CRYPTOCURRENCIES AND DECENTRALIZED FINANCE (DEFI)

BIS ANNUAL CONFERENCE, JUNE 2022

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MOTIVATION

- Cryptocurrencies are no longer a niche market

Bloomberg.com
Bitcoin ($BTC USD), Ether ($ETH) Lead Crypto to $3 Trillion Market Cap

US Public Pension Fund for Firefighters Adds Bitcoin and Ether Worth $25 Million to Portfolio

- Many calls for even wider adoption
- But many open questions about the architecture, its major players, potential risks, and spillover effects on the real economy
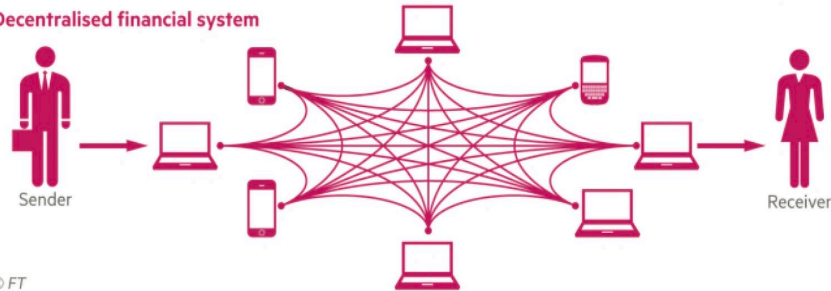
"TRUSTLESS TRUST ARCHITECTURE"

Traditional financial system
Sender → Sender's bank → $ £ ¥ € Payments companies → Receiver's bank → Receiver

Decentralised financial system
Sender → Receiver

© FT

- Blockchain technology offers the possibility of a different financial architecture where record keeping is decentralized and access to the system is anonymous and unrestricted

- Key building blocks
  - Blockchain: Open-source and permissionless ledger that provides decentralized record keeping
  - Smart contracts: Self-executing algorithms embedded in the blockchain
  - Verification done by validators that are decentralized and anonymous

TRADITIONAL ARCHITECTURE

- Intermediaries serve as centralized nodes that guard the access to the financial system, provide customers with essential services, and are charged with the implementation of regulatory goals such as tax reporting, AML or consumer financial protection

- Centralized intermediaries hold significant power, based on their preferential access to customers and data, which if not properly harnessed and regulated, can be a source of outsized economic rents and can lead to considerable inefficiencies

OUTLINE

- Important issues
  - 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 intermedaries and automating contract execution
  - Example: Trading on DeFi exchanges removes the need for central exchanges that could provide KYC checks and tax enforcement

- Thus, DeFi creates externalities for the rest of the economy that are currently not internalized by market participants
  - 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 can limit effectiveness of free entry

- Rents can accumulate at different layers in the DeFi architecture
  - Validators/miners have incentive to be concentrated ⇒ possibility of collusion
  - Smart contract platforms have strong network externalities ⇒ limits competition
  - Individual DeFi applications benefit from scale economies ⇒ monopoly power
  - Customer lack financial literacy or behavioral biases ⇒ shrouding, rent extraction

ECONOMIC RENTS CONTINUED

- Regulation can reduce excessive rents where competition fails

- But anonymous and permissionless eco-system impedes regulators from enforcing rules to counter excessive rent extraction

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CONCENTRATION OF VALIDATORS IN POS BLOCKCHAINS

Cryptocurrency	Amount staked as a (%) of circulating supply	Validator Concentration	
		top 10	top 50
Solana	70%	23%	56%
Cardano	73%	30%	47%
Avalanche	97%	17%	57%
Terra	77%	36%	76%
Polkadot	57%	30%	56%
Cosmos Hub	63%	45%	87%
NEAR Protocol	61%	50%	96%
Polygon	34%	72%	99%
Fantom	54%	88%	100%
Tezos	76%	63%	96%

Authors' calculations

CONCENTRATION ACROSS BLOCKCHAINS

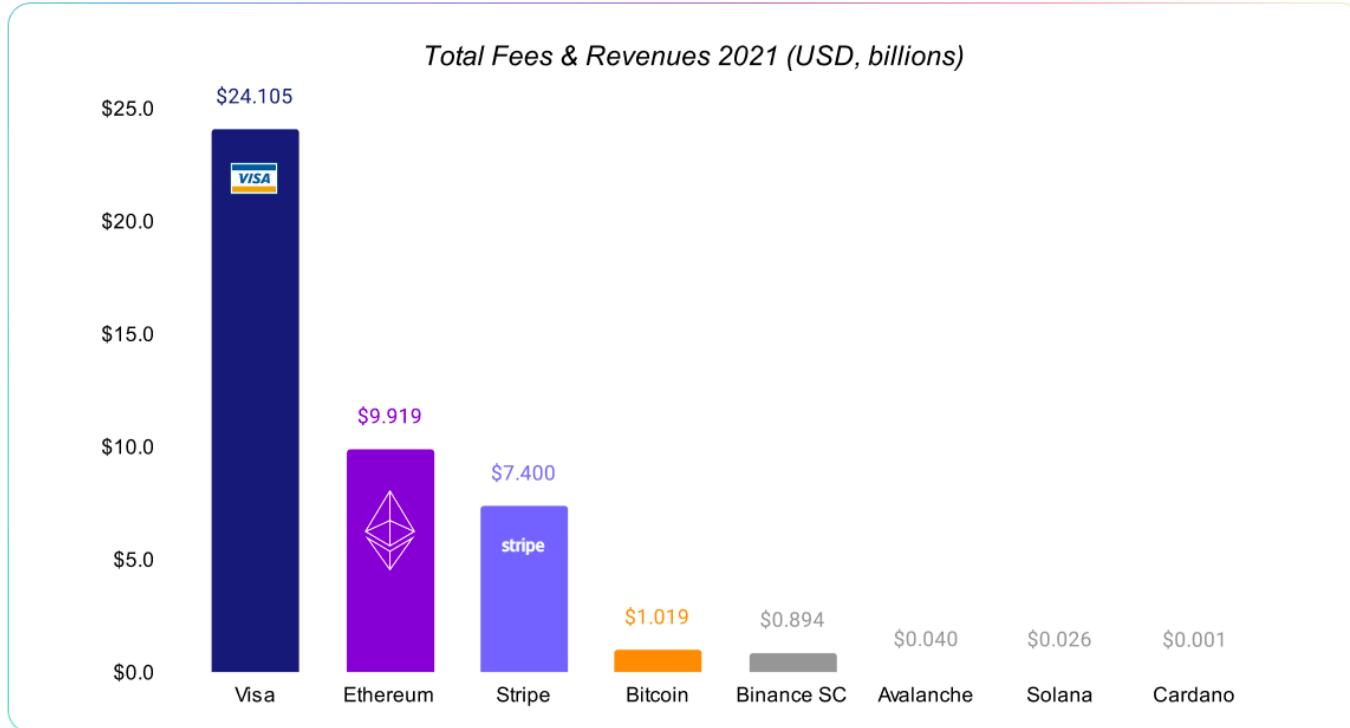| Validator	Staked USD	Share
Everstake	2.8 B	2.20%
Binance Staking	2.6 B	2.10%
Chorus One	1.6 B	1.30%
Dokia Capital	1.6 B	1.30%
Certus One	1.5 B	1.20%
Bison Trails	1.5 B	1.20%
Allnodes	1.5 B	1.20%
InfStones	1.5 B	1.20%
Kraken	1.4 B	1.10%
Staked	1.2 B	1.00%
P2P Validator	1.2 B	1.00%
Orion.Money	1.1 B	0.90%
B-Harvest	1.0 B	0.80%
Staking Facilities	1.0 B	0.80%
Figment	1.0 B	0.80%

Top 15 PoS validators and their aggregate stakes in the top ten proof-of-stake smart contract platforms by market capitalization as of February 2022.

Authors' calculations

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PLATFORM TRANSACTION FEES

Total Fees & Revenues 2021 (USD, billions)

| Platform	Value
Visa	$24.105
Ethereum	$9.919
Stripe	$7.400
Bitcoin	$1.019
Binance SC	$0.894
Avalanche	$0.040
Solana	$0.026
Cardano	$0.001

Year in Ethereum 2021 - stark.mirror.xyz

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DEFI EXCHANGE CONCENTRATION
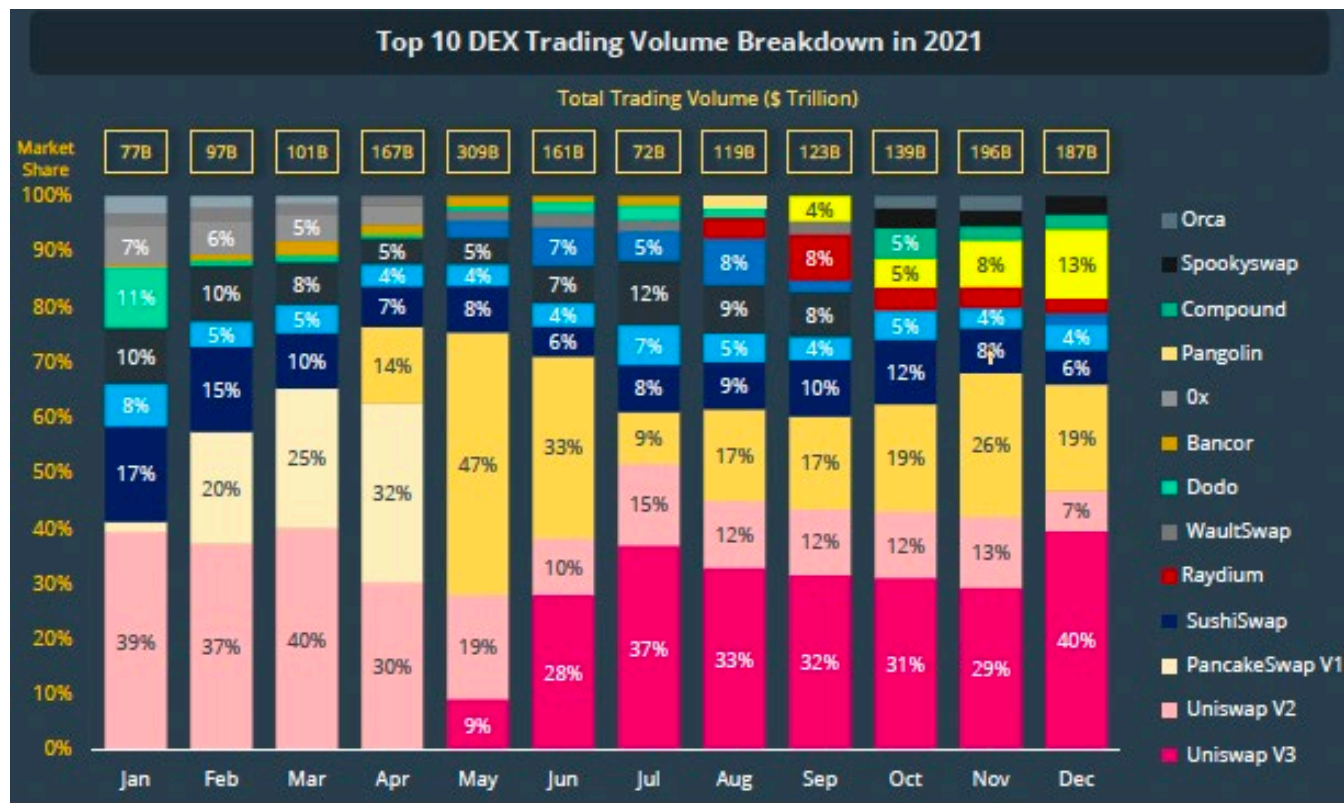
CoinGecko Yearly Report

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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"

DAO

- 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

SYSTEMIC RISK

- 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 stables 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 and developers, 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

- 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 the global financial system

THANK YOU

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