

Cryptocurrencies and Decentralized Finance (DeFi)

Igor Makarov Antoinette Schoar
LSE MIT Sloan, NBER

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Background

- The Blockchain technology offers the possibility of an entirely different financial architecture, commonly called decentralized finance (DeFi), where record keeping is decentralized and access to the system is anonymous and unrestricted
 - Advocates argue that it can replace traditional financial institutions and democratize finance by creating a level playing field among providers
- Key building blocks
 - Blockchain: Open-source and permissionless ledger that provides decentralized record keeping, e.g. Bitcoin or Ethereum
 - Smart contracts: Self-executing algorithms embedded in the blockchain
 - DeFi apps: Smart contracts that perform finance functions, such as trading or lending

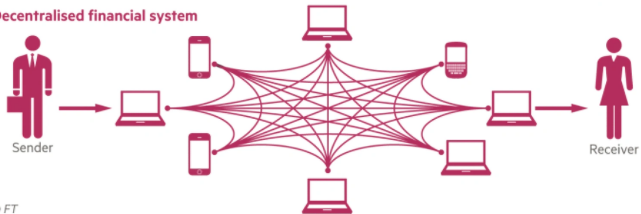
“Trustless” Trust Architecture

How decentralised finance works

Traditional financial system



Decentralised financial system



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This Paper

- Provide an introduction to how the DeFi system works
- Critical analysis of economic forces behind DeFi applications
 - Data privacy and transparency
 - Economic rents
 - Transaction costs
 - Governance
 - Systemic risk
- Discuss regulatory challenges and possible solutions

Data Privacy and Transparency

- Traditional intermediaries are tasked to solve the tradeoff between
 - Protecting individual privacy for financial transactions
 - Societal goals of preventing money laundering, tax evasion, terrorist financing etc
- Cryptocurrencies built on permissionless protocols ensure privacy by not collecting any personal information of address holders
- DeFi apps reinforce anonymity by removing centralized intermediaries and automating contract execution
 - Example: Trading on DeFi exchanges removes central record keeper that could provide KYC checks and tax enforcement

Data Privacy and Transparency II

- DeFi creates externalities for the rest of the economy that are currently not internalized by market participants
 - Generates significant challenges for regulators
 - Impedes enforcement of taxes, AML or anti-terrorism regulations
 - Worsens preventions of bribes, ransomware and other malfeasance

Economic Rents

- Inherent constraints to competition in financial markets limit effectiveness of free entry
- Rents can accumulate at different layers in the DeFi architecture
 - Validators/miners have incentive to be concentrated \Rightarrow possibility of collusion
 - Smart contract platforms have strong network externalities \Rightarrow limits competition
 - Individual DeFi applications benefit from scale economies \Rightarrow monopoly power
 - Customer lack financial literacy or behavioral biases \Rightarrow shrouding, rent extraction
- Regulation can reduce excessive rents where competition fails
 - But anonymous and permissionless eco-system impedes regulators from enforcing rules to counter excessive rent extraction

Transaction Costs

- Centralized intermediaries can have limited incentives to invest in new technologies even if they are welfare improving
- The blockchain technology has the potential to reduce some of these costs, e.g. automatic clearing and settlement
- The introduction of cryptocurrencies has provided incentives for financial service firms to upgrade infrastructure and reduce costs
- But disincentives to innovate can also exist for blockchain platforms
 - Miners/validators of a dominant blockchain might resist upgrading the technology, if it reduces the returns on their past investments

Governance

- Governance rules needed to balance the interests of different stakeholders in DeFi apps, e.g. developers, investors, users
 - Provide coordination, incentives to adopt value increasing investments
 - Prevent minority stakeholders from expropriation by powerful insiders
- Governance research has shown that recourse to the legal system is necessary to effectively implement these goals
 - But reliance on off-chain enforcement clashes with the maxime of the “trustless trust architecture”
- Experimentation with on-chain and decentralized governance (DAO)
 - Decentralized governance runs into the typical coordination problems
 - Low participation by eligible tokenholders
 - Large stakeholders dominate voting, can engage in vote buying
- We show, in a majority of DeFi apps, ownership is very concentrated

Systemic Risk

- DeFi has primarily operated under a narrow banking model
 - Every loan is overcollateralized
 - Removes many of the problems faced by fractional reserve systems
- Main risks stem from a potential run on stable coins and the ability of investors to take highly leveraged positions
 - Need for careful regulation of stable coins issuers, see Gorton and Zhang (2021) and Gorton (2021)
 - DeFi eco-system has wide range of highly leveraged products, many exchanges offer up to 100X leverage for perpetual derivative contracts
 - Multiple interconnected contracts across different DeFi apps and blockchains can result in a highly complex and fragile system

Regulation I

- Key challenges for DeFi regulation stem from the anonymous and open access nature of the system
- A natural solution for regulatory oversight is at the level of validators and developers, which control the network protocol
 - If validators are known and regulated, they can verify that only certified participants transact on the blockchain
 - Countries that agree on KYC standards can use the same blockchain while those that have different requirements can require their own blockchain
- Once this level of regulatory compliance is established, many other functions can be built on top of it

Regulation II

- If regulators give up on the ability to oversee validators, the effectiveness of regulation will be much more limited and will depend on the goodwill and voluntary cooperation of validators and developers of the blockchain
- If validators accept transactions from every party, the most regulators can hope for is to separate the network into “regulated” and “unregulated” parts
- If regulators wait too long, cryptocurrencies and DeFi applications can become too-big-to-regulate

Conclusion

- DeFi apps are still evolving and developing new functionalities
- Potential for new solutions but in its current form DeFi creates large negative externalities
 - Problems linked to the permissionless and anonymous nature of DeFi
- We show that there are ways to regulate DeFi while preserving most of the features of the blockchain architecture
- How the DeFi eco-system evolves has important implications for the integrity of financial markets, and ultimately the US and global financial systems