

Dyson
The Hotel School
Johnson



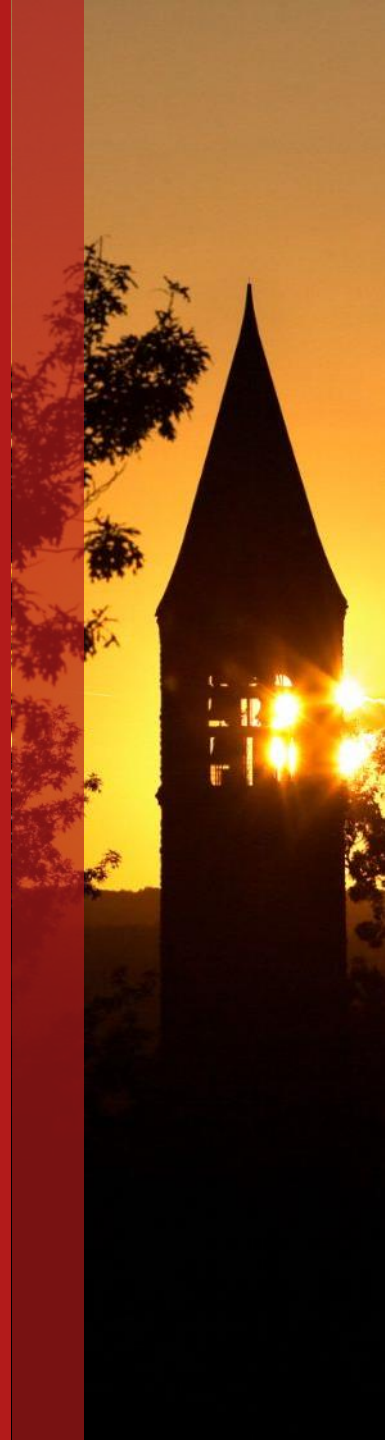
Cornell
SC Johnson College of Business

DeFi, DLT, Smart Contracts: Hope or Hype?

Lin William Cong

Cornell SC Johnson College of Business
FinTech@Cornell | IC3 | DEFT Lab | NBER

November 2024



DeFi and the Future of Finance

Bank for International Settlements (BIS) found that 90% of central banks were investigating the potential of central bank digital currencies (CBDCs), including 26% that were actively developing CBDCs or conducting pilot projects.

The transaction volume of China's digital yuan, or e-CNY, reached RMB 100 billion (**\$13.9 billion**) at the end of August 2022

On the private sector side, privately issued stablecoins, which are cryptocurrencies typically pegged to fiat money such as the US dollar, have grown to a nearly \$150 billion market.

91%

Of institutional investors are interested in investing in tokenized assets, according to a 2022 Celent survey¹¹

J.P. Morgan's intra-day repo application on Onyx Digital Assets has processed more than \$430 billion since its launch in November 2020.
DBS has issued digital bonds in its first security token offering (STO);

HSBC in issued a \$1 billion tokenized perpetual securities issue by Singtel Group.

The Dark Side of Crypto?

1. Exchange Manipulation: “Crypto Wash Trading” (Cong, Li, Tang, & Yang, 2019).
2. Trader Manipulation: “Tax-Loss Harvesting with Cryptocurrencies” (Cong, Landsman, Maydew, & Rabetti, 2021).
3. Cybercrimes: “An Anatomy of Crypto-Enabled Cybercrimes” (Cong, Harvey, Rabetti, & Wu, 2022); “Blockchain Forensics and Crypto-Related Cybercrimes” (Cong, Grauer, Rabetti, & Updegrave)

Technical Possibility VS. Economic Reality

1. Decentralized Mining in Centralized Pools
2. Inclusion and Democratization Through Web3 and DeFi?
3. The (Missing) Links to the Real Economy
4. Promising Directions.

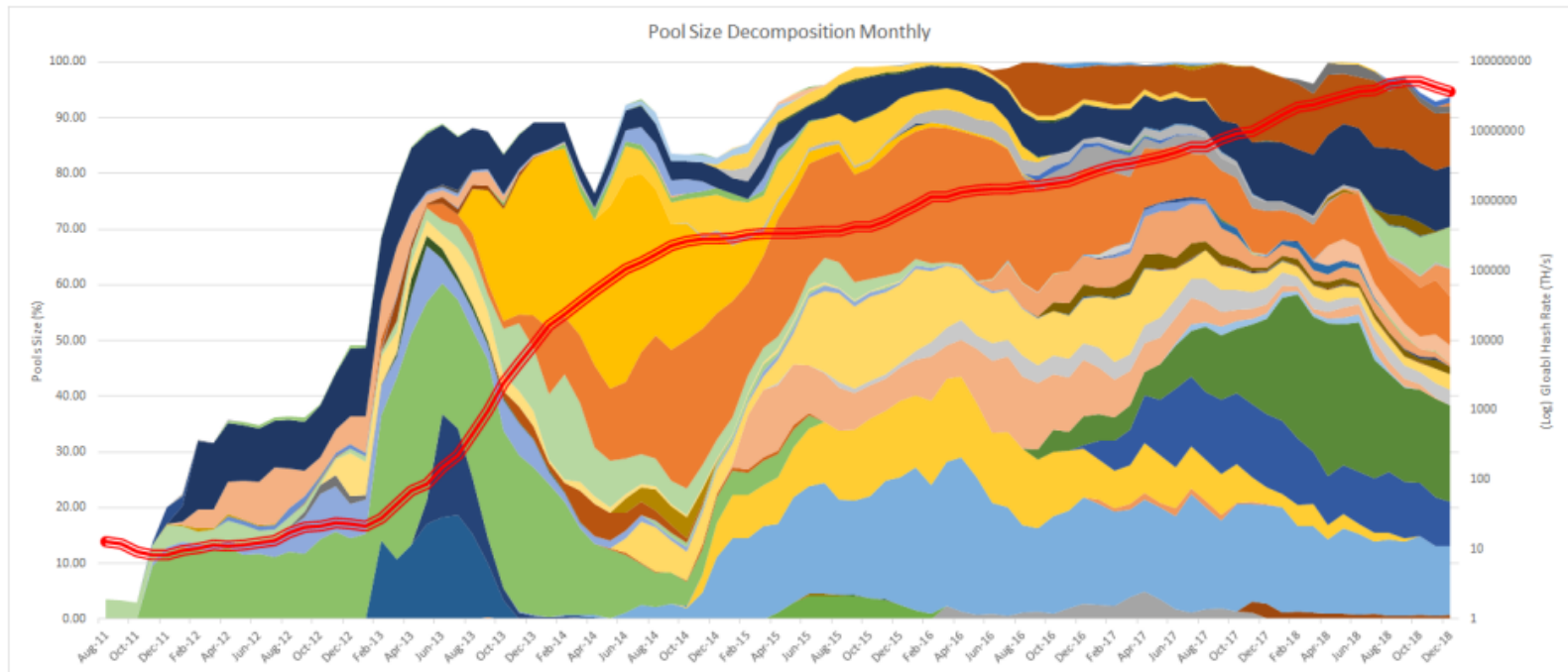
1. Decentralization and Mining Pools

1. Defies the intent of decentralization?
2. Not really, if you think about the economics carefully.
3. But costly for the environment and liquidity.

Decentralized Mining in Centralized Pools

Cong, He, and Li (RFS 2021)

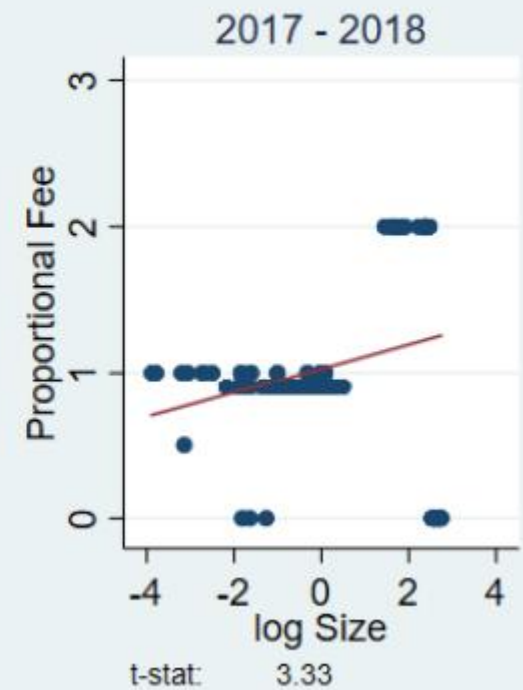
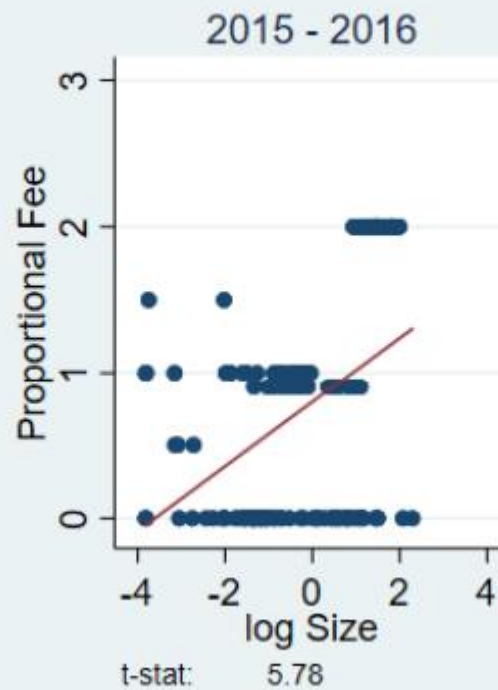
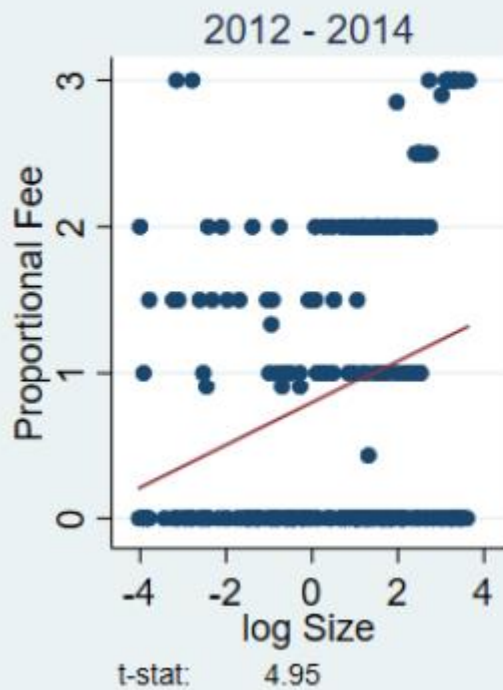
Evolution of Bitcoin Mining and Environmental Impact



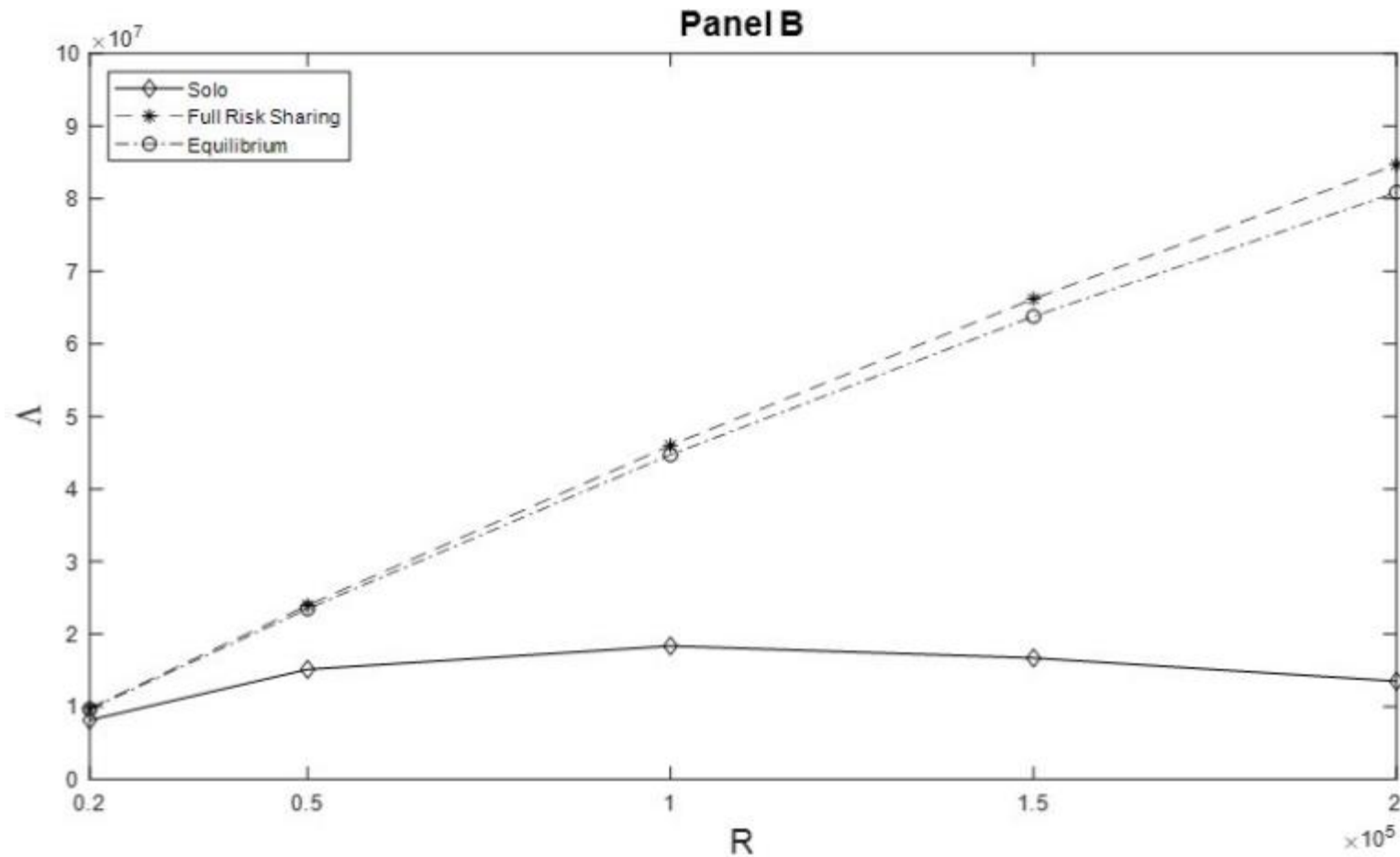
- 1 Pool dominance coincides with explosive growth in hash power.
- 2 Pools grow but no long-term over-concentration.

Fee and Size

Panel A: Proportional Fee vs log Size



Exacerbating Mining Arms Race

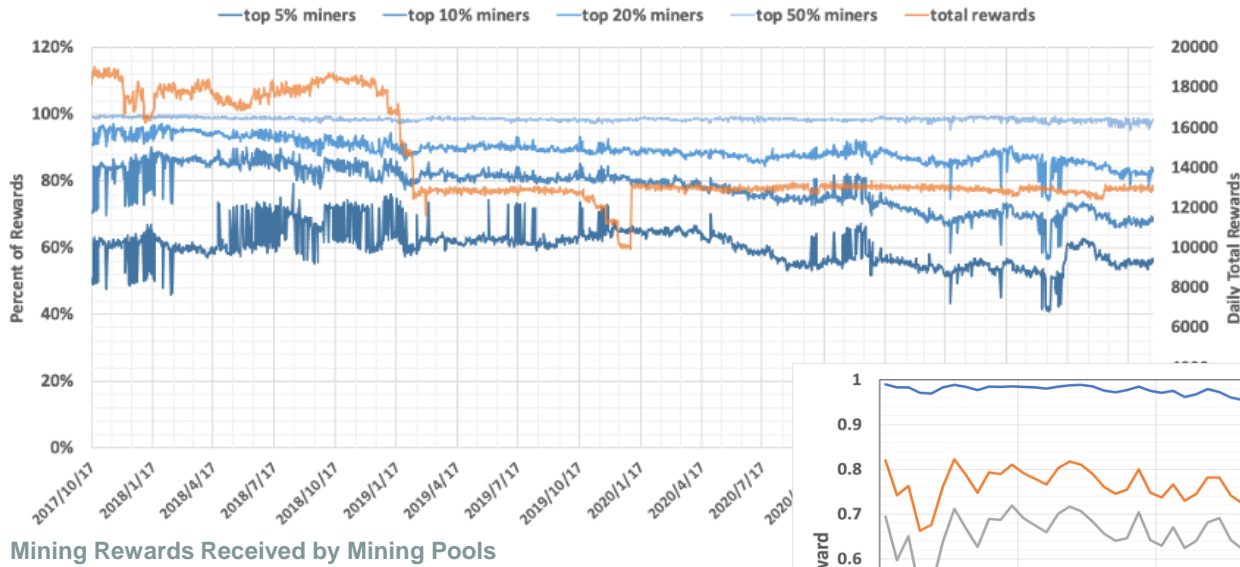


2. DeFi Serving Its Advocated Purposes?

Inclusion and Democratization Through Web3 and DeFi? Initial Evidence from the Ethereum Ecosystem (Cong et al., 2022)

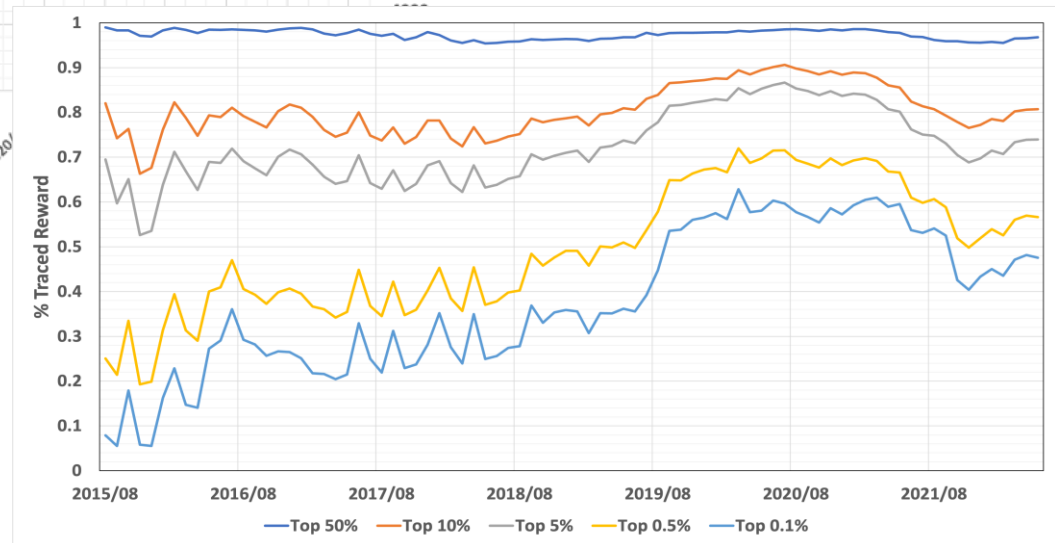
- Ethereum blockchain
 - Aug 15-Feb 22; 14 million blocks, 1.7+4.6 billion transactions, 1 billion transfers, 433 DeFi, 5047 Dapps, etc.;
 - Value of tokens transferred, the time when transaction bundled into the block, gas used, gas price and gas limit (set by the initiator), status of transaction.
- Block information (e.g., address of block verifier, mining pool, block number, etc.)
- Addresses associated with DeFi/ DApps
 - DApp Radar, DApponline, and Etherscan
 - Classified into 9 groups: exchanges, DeFi, gambling, games, collectibles, etc.
 - 166 DeFi protocols, 2,820 DApps.
- ETH Gas Station, CoinMarketCap, Google Trends
 - Recommended gas prices, etc.
 - Token prices, popularity metrics, etc.
- Large-scale computation: 14 servers dual Xeon E5, 128G Mem, 48TB hard disks,

Description of Ethereum Ecosystem—*Distribution of Mining Income*

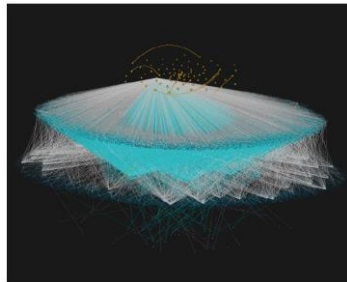


- Mining activities and rewards are concentrated in large mining pools and nodes, similar to Bitcoin.

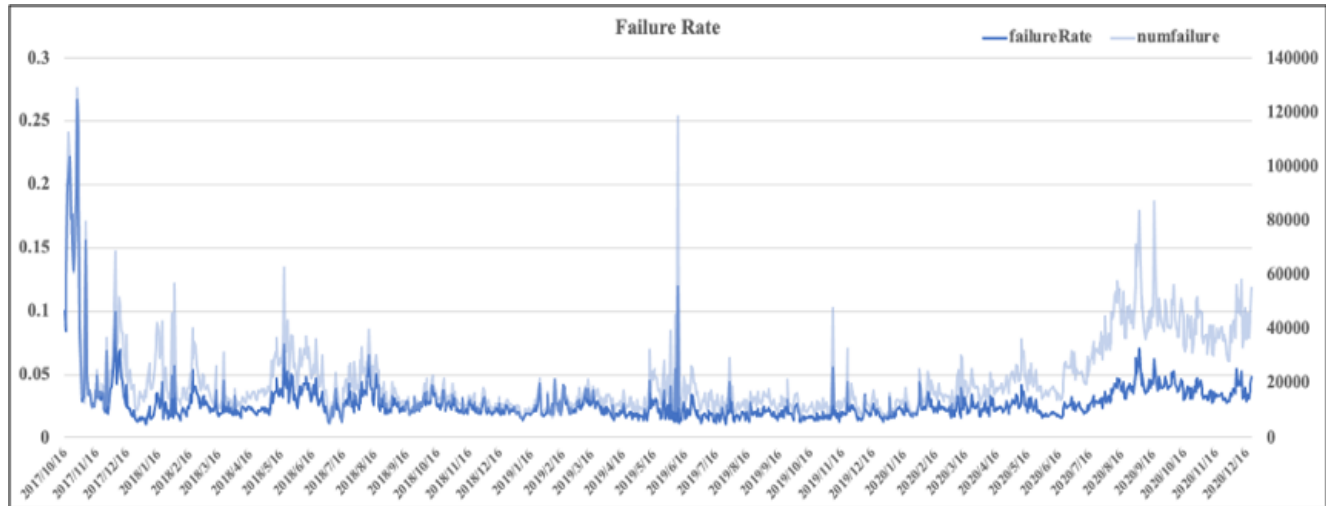
Traced Mining Rewards for Miners



The Tracing Porcess



Transaction Fees and Failures



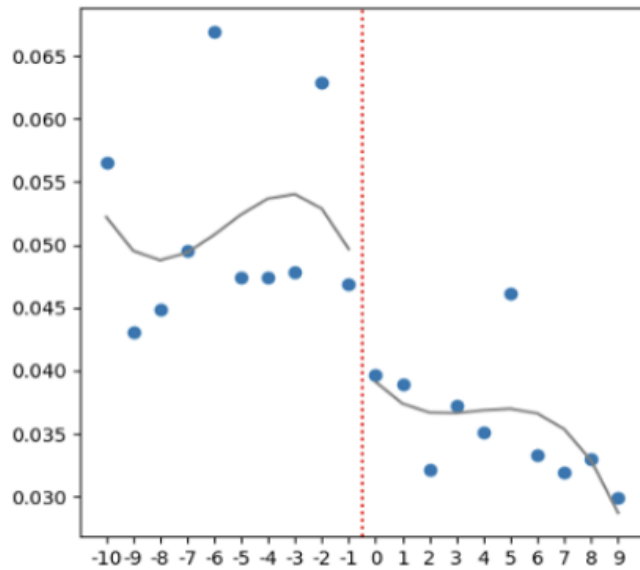
$$\text{PercentageTransactionFee} = \frac{\text{GasPrice} * \text{GasUsed}}{\text{Value}} \times 100\%$$

- The percentage transaction fee for small amount transactions using DeFi is too high and volatile for inclusive finance.

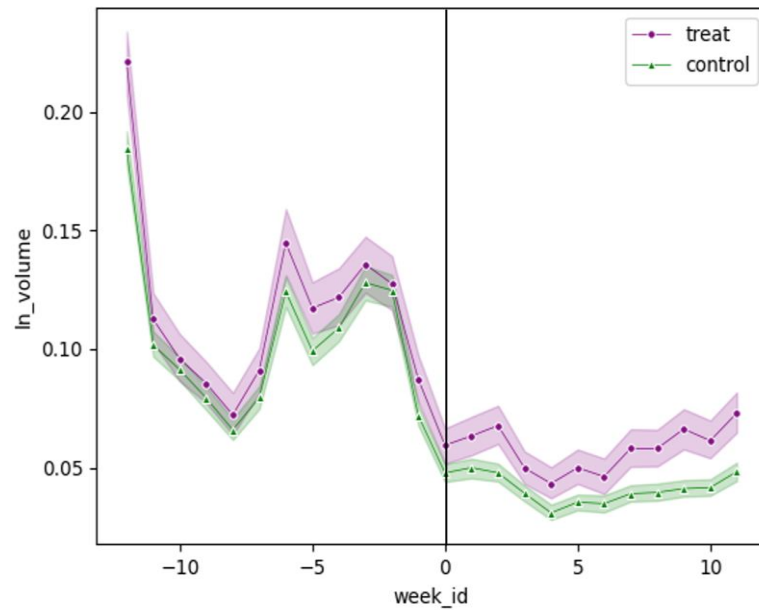
- **Major Reasons for Failure**
 - a) “Out of gas”(30%)
 - b) “Reverted” (73%)
 - c) “Bad Instruction”
 - d) “Bad jump destination”

Inclusion and Democracy Through EIP-1559 and Airdropping (OmiseGo + Impact on ETH Price)

Redistributive Effect of EIP-1559—*Miner Side*



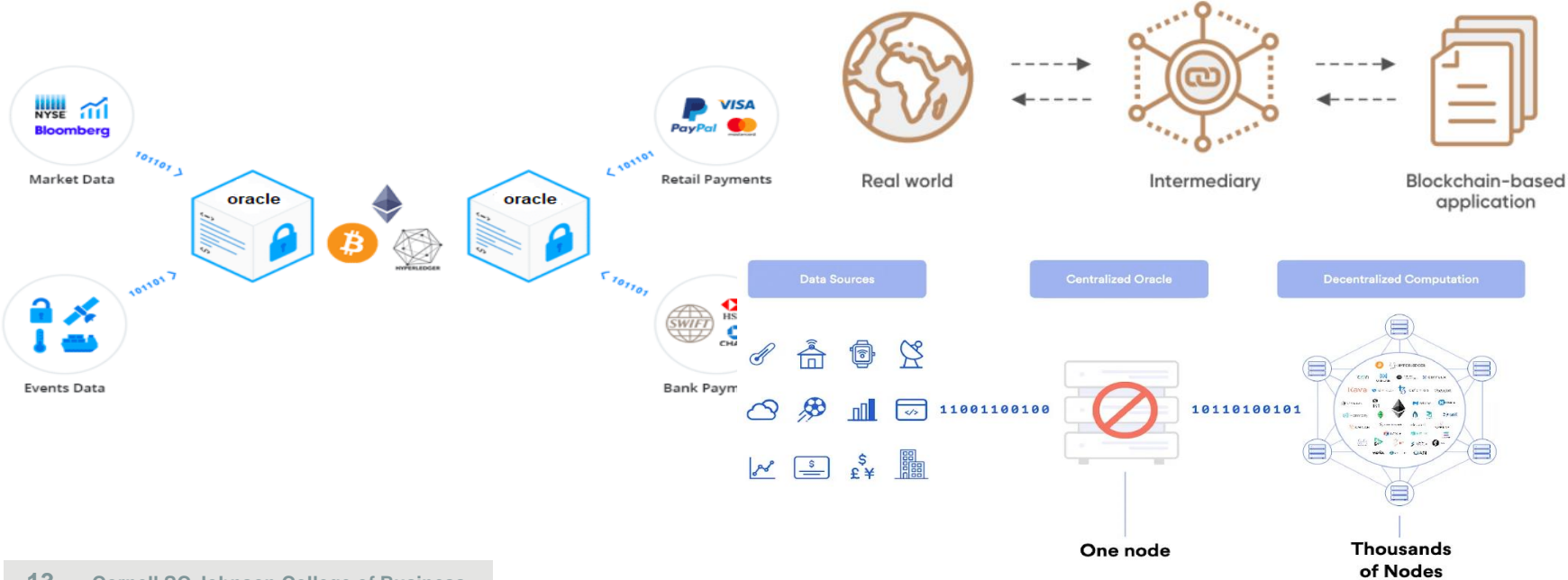
(a) The Log of Weekly Mining Rewards



3. Interoperability and Connections to the Real World

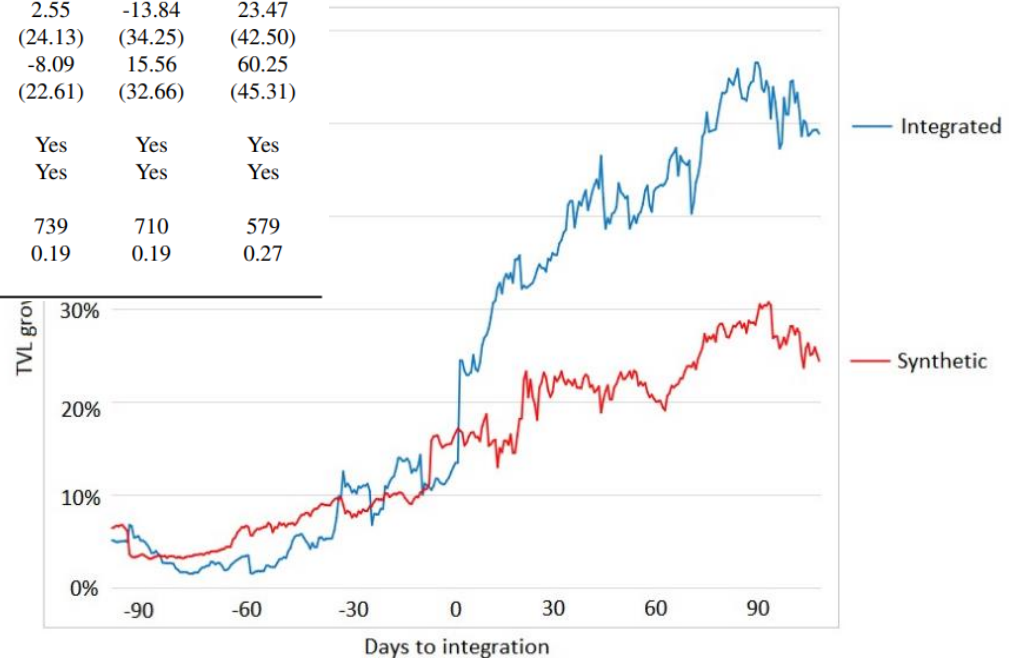
Financial & Informational Integration Through Decentralized Oracle Networks (Cong, Prasad, & Rabetti, 2022)

The oracle problem and DONs



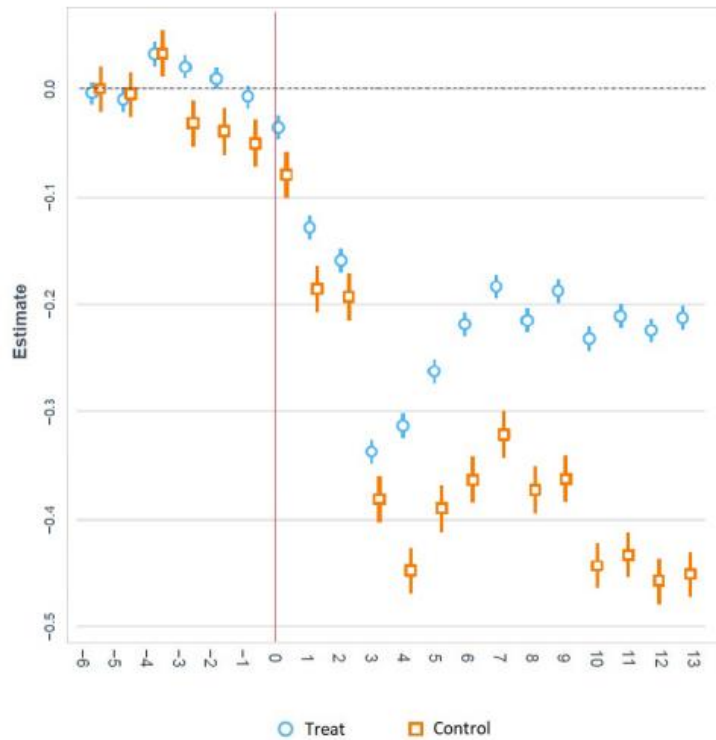
DON Integration Effects

	Panel A: Total Value Locked				Panel B: Market Capitalization			
	Day	Week	Month	Quarter	Day	Week	Month	Quarter
DON	10.84 (11.53)	35.12 * (20.96)	74.85 *** (28.64)	92.21 ** (38.18)	2.65 (9.14)	25.50 * (15.10)	42.63 ** (21.37)	75.57 *** (28.49)
CO	5.52 (19.35)	-16.84 (35.24)	-46.10 (50.54)	-40.51 (67.86)	-6.96 (16.42)	34.47 (26.81)	34.34 (38.55)	81.35 * (49.35)
log(1 + FDV)	1.43 *** (0.54)	2.34 ** (0.98)	3.08 ** (1.34)	5.53 *** (1.78)	0.34 (0.46)	-0.22 (0.76)	1.44 (1.08)	3.15 ** (1.46)
log(1 + Staking)	0.67 (0.73)	1.09 (1.32)	3.63 ** (1.83)	5.89 ** (2.47)	0.83 (0.57)	-0.02 (0.93)	1.07 (1.34)	4.87 *** (1.83)
log(1 + # Chains)	-0.92 (17.40)	-26.77 (31.44)	-42.80 (43.37)	-56.74 (55.54)	-3.76 (14.78)	2.55 (24.13)	-13.84 (34.25)	23.47 (42.50)
log(1 + # Oracles)	5.57 (15.98)	13.85 (29.55)	29.90 (41.31)	29.88 (57.09)	-11.43 (13.55)	-8.09 (22.61)	15.56 (32.66)	60.25 (45.31)
Category Blockchain	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
Obs.	1,373	1,349	1,273	1,047	745	739	710	579
Adj.r ²	0.08	0.08	0.12	0.16	0.18	0.19	0.19	0.27

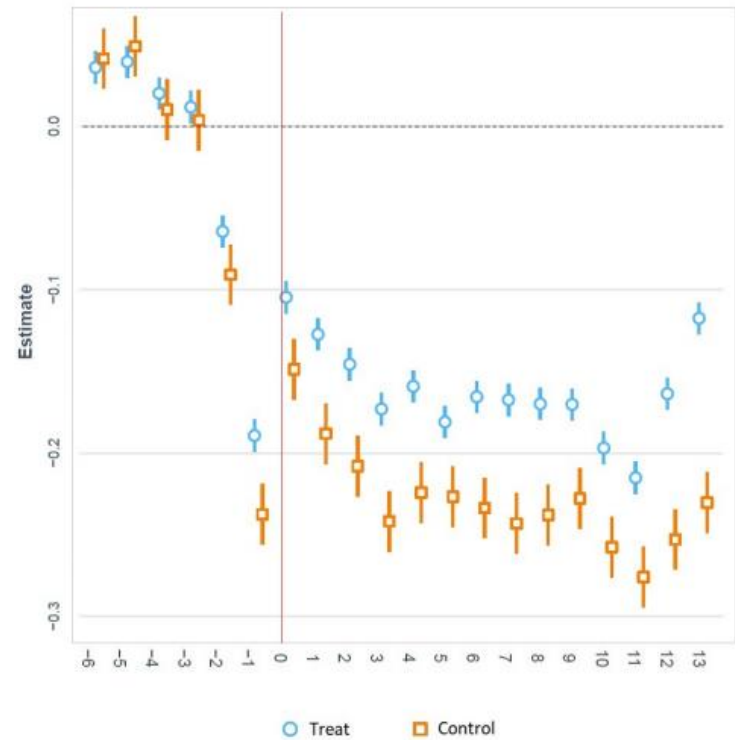


Systemic Risk or Resilience in Times of Crisis?

Panel A: Luna Crash



Panel B: FTX Collapse



4. Promising Future Directions

Agent-Based Modeling/Simulation for AI+Web3

- (i) DeFi features clearly specified action set, data-driven optimization, and allows decentralized monitoring/stress-testing.
- (ii) DLT can help incentivize AI training and data contribution/collection.



HOLOBIT

**Design and Optimize
Web3 Projects For Success**

On-chain and off-chain simulation

Real time risk alert and parameters dynamic adjust



Using our multiverse simulator to explore **all possible future scenarios**

Effectively **manage risk** and **dynamically optimize** your project for success.

ANY
QUESTIONS?



Thank you for the questions, comments, and discussion.

Lin William Cong

Rudd Family Professor of Management

Associate Professor of Finance (Johnson)

Faculty Director, FinTech@Cornell Initiative

Cornell University SC Johnson College of Business

Research Associate, National Bureau of Economic Research

Will.Cong@Cornell.edu | www.linwilliamcong.com



Dyson
The Hotel School
Johnson

Cornell
SC Johnson College of Business