes Records with Over 30 Million Active Users and 15K ETH Burned in a Week' (7 May 2023), https://www.crypto-news-flash.com/uniswap-smashes-records-with-over-30-million-active-users-and-15k-eth-burned-in-a-week/.

Crypto-asset holders who contribute their assets to a liquidity pool get Uni tokens in return. These tokens reflect contributors' share of the pool's liquidity, and allow contributors to earn a fee for contributing to the pool's liquidity. The Uni token is coded to represent each contributor's share of the liquidity quality of the pool, with the entitlement to receive such fees as algorithmically adjusted. The fees for participating in a liquidity pool are set in three tiers that will be algorithmically adjusted to reflect the conditions of pool liquidity. This means that where there is excess liquidity for a particular crypto-asset in the pool, the contribution of that asset will attract an algorithmically adjusted lower tier of fees for the contributor. These tiers of fees can be further added to and refined by users themselves, participating in the decentralised governance of the project.

The Uniswap project[6] is initially developed by a number of programmers, but they seek to build up an ultimately fully decentralised system for participation and governance by its users, so that users themselves refine and maintain the rules of the project. Users who hold Uni tokens can participate in Uniswap's governance. For example, users with token-holding above 1% of issued total tokens can field governance proposals to the community, and these can then can then be subject to quorum requirements for voting. When a governance proposal is submitted, all Uni token-holders are given a specified period of time to consider and consult on the proposals amongst themselves. The merit of proposals is subject to self-regulation as token-holders are asked to individually ensure their legality and workability. Upon successful majority voting, proposals can be executed as algorithmic rules for the platform after a 2-day timelock delay.[7] For example, users can field proposals to create new liquidity pools, allocate pooled funds to other purposes or projects, or to change the fee tiers in liquidity pools.

In sum, Uniswap allows users themselves to engage in market-making for crypto-assets and to determine the rules and yields for this process. The ethos is that users do not need to rely on a centralised intermediary for crypto-assets or pay the rents that are captured by centralised market intermediaries such as centralised crypto-exchanges. Theoretically, research has shown that where market-making is undertaken by diffuse participants on a sufficiently massive scale, such liquidity pools provide efficient and optimal transactional conditions.[8]

The decentralised automated market-making business model in Uniswap is inherently able to mitigate many types of financial risks. Being non-custodial in nature, users are free to retain or withdraw their Uni tokens for their crypto-assets, without fear of any centralised financial intermediary's insolvency. There are no custodial risks as with centralised exchanges which can put customers' assets in jeopardy if assets were misused, not segregated or hacked. This however does not mean that the Uniswap protocols cannot be hacked externally, but this cybersecurity risk is not unique to DeFi, and affects all digital finance. Uniswap has grown in participation and trading volumes. Indeed, even during the

[6] https://uniswap.org/.
[7] https://blog.uniswap.org/uni.
[8] Katya Malinova and Andreas Park, 'Learning from DeFi: Would Automated Market Makers Improve Equity Trading?' (2023), https://ssrn.com/abstract=4531670.

crypto winter in 2022 precipitated by the fall of FTX,[9] liquidity conditions in Uniswap pools remained stable or volumes of transactions even grew.[10]

Another example of a popular DeFi application is the pooled lending platform. Essentially, these platforms allow crypto-asset holders to borrow or swap crypto-assets amongst each other. How this works is that the DeFi protocols create asset pools to incentivise crypto-asset holders to contribute to them for a rate of return. Contributors of crypto-assets may also borrow or swap other assets in the pools, by using their contributed assets as collateral for doing so. The pooled lending protocol works on the supply side by locking contributors' crypto-assets into a pool by smart contract in exchange for the platform's native token. The native token provides an interest rate earn right for crypto-asset contributors that is algorithmically adjusted according to supply and demand conditions in asset pools. In this manner, even if the crypto-asset contributor is not using the borrowing facilities, they may earn a yield on otherwise passively stored assets. If a crypto-asset contributor wishes to borrow from one of the pools, the borrower's contributed crypto-asset is treated as collateral for doing so. The collateralisation protocol demands that borrowing capacity is limited to a certain percentage below the full market value of the collateral provided. Hence, collateralisation protocols work with supporting oracles that fetch the latest market prices for crypto-assets, and the protocol also aims to overcollateralise the borrowing, at say 30% over the value of the crypto-asset borrowed. Over-collateralisation is designed to deal with borrowers' default risk so that default can be covered by the value of the collateral. The assumption of a random percentage of over-collateralisation may however not be resilient against dramatic price volatility in crypto-assets.[11]

Compound Finance[12] is an example of a pooled lending protocol that issues its COMP token to users who deposit their assets in the pool. Users can use the COMP token for borrowing from the Compound pools or other lending platforms that admit the COMP token. Another example of a lending protocol that works for a different purpose is the Maker protocol[13] that issues the token Dai against ether (the native cryptocurrency of the Ethereum blockchain) as collateral. Maker has over time become willing to accept collateral in the form of various other crypto and real-world assets. Dai is also designed to be a stablecoin pegged against the US dollar. Hence the lending protocol provides for ether holders' store of value needs, rather than their needs for swapping or borrowing assets as such. Both the Maker and Compound business models incentivise contribution to their collateral pools by promising interest rate yield for depositing users.

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[9] Douglas W Arner, Dirk A Zetzsche, Ross P Buckley and Jamieson Kirkwood, 'The Financialization of Crypto: Lessons from the Crypto Winter of 2022-23' (2023), https://ssrn.com/abstract=4372516.

[10] 'Uniswap: How the FTX Collapse Resulted in a 1500% Increase in THIS Metric for UNI' (2 Dec 2022), https://coindcx.com/blog/crypto-news-global/uniswap-how-the-ftx-collapse-resulted-in-a-1500-increase-in-this-metric-for-uni-2-december-2022/.

[11] Which happened on Black Thursday for MakerDAO, see 'Black Thursday for MakerDAO: $8.32 million was liquidated for 0 DAI' (14 March 2020), https://medium.com/@whiterabbit_hq/black-thursday-for-makerdao-8-32-million-was-liquidated-for-0-dai-36b83cac56b6.

[12] https://compound.finance/.

[13] https://makerdao.com/en/.

In a truly decentralised manner, asset lenders' yields must be matched by asset borrowers' overcollateralisation or else the business model of decentralised pooled lending would be unsustainable. If crypto-asset prices rise in value, lending protocols may offer high interest rates in order to incentivise crypto-asset holders to contribute to the pools. Concomitantly, overcollateralisation levels could be moderated due to the optimistic value of crypto-asset prices fed into the automated protocols. Opportunistic crypto-asset holders would be attracted to engage in arbitraging amongst crypto-assets on different lending platforms, rehypothecating borrowed crypto-assets many times over. The operation of these automated protocols therefore incentivises risky financial behaviour on the part of users that would precipitate and augment a crisis if it should occur. If crypto-asset prices fall in a dramatic fashion, such as after the collapse of FTX in late 2020, crypto-asset borrowers from lending platforms could quickly experience collateral liquidation.[14] Such collateral liquidation may happen on a massive scale due to the series of rehypothecation of crypto-assets that borrowers have engaged in. Such liquidations inevitably result in greater vicious spirals of price falls. Users may experience severe losses from such liquidation herding, as well as raised transaction fees from the increased traffic in liquidations. In this manner, the operation of pooled lending platforms' automated protocols (i.e. upward algorithmic adjustment of earn rights in boom times and the algorithmic liquidation of collateral in bad times) leads to excessive risk-taking and uncontrolled losses for their users[15] and the possibility of a systemic crisis.[16]

Although pooled lending platforms boast of their decentralised nature, like opaque repo markets, the main risks they generate lie in the lack of macro-oversight for the collective effects that emanate from their individual financial policies, the overall levels of leverage that borrowers engage in and the interconnections amongst different crypto-financial applications. There is no oversight of any borrower's default risk and exposure levels as faith is placed on the algorithmic assumptions in overcollateralization. There is no transparency in relation to rehypothecation of borrowed assets. Further, there is no risk management or control over the execution of automated financial governance policies such as collateral liquidations. Although there is celebration of autonomy and the freedom of self-interested agency in DeFi, there is a corresponding lack of the provision of collective goods like the maintenance of systemic orderliness, stability or financial sustainability.

Commentators have mixed feelings regarding the utility and benefits of DeFi. On the one hand, DeFi can promote innovations that can be more generally learnt and adapted for peer-to-peer participation, and this can provide a counterfoil to the capture of excess rent by centralised financial intermediaries.[17] On the other hand, much of DeFi is short-termist and speculative,[18] and it is queried how this contributes at all to productive finance for real economic activity.[19] In this manner, regulatory application to DeFi can be focused on curbing

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[14] '$24 million lost in second-largest day of DeFi liquidations' (23 Feb 2021), https://cointelegraph.com/news/24-million-lost-in-second-largest-day-of-defi-liquidations.
[15] Kaihua Qin et al, 'An Empirical Study of DeFi Liquidations: Incentives, Risks, and Instabilities' (2021), https://discovery.ucl.ac.uk/id/eprint/10150722/1/an-empirical-study-of-defi-liquidations.pdf.
[16] Pablo D Azar et al, 'The Financial Stability Implications of Crypto-assets' (FEDS Working Paper, 2022) at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4438746.
[17] Vincent Gramlich et al, Decentralised Finance (2023), https://ssrn.com/abstract=4535868.
[18] Iris H-Y Chiu, 'Regulating Crypto-finance', in *Regulating the Crypto-economy* (Oxford: Hart 2022), ch7.
[19] Todd H Baker, 'Let's Stop Treating Crypto as If It Were Finance' (2022), https://ssrn.com/abstract=4287185.

its excesses, or levelling out the playing field so that DeFi applications do not enjoy regulatory arbitrage over established financial intermediaries.[20] However, it is also important to consider if regulation 'adds anything' to DeFi in relation to addressing the particular risks that users or third parties face, or providing collective goods for the commons of the system. In this light, the application of MiCA to DeFi will be examined.

The Application of MiCA to DeFi

As MiCA has been finalised as law in the EU and will come into force from mid-2024, participants in the crypto-economy need to be prepared for compliance with its provisions, many of which are in the vein of the 'same activity, same risks, same rules' principle in EU financial regulation. Offers of crypto-assets are subject to a less detailed regime of mandatory disclosure as compared to securities offers, while asset-referenced stablecoins are categorised as either being subject to electronic money regulation or a regime based on reserve integrity, risk management and investor protection for highly liquid fund management. Crypto-asset service providers are subject to provisions that are derived from the EU Markets in Financial Instruments Directive (MiFID 2014) which is the flagship legislation applying conduct regulation across different financial service functions.[21] These conduct rules are underpinned by the principle that agency problems pervade intermediary-client relationships due to the intermediary's conflicts of interest, position of power and influence over the client and custodial functions over client's assets. These features do not necessarily present themselves in DeFi contexts. Rather, different problems may arise, as this paper discusses in the next Section. In this manner, the application of MiFID-equivalent rules to DeFi risk being ill-fitting and may present impracticable legal risks.

We turn to tease out how MiCA may apply to DeFi. First, would DeFi fall within MiCA's scope?

DeFi are purportedly peer-to-peer and decentralised services, so would these be regarded as 'crypto-asset service providers' within the scope of MiCA? At the very basic, DeFi protocols mostly issue a token in exchange for other crypto-assets to be locked up for financialisation purposes, so this means that DeFi protocols could strictly speaking fall within the crypto-asset service provider category of 'exchanging crypto-assets for other crypto-assets'.[22] It can however be argued that no 'proprietary capital' is involved as the DeFi protocol issues the platform's native token to swap for a participant's crypto-asset, and there is no 'taking on' of assets onto a proprietary balance sheet. However, as the business model involves the redemption of native tokens, there is arguably a form of 'centralisation' around the native token of the DeFi protocol, even if there may not be a counterparty who utilised proprietary capital. It is overall uncertain how national regulators would fit DeFi protocols within the list of crypto-asset service providers in MiCA.

[20] Which is essentially the approach taken in MiCAR to subject crypto-service providers to MiFID equivalent regulation, see Annunziata (2023).
[21] Fernando Restoy, 'Fintech Regulation: How to Achieve a Level Playing Field' (Financial Stability Institute Working Paper, 2021).
[22] Art 3(16), (20).

Another point to raise is that even if DeFi is characterised to be within the scope of MiCA, it is uncertain if such inclusion serves a viable purpose. Where MiCA includes crypto-asset service provides who exchange tokens for other crypto-assets using proprietary capital, the reference to proprietary capital is associated with balance sheet risks. In this way, MiCA deals with the risk to investors' redemption rights. With a non-custodial DeFi model, do investors suffer from the same risks? It can be argued that participants' risks are of a different nature, such as in relation to over-collateralisation and automated liquidation, which may inflict uncontrolled losses. However, in destabilising conditions, any risk to platform continuity also presents redemption risk to investors. Regulators remain in need of clarifying whether the different business models in DeFi pose similar or new and other risks. The question also remains as to whether such risks are addressed, even if we apply a highly inclusive regulatory scope.

It may be argued that since the developments in the crypto-economy are both fast and varied, inclusive regulatory categories are able to capture within scope new developments so that legislation is not constantly lagging behind. In this manner, a commentator[23] has argued that such an inclusive scope is justified and indeed should be implemented by the national authorities who should make DeFi by default authorisable. National authorities can then judge individual applications to see if they should be exempt if risks to regulatory objectives are not posed, such as if the DeFi network is sufficiently closed and participants may be sophisticated.

On the other hand, such inclusive framing makes it difficult for national authorities to implement. They are left with the actual tasks of considering the fit of DeFi's business models to regulatory categories and the nature of authorisation (or otherwise) that is relevant. Further, even if all of DeFi is captured within the definition of crypto-asset service provider, there is a further issue: the rules do not necessarily address the particular risks of the DeFi business model, such as pooled lending platforms. This means the risks of technological and prudential management of lending protocols, as well as participant protection relating to leverage, default risks, collateralisation policies and redemption are not particularly addressed. Merely having MiCA include DeFi activities within the scope of crypto-asset service providers does not mean that we have an optimal framework for meeting regulatory objectives connected with DeFi's risks, in relation to the shades of systemic stability and investor protection needed.

Further, if we take the example of MakerDAO which mints the token Dai that is lent to crypto-asset depositors for an interest rate, Dai is also itself pegged to the US dollar. The Dai business model has a stablecoin aspect in addition to a lending aspect, since it has started accepting collateral other than ether. Hence would Dai be caught under a number of regulatory categories ie as asset-referenced stablecoin, as well as crypto-asset service provider? How would national authorities choose to classify this?

It is also clear that automated market makers do not work like centralised exchanges and it is unclear how such DeFi protocols would be regulated under MiCA. Would they be regarded

[23] Dirk A Zetzsche et al, 'Remaining Regulatory Challenges in Digital Finance and Crypto-assets after MiCA' (ECON Committee Working Paper, 2023), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4487516.

as 'operating a trading platform' within the list of 'crypto-asset service providers'? Such an interpretation, which entails the consequences of applying the rules for trading platforms to automated market makers, could render the compliance obligations for automated market makers inappropriate or misfitting in relation to their business models. Such potential misfits in MiCA's rule application will be shortly discussed.

This paper argues that the application of MiCA to many DeFi protocols suffers from two problems. One is that many DeFi protocols would, under the application of MiCA, simply be unauthorisable. In this manner, DeFi interfaces could manage their legal risks by blocking internet IP addresses coming from anywhere in the European Union, much like the approach taken by non-EU websites that are unable to comply with the EU's General Data Protection Regulation. This does not mean that EU users are unable to 'go underground' to participate in DeFi either through offshore proxies or using virtual personal networks. The unauthorisability of DeFi protocols does not benefit EU policy or market development. Regulatory development can come to an impasse with policy-makers not being willing to consider the novelties of DeFi's business models and are straitjacketed by the flaws of the 'same activity same risks same rules' principle.[24] The development of underground or black markets for DeFi is undesirable for EU policy-makers who are concerned with the existing problems of abuse or crime in these markets, as well as for the participant base who would benefit from clearer rules and protection.

The second problem is that the rules in MiCA are largely designed for centralised crypto-service providers who may engage with proprietary capital or have custodial rights and functions. These outfits are usually corporations and organised by forms of governance that are also quite different from DeFi. MiCA's rules contain certain compliance expectations which may be impracticable or misfitting for DeFi's governance and business models, while ignoring particular DeFi business model risks to either stability or investor protection concerns. We look at these issues in turn.

DeFi as Unauthorisable under the MiCA?

One of the obvious obstacles to the authorisability of DeFi is that most DeFi protocols are governed by decentralised autonomous organisations (DAOs) and deployed on permissionless blockchains such as the Ethereum virtual machine. The DAO is an a-legal but collective form[25] for participants first pioneered by Slock-it.com. Slock-it.com carried out an experiment in order to build a completely decentralised organisation (DAO), which may serve as a template for permissionless blockchains becoming unique distributed communities yet bound by certain collective purposes. The first DAO welcomed anyone to

[24] See Iris H-Y Chiu, 'An Institutional Account of Responsiveness in Financial Regulation- Examining The Fallacy and Limits of 'Same Activity, Same Risks, Same Rules' as the Answer to Financial Innovation and Regulatory Arbitrage (2023) 51 Computer Law and Security Review 105868, and also Peder Østbye, 'Exploring DAO Members' Individual Liability' (2023), https://ssrn.com/abstract=4045799 for a view that is more supportive of the importance of 'same activity, same risks, same rules'.

[25] Østbye, ibid discusses different intensities of collective organisation, from a collective where there is more orchestrated agency for articulated goals and actions to looser combinations and coalitions where individual autonomy still features large with some collective interest being pursued or automated for action and execution.

join in order to co-fund and generate decision-making.[26] It was a pioneer template[27] built on the Ethereum blockchain for smart contract applications which had the following functions:

(a) To enable participants to send funds in ether to an address on the blockchain, and for the address mentioned to receive the funds in a pooled form;
(b) To enable participants to vote on where the pooled funds should be deployed i.e to indicate by vote the participant's preference for investment;
(c) To enable the recording and tallying of investment votes to meet the majority number trigger;
(d) To enable pooled funds to be sent to one or more investment opportunity destinations the majority of votes support.

The pioneer template was a simple governance model, as acknowledged by slock-it.com, the developers, to kickstart the conceptual development of decentralised governance of a commons, ie the pooled funds. The developers envisaged that the open source code for the DAO could become a template for future DAOs to be developed, perhaps with more complex governance functions.[28] Despite the failure of the first DAO, commentators are of the view that this is a futuristic vision of a distributed organisation that is de-hierarchical, removing itself of the need for centralised management, administrators and the agency problem between financiers and management,[29] allowing direct governance by democratic participation by all funders, powered by carefully curated smart contracts.

The DAO's story ended in flames as an attacker exploited a flaw in the open source code and managed to drain the pool of funds of about USD$50million worth of ether, parking them in a child DAO. However slock-it.com and key miners on the Ethereum blockchain decided to remedy the damage by implementing a hard fork so that an application (smart contract) was written in order to return ether that had been contributed to the DAO address, and the Ethereum blockchain therefore maintained a ledger clean of the theft.[30] Although the implementation of the hard fork was pragmatic in order to resolve the harms caused to the DAO's funders, it raised the question of not just the DAO's governance protocols but the sufficiency of barebones governance and functional automated protocols in the face of a collective crisis.

This has however not stopped the crypto-community from developing DAOs and evolving governance measures. Today, many DAOs are the organising form for DeFi protocols, including Maker, Uniswap and a number of other significant automated market makers such as Sushiswap, as well as significant lending protocols like Compound and Aave. MiCA is arguably not oblivious to DAOs as it expressly provides for the possibility of national authorities authorising crypto-asset service providers even if they do not meet conventional

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[26] Q DuPont, 'Experiments in Algorithmic Governance: A History and Ethnography of "The DAO," A Failed Decentralised Autonomous Organization' in M Campbell-Verduyn (ed), *Bitcoin and Beyond: Cryptocurrencies, Blockchains, and Global Governance* (Oxford: Routledge 2018) at ch8.

[27] See Slock.it.com, 'The History of the DAO and Lessons Learnt' at https://blog.slock.it/the-history-of-the-dao-and-lessons-learned-d06740f8cfa5 where the DAO is described as an open source project that is intended to inspire others to develop DAOs.

[28] Ibid.

[29] O Oren, 'ICO's, DAO'S, and the SEC: A Partnership Solution' (2018) 2018 *Columbia Business Law Review* 617.

[30] Described in Slock.it.com, 'The History of the DAO and Lessons Learnt' at https://blog.slock.it/the-history-of-the-dao-and-lessons-learned-d06740f8cfa5.

legal person wrappings.[31] In this manner, being in an a-legal organisational form does not make DeFi protocols immune from the need to seek authorisation. However, the framework for authorisation does make certain assumptions and provides for requirements that disadvantage organisational vehicles that are not in recognised legal forms.

National authorities have to be convinced that where a crypto-asset service provider does not come in a recognised legal form, their governance arrangements would be able to provide an equivalent level of protection for third parties' interests, and such a-legal organisational forms must still be capable of prudential supervision.[32] Although MiCA provides a way for DeFi DAOs to be authorised, the odds are stacked against them.

National authorities would be highly cautious about authorising a DeFi DAO, or may impose demands on them to change their business organisational form. Why and how could any national regulator be able to warrant that they would be able to supervise an a-legal form prudentially and in terms of conduct, when faced with unusual organisational and governance arrangements that are unique to the DAO? The authorities are tantamount to being asked to warrant the merit of these unique organisational and governance structures for supervisability, and authorities would be incentivised to refrain from doing so. The myriad governance arrangements in DeFi are also likely to present national authorities with challenges in terms of judging their fitness for prudential and risk management as well as appropriate conduct compliance, not to mention the problem of having to ascertain 'who is being asked to comply', as we shall turn to shortly. Further, if there is a track record of governance trouble in a particular DeFi protocol, as even Uniswap has not been immune to its founder's cyber mishap, then can regulators take the precautionary approach and presume that DAOs' unique a-legal organisational and governance arrangements cannot meet the authorisable threshold? DeFi DAOs are unlikely suitable or willing to convert to conventional governance forms such as corporations, as the hierarchical structures and assumptions of power divisions in such structures are misaligned with many DAOs' values or goals (however limited they may be). For example, although a hierarchical structure has actually arisen organically in MakerDAO, the community ultimately rejected[33] a proposal to convert the governing body to a board of directors. This episode reflects the ideological differences maintained by DAO communities in relation to their collective governance preferences.

Further, MiCA imposes certain conditions for authorisation that would be challenging for DeFi DAOs to comply with. The conditions for authorisation[34] include the need for regulators to ascertain that the 'management body' is of sufficiently good repute and appropriately skilled. In a DAO, who are the members of the management body? DAOs usually have governance communities comprising of holders of the DAO's issued governance token, which can be freely traded in crypto markets. If members of the governance body include all token holders, the governance body has an indefinite and shifting membership which makes the determination of 'good repute' and 'sufficiently skilled' challenging. Further these

[31] Art 59.
[32] Ibid.
[33] Discussed in Eleunthia Wong Ellinger et al, 'Decentralised Autonomous Organization (DAO): The Case of MakerDAO' (2023) Journal of Information Technology Teaching Cases 1,
[34] Art 59.

requirements, if they have to be admission requirements to a DAO, would also be at odds with the open-ness of governance membership which many DAOs wish to maintain. If regulators take a narrower view and regard only developers or seasoned voters to be the 'management body', then the inclusion criteria can be rather arbitrary and liable to be applied in a fragmented manner amongst regulators in the EU.

The 'good repute' requirement also applies to qualifying 'shareholders' named in MiCA. This framing again maps inappropriately onto DeFi DAOs as governance members can all be potentially regarded as 'shareholder' equivalents but they would be arguably the same as the 'management body' named in MiCA. The idea of 'qualifying' shareholdership would also have to be translated into the context of token ownership and it is uncertain how this should be applied by national regulators. This is not to mention that the qualitative criteria of 'good repute' and 'sufficiently skilled' need interpretation. In pseudonymous DAOs, how much personal information is required to be collected for determination of 'good repute'? The conventional application of 'fitness and propriety' by the UK's Financial Conduct Authority[35] for example, centres upon evidence of personal integrity, including track records of criminal convictions or disciplinary experiences. Is this what is required for good repute? In the context of crypto-financial services, how should appropriateness and sufficiency of skills be judged- according to technical expertise or financial qualifications?

The conditions for authorisation further raise a more pertinent question regarding *what* is being sought to be authorised. Would that be the DAO, as an equivalent of a company providing crypto-financial services, or the project which the DAO governs? Commentators[36] have argued that it seems impracticable to authorise the DAO, given its indeterminate organisational nature and dynamic governance frameworks, and its shifting body of token holders. What should perhaps be authorised is the DAO project itself. It is the project itself and the execution of its code and conditions that affect participants' risks, as well as the risks to the broader crypto-financial system, if not more broadly to mainstream finance, if the two become more connected in the future.[37]

If a more appropriate regulatory framework for DeFi DAOs is to consider projects as such for authorisation rather than the bodies of persons behind the project, then there is arguably a need to update MiCA's authorisation framework.

DeFi DAOs should be vetted in relation to the projects themselves and the risks to regulatory objectives that each project poses. In this manner, there is a need to consider how the prudential requirements should be designed to apply, such as how own funds should be calculated and locked up. If DeFi projects do not necessarily have staff allocated to them, then MiCA's treatment of staff salaries as fixed costs in the definition of 'own funds' is an inappropriate calibration. Perhaps a fixed sum based on volume of user base and token ownership could be the basis for calibration, and own funds should be secured and locked in smart contract, and perhaps only released in a crisis. Prudential requirements are not in principle unworkable but they need rethinking in terms of design and application. DAO

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[35] FCA Handbook FIT.
[36] Guilherme Maia & João Vieira dos Santos, 'MiCAR and DeFi' (2021) at https://ssrn.com/abstract=3875355.
[37] FSB and IMF, *IMF-FSB Synthesis Paper: Policies for Crypto-Assets* (Sep 2023), https://www.fsb.org/2023/09/imf-fsb-synthesis-paper-policies-for-crypto-assets/.

governance bodies also have no equivalent structure of internal control or business continuity, which MiCA requires as part of authorisable conditions. Governance in DAOs is a highly developmental phenomenon, allowing token-holders to make proposals in order to allow the project's policies and business model to evolve and change. The 'elementary' nature of much of DAO governance is unlikely to square with the regulatory expectations of certainty and maturity in business governance and organisational policies that qualify for authorisation. Auer[38] argues that DeFi applications would need a different type of regulatory framework and supervision, one that embeds regulatory requirements within their code, and that operates within permissioned networks that are connected to supervisory oversight in real-time. In that way, authorisation and supervisory frameworks arguably need substantial adjustment due to the 'whole different creature' that DeFi DAOs are.

The Misfits between DeFi DAOs and Application of MiCA Rules

It can also be argued that contriving to apply the substantive requirements of MiCA rules to DeFi serves as another reason for considering the development of a different regulatory framework for DeFi.

First, the rules in MiCA apply conduct regulation to crypto-asset service providers vis a vis clients, and this flows from the 'agency' framing of a financial intermediary's relationship with its client- as being one in a position of power and trust, potentially creating opportunities for abuse and disadvantage to clients. This is not a necessary fit with the DeFi DAO model. For example, peers supply crypto-assets to be swapped for other crypto-assets on an automated market maker, under rules which these peers collectively vote on and approve by majority. In this model, who is acting as agent for who and would therefore need to protect their interests? Self-interest is assumed in such peer-to-peer transactions governed by a DeFi platform's protocols, which, although developed by an initial group of developers, can be changed and moulded in due course by the DAO's governance body. It is true that many DeFi DAOs continue to feature large token-holders who are influential, or minority seasoned proposal-makers and voters who wield larger than proportionate governance influence.[39] This problem is however not an agency problem between financial intermediary and client but an intra-organisational agency problem pertaining to power imbalances. Hence it can be questioned whether many rules that pertain to an intermediary-client context should apply to DeFi DAOs whose real issues lie in their internal governance.[40]

In this manner, it is not certain how rules of conduct relating to the crypto-asset service provider 'acting honestly and fairly', or 'managing conflicts of interest', could practically apply to DeFi DAOs.[41] If the argument is that MiCA's requirements should be taken on board within DeFi's governance protocols, it is questioned how code can embed a qualitative

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[38] Raphael Auer, 'Embedded Supervision: How to Build Regulation into Decentralised Finance' (Cesifo Working Paper 2022), https://ssrn.com/abstract=4127658.

[39] Tom Barbereau et al, 'Decentralised Finance's Timocratic Governance: The Distribution and Exercise of Tokenised Voting Rights' (2023) 73 Technology and Society 102251; Chuxuan Fan, 'Reintermediation in Decentralised Governance' (2023), https://ssrn.com/abstract=4533512; Xiaotong Sun et al, 'Decentralization Illusion in Decentralised Finance: Evidence from Tokenized Voting in MakerDAO Polls' (2022), https://ssrn.com/abstract=3971791.

[40] Ch4, Chiu (2022).

[41] Arts 66 and 72.

degree of honest and fair dealing amongst peers on a DeFi network, and how transparency should be recalibrated on such networks in order to ascertain if fair and transparent information, or conflict of interest management policies are disclosed. The governance requirements under Article 68 also assume too much of a centralised corporate form and its capacity to centralise control over risk management, cybersecurity and business continuity. These demands seem inconsistent with MiCA's earlier permission for regulators to consider the authorisation of non-legal forms with their unique governance arrangements. The next Section below argues shortly that conduct risks that occur on DeFi emanate from internal governance problems and this may require a different regulatory design.

More particularly, it would be both uncertain as well as inappropriate to apply MiCA's particular rules to certain DeFi models that may be viewed as equivalents of their centralised intermediation ones. A decentralised automated market maker such as Uniswap can be categorised as operating a trading platform, or as providing transfer services of crypto-assets. This paper does not consider an automated market maker to be likely categorised as providing services for reception and transmission of orders as the definition fits brokerage rather than direct trades or swaps that occur. Further it is, as argued above, uncertain if an automated market maker would simply be classified as exchanging crypto-assets for other crypto-assets as it is indeterminate if the issue of native tokens can be regarded as 'based on proprietary capital'. There is an issue of potential misfits in regulatory categorisation and the consequential application of particular rules for these categories.

Automated market makers would not be in the same position as centralised crypto-exchanges in relation to complying with rules under Article 76 of MiCA (relating to the operation of trading platforms). MiCA presumes the operator of a centralised trading platform being able to provide rules on due diligence for admission to participation, as well as rules on asset admission, trading orderliness, execution and settlement, and intervention in extraordinary circumstances such as suspension. Arguably DeFi automated market makers develop particular rules as user governance develops. This essential governance and participation model is different from the intermediation roles performed by a centralised trading platform. There is eminent sense in imposing these requirements on centralised trading platforms as many of them have become almost universal bank-like in character in the crypto-financial space,[42] creating massive and multiple agency problems between such exchanges and customers. This seems a different situation with automated market makers as a business model.

Nevertheless, the European Securities and Markets Authority, in developing technical standards for Commission legislation[43] that would implement MiCA, suggest that automated market makers may be captured within the scope of crypto-asset service providers in relation to operating a trading platform. ESMA proposes to apply pre and post trade transparency obligations to them. Although the draft technical advice recognises the AMMs' business model and tailors disclosure to their automated protocols, it remains uncertain

[42] Such as Binance, Kraken, Okex etc.

[43] ESMA, *Second Consultation Paper on the Technical Standards Specifying Certain Requirements of Markets in Crypto Assets Regulation* (MiCA), https://www.esma.europa.eu/document/second-consultation-paper-technical-standards-specifying-certain-requirements-markets.

how the full gamut of obligations specified for trading platforms that are centralised in nature can be applied to decentralised trading platforms and AMMs.

Further, the requirements of 'gatekeeper capacity' imposed on centralised trading platforms, in order to detect market abuse or to ensure that they can cope with stressed market conditions to protect investors, are appropriate given their multi-functions and power over customers and their crypto-assets. If DeFi protocols need to embed these requirements in order to fit as an authorizable trading platform, it would be uncertain how these can practically be embedded without forcing DeFi business models to become more centralised and hierarchical in nature, perhaps having a permanent governance or crisis management body in order to comply with MiCA's rules. It will have to be questioned whether this is a desirable result if DeFi governance models that intend to be flatter and developmental in nature have to be compelled to adopt corporate-like structures in order to comply with substantive requirements for similarly categorised business models. Further, theoretical research shows that DeFi innovations such as automated market makers are not only organisational innovations but also innovations in terms of market liquidity business models, and these innovations offer much potential for efficiency exploration and development.[44]

If all DeFi models are basically regarded as exchanging crypto-assets for other crypto-assets under Article 77, it is questioned how the automated protocols that create and maintain asset pools would meet the compliance requirements. Article 77 requires 'publishing a firm price' for the execution of orders that is firm and non-discriminatory price. However, prices for contributing to asset pools are dynamic and algorithmically adjustable based on pool liquidity conditions. It remains uncertain how these protocols can comply with a requirement that is designed more appropriately for a centralised financial intermediary who has opaque discretion to determine exchange prices and may therefore engage in favouritism and discrimination. It also remains uncertain if some DeFi protocols such as automated market makers would be regarded as receiving and transmitting orders on behalf of clients. If so, it is queried if the individual client agreement demanded in Article 82 is capable of being embedded in code. As many DeFi projects are developmental in nature and cannot be completely free of code loopholes or bugs,[45] it is questioned how much the cybersecurity disclosure required under Article 82 demands and whether investors are still subject to caveat emptor as per what is disclosed by the project's white paper?

We have thus far discussed a few examples of highly awkward applications of MiCA's rules as well as substantial uncertainty in how they may be applied to certain DeFi models and operations. There is another issue, which is that MiCA is likely to fail to capture within scope the substantive risks of DeFi to (a) participants where these risks are particular to DeFi business models and operations and (b) wider systemic risks[46] that can entail from automated transactional execution such as massive automated liquidations of collateral under extraordinary circumstances of collateral price volatility (such as experienced by

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[44] Katya Malinova and Andreas Park, 'Learning from DeFi: Would Automated Market Makers Improve Equity Trading?' (2023), https://ssrn.com/abstract=4531670.

[45] Arner et al (2022), Marilyn Ordekian et al, 'Shaping Cryptocurrency Gatekeepers with a Regulatory Trial and Error' (2023), https://ssrn.com/abstract=4398362.

[46] Pablo D Azar et al, 'The Financial Stability Implications of Crypto-assets' (FEDS Working Paper, 2022) at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4438746.

Maker in 2020 when the price of ether fell dramatically during the covid pandemic). Particular risks to investors and borrowers participating in lending protocols are not covered by MiCA.[47] One commentator has argued that MiCA's rules still leave much clarification to be desired.[48] This paper goes further to argue that it is unfair as a matter of regulatory process if insufficient consideration and consultation with DeFi and their business models were carried out, in order to apply MiCA's provisions to them.

In this light, the paper moves on to argue that the broader question is not whether DeFi is covered by MiCA and therefore reined in by regulatory governance. The broader question is what regulatory framework would best govern the risks that DeFi gives rise to in light of regulatory objectives to be pursued.

Considerations for the Regulatory Governance of DeFi

One can take the view that DeFi should not be regulated at all in order not to give it legitimacy. Participants should be aware that it is the wild west and it is essentially a form of speculation and gambling.[49] However, this market is worth US$38bn[50] and mainstream finance is not unconnected from it. Many asset managers, especially hedge funds, treat investments in crypto as part of portfolio diversification and mainstream banks are increasingly foraying into offering such innovative services. It may be a matter of time before conventional financial intermediaries participate in DeFi as well.

Shutting DeFi out of regulation will not make this market vapourise, and the risks these activities pose remain in need of stock-taking and regulatory consideration. First this paper argues that if regulators do not consider that financial regulation should be extended to DeFi, it should be on the basis that regulation is not needed. This may be because the risks of DeFi can be sufficiently dealt with internally within the respective DAO communities responsible for DeFi protocol governance, or that the risks do not pose sufficient hazards to the general public so that regulators' dedication of public resources to deal with them would not be justified.

Regarding the argument that DeFi's risks can be resolved by DAO communities' internal governance development, some doubt remains. DeFi DAOs are not simply egalitarian organisations, and indeed far from that. Power dynamics within a DAO are not generally flat to begin with. DeFi DAOs usually start with developers who hold large stakes of governance tokens and have outsized influence during the developmental stages. Many DeFis however envision a route towards total decentralisation. In Uniswap for example, developers have relinquished their control in order to achieve the fully-decentralised vision. Compound for example is still working towards full decentralisation with founding developers taking more of a back seat in due course. Nevertheless, as governance tokens are fully tradeable in open crypto markets, anyone can amass a significant stake in a DAO's governance tokens in order to influence the governance of the DAO and ultimately, the policies of the DeFi business

[47] Zetzsche (2023).
[48] Zetzsche (2023).
[49] Hilary J Allen, 'DeFi: Shadow Banking 2:0?' (2023) 64 William & Mary Law Review 919.
[50] https://coinmarketcap.com/view/defi/.

project governed by the DAO. Founder developers relinquishing control are not sufficient for the DeFi DAO to achieve a complete diffusion of power.

It has been empirically found that people often amass governance tokens in certain DeFi DAOs in order to make proposals and influence policies, such as financial policies regarding earn or payout rates. These proposals are mainly motivated by self-interest. Such governance token holders may even have conflicts of interest, such as being a competitor, but these need not be disclosed or vetted prior to token purchase and therefore, joining the DAO.[51] At worst, some governance token-holders are downright malicious, making proposals that seem benign but hiding malicious bugs in executable code within the proposals so that they may be deployed upon successful voting. Such malicious code can drain the DAO's pools of their assets and smart contracts can be tampered with to relinquish users of their rights over crypto-assets.[52] One incident involving a user Humpy on the DeFi platform Balancer[53] involved the deployment of code that allowed Humpy to extract a significant share of rent from the DAO. The rest of the members had to come to a truce with Humpy to cap its rent extraction. However there is no way to expel a rogue member or to affect its governance token stake. On the one hand the absence of such rules protects users from arbitrary or capricious misappropriation of their assets, but on the other, there seems no way to resolve the hazards of tyranny once established.

DAOs' own developing internal governance protocols may not be able to fully address security, autocracy and other governance risks. The very developmental nature of internal governance means that it is immature when initiated and the quality of governance depends on ex post organic development, by presumably trustworthy users who have the collective interests of the DAO at heart. The rather naïve vision of governance that underlies this set-up is vulnerable to internal abuse and malice. In this way, users risk being 'in a pool of sharks' where they know little about other users' identities, intentions and conflicts of interests. The 'conduct' risks to users that regulators are concerned about are not 'agency' problems in the sense of being abused or disadvantaged by financial intermediaries. Rather, they are 'game' problems where users have to manage the risks and threats to self-interest all the time. As DeFi projects are based on maximising self-interest for win-win outcomes, it is doubted that their business models alone provide for collective goods such as users' security, trust, fairness of dealing, freedom from abuse and even business sustainability for sustained user participation. DAOs are essentially 'game' environments[54] and it is queried how the collective goods desired by regulators, such as fair conduct and dealing, cybersecurity and business continuity can be fostered. Indeed failings in these aspects are often the result of internal governance failures.

Primary Regulatory Tier- Governing the DAO

There may be a case for a regulatory framework to govern DeFi DAOs' internal governance at a meta-level, in order to set up guardrails against abuse and to counter abuse. However such

[51] Maya Dotan et al, 'The Vulnerable Nature of Decentralised Governance in DeFi' (2023), at arXiv:2308.04267v1.

[52] Ibid.

[53] Ibid.

[54] Game dynamics is discussed as a model for DAO relations, Jun Aoyagi and Yuki Ito, 'Competing DAOs' (2023), https://ssrn.com/abstract=4293846.

a framework must first be based on how a DAO is treated as a legal phenomenon. Should it be recognised as a legal organisational form with certain default or mandatory rules for organisation and governance so that users can have certain standardised starting points and expectations? In an earlier work,[55] it is argued that a 'DAO' organisational law is important as it provides the basis for setting a framework for principles for governance. Such principles can be based on commons protection, and can be further refined, drawing from lessons of governance failures, and learning from rules applicable to other organisations, such as in relation to minority shareholder remedies or corporate governance. Without a legal framework for DAOs, the Law Commission[56] has opined that other association-based laws may still apply, such as laws regarding business partnerships, unincorporated associations and joint ownership of property. These may result in uncertainty and undesirable exposures to legal risks by participants, and also provide no upfront clarity to financial regulators as to what extent existing law (which needs to be clarified by ex post jurisprudence) can rein in the excesses of individualistic behaviour in DeFi DAOs. In this way, designing a regulatory framework for DeFi implicates broader questions regarding forms for doing business and how the DAO challenges our conception of legal organisational forms. This also raises the question of whether DAOs can be legal entities.

Should the DAO be treated as a legal entity in itself or should individual miscreants be liable separately to a third party who may be harmed by a DAO's activities? The US Commodities and Futures Trading Commission's suit against Ooki DAO included all of its governance token holders for operating an illegal trading platform, alleging that the DAO caused potential harm not only to users but also to unsuspecting third parties who do not benefit from regulatory standards of protection. The settling of the Ooki suit did not provide an opportunity to advance this area for legal clarification. My earlier work has argued that DAOs can be separately governed by a legal framework that deals with the protection of its commons, and a number of US states' as well as Malta's Innovative Technological Arrangements Act seek to cater for such new organisational arrangements. However, this is ultimately a policy choice that has to be made, as legal personality is ultimately a regulatory concession for certain compliance requirements in exchange.

Further, the flexible nature of DAOs' internal governance also means that plenty of room must be assumed for experimentation, disputes, conflicts and development. There is a need to consider to what extent ex ante principles for internal relations should be provided and to what extent ex post development is accommodated. In particular, as many DAOs have experienced problems with managing ex post malice or tyranny, it should be considered if a regulatory framework can provide for ex post dispute resolution or problem solving for DAOs.

Market-based solutions such as blockchain-based dispute resolution could arguably help resolve internal governance disputes in DAOs.[57] Providers such as Aragon can be resorted to when internal disputes erupt within DAOs. Aragon's pool of peer-level adjudicators may

[55] Chiu (2022), ch4.
[56] Law Commission, *Decentralised Autonomous Organisations: Call for Evidence* (2022).
[57] Florence Guillaume and Sven Riva, 'Blockchain Dispute Resolution for Decentralized Autonomous Organizations: The Rise of Decentralized Autonomous Justice' in Andrea Bonomi and Matthias Lehmann (eds), Blockchain and Private International Law (Brill Nijhoff 2022).

make decisions which can be enforced by executable code. This however requires the DAO to first embed within its protocols to submit to Aragon's adjudication. Market-based solutions like private dispute resolution however suffer from the weakness of needing voluntary uptake. There is also a need to ensure that market-based adjudicators can be trusted, have due processes that adhere to qualities of fairness, accountability and accessibility, and are unlikely to deploy malicious code themselves.

Secondary Regulatory Tier- Financial Regulation for DeFi DAOs

DeFi DAOs should arguably be regulated at a primary level of being DAOs, within a legal framework which provide clarity for issues such as internal relations and legal personhood. Secondarily, precise tenets of financial regulation have to be developed to address the specific risks of DeFi DAOs' internal governance to regulatory goals and objectives. In this manner, regulatory design needs to be mindful of the context of DAOs' internal structures and governance, and connect with how their outcomes affect regulatory objectives. Internal governance issues affect the broader goals of orderly transactions, anti-market abuse, cybersecurity and business continuity. Regulators may benefit from a form of technologically-enabled meta-regulation, where regulatory principles should be provided ex ante and in an embedded and programmable manner, as proposed by Auer.[58]

Further, as many DAOs' governance problems need to be addressed ex post, dispute resolution frameworks, whether in internal governance protocols or reliant on importing an externally-provided market-based adjudicated solution, need to cohere with regulatory objectives. The results of dispute resolution cannot conflict with regulatory expectations against market abuse or prudential management for example. Hence, there may be a role for the financial regulator to have oversight of DeFi DAOs' dispute resolution implementation in order to secure consistency with regulatory objectives.

DeFi regulation has to work with a DAO law in order to establish to whom responsibilities and liabilities should attach. DAOs can be loose and shifting coalitions but can also be more collective in nature. It should be considered whether a DAO law should admit of different degrees of intensity of collectivity in order to apportion responsibility and liability.[59] Perhaps individual responsibility and liability should be more prominent than group responsibility and liability in looser coalitions. Where there is a greater degree of collectivity, the opposite position may be taken so that the DAO is treated as its own legal person bearing its own risks and liabilities to third parties.[60] This spectrum of treatment also gives rise to implications for financial regulation as prudential regulation would be differently designed to accommodate more collective organisational forms over looser individualistic associations. The expectations of responsibility for conduct, and collective goods would also be framed differently.

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[58] 2022.

[59] Henrik Axelsen, Johannes Rude Jensen, and Omri Ross, 'When is a DAO Decentralised?' (2022) 31 Complex Systems Informatics and Modeling Quarterly 51, https://doi.org/10.7250/csimq.2022-31.04.

[60] The arguments for and against this position are polarised and canvassed in other literature, see Samer Hassan and Primavera de Filippi, 'Decentralised Autonomous Organisations' (2021) 10 Internet Policy Review 1; Peder Østbye, 'Exploring DAO Members' Individual Liability' (2023), https://ssrn.com/abstract=4045799; Benedikt Schuppli and Golnaz A Jafari, 'Piercing the Digital Veil A Case Study for a DAO Legal Framework under Swiss Law' (2021) 12 J. Intell. Prop. Info. Tech. & Elec. Com. L 331.

Finally, a regulatory framework for DeFi is not just about serving investors' and users' needs but also about addressing the collective goods that DAOs do not seem able to provide. These relate to broader risks such as financial stability risks where automated liquidations of collateral happen due to users' default or contagion effects, leading to disorderly and depressed markets, augmenting users' losses and damaging liquidity conditions. In these circumstances, the DeFi protocols may be working as intended. However, these protocols would be oblivious to the collective impact of adversity to markets and users as a whole. Should regulators consider these as the inherent risks of automated code that users have voluntarily undertaken, or should regulators consider this as a type of financial stability risk that should be governed with public interest goals in mind and by public resources?

The above is a difficult question as it likely depends on the scale of activity, the level of social expectations, and the possibility of contagion in conventional financial markets (and at what scale). Regulators can treat the failure of collective goods provided by DeFi DAOs as an inherent limitation that users assume but if the failure of such collective goods have broader ramifications, then they may become public goods that need to be supplied. The stance that regulators are currently maintaining is to build up information capacity on crypto and DeFi activities and markets, in order to ascertain the scale and nature of collective risks. Although not formally so-called, this is a type of macroprudential oversight.[61] This wait-and-see approach is a sensible one given that any indication of regulators willing to act as market makers or liquidity providers of a last resort could be rather distorting for DeFi markets which are still highly emerging, volatile and immature. Hence a regulatory put is premature. Much of DeFi is developed on permissionless blockchains that are in competition, such as Ethereum, Solana, Polygon etc, and it is yet too early for regulators to predict market development, trends and their interaction with financial stability that 'really matters'.

Conclusion

In considering why and how to govern the wild west of DeFi, the application of MiCA or otherwise is not necessarily the key question. MiCA's application is arguably uncertain in terms of scope, categorisation, interpretation of rules, and ultimately, authorisability. Regulators should seek to understand precisely what DeFi risks they wish to deal with using public resources, in particular, whether investor protection, third party liability risks and financial stability matter, and to what extent. The market-based mechanisms in the crypto-economy that purport to resolve these issues should also be considered in terms of their fitness and their need to be subject to governance themselves. The DAO innovation and what it has enabled in relation to DeFi activities are new phenomena that should not be dealt with in a coherentist manner.[62] Regulatory innovation and rethinking is needed, in order to respond to social expectations that may grow over time. The paper proposes a two layered approach where DeFi DAOs need to be first governed in terms of an organisational framework for internal relations and the prevention of abuse and instability, followed by an appropriate application of financial regulation standards that connect regulatory objectives

[61] FSB-IMF (2023).
[62] Roger Brownsword, *Law, Technology and Society* (Oxford: Routledge 2019), pp191-196.

to the effects of internal governance, so that users' risk and wider stability risks can be mitigated. This requires regulatory innovation to match pace with technological innovation.