

Centralized Governance in Decentralized Organizations

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The Big Picture: Decentralization in Web3

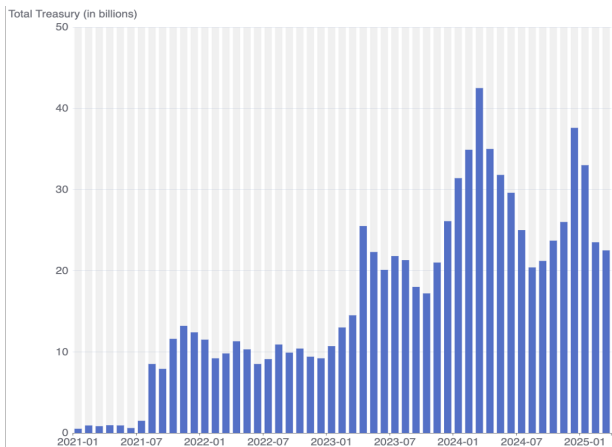
- ▶ Why decentralize?
 - Cong & He, 2019; Chen, Cong, & Xiao, 2021
- ▶ Decentralization at Consensus Layer
 - Biais et al., 2019; Rasu & Saleh, 2020; Cong, He & Li, 2021; Capponi, Olafsson & Alsabah, 2021
- ▶ Decentralization at Asset Layer
 - Cong, Tang, Wang, & Zhao 2022; Ao, Horvath, & Zhang, 2023
- ▶ Decentralization at Information Layer (blockchain oracles)
 - Zhang 2022; Cong et al., 2023; Cong, Prasad & Rabetti, 2024; Cong et al., 2025
- ▶ Decentralization at Governance Layer

Introduction to DAOs

- ▶ Decentralized Autonomous Organizations (DAOs), emerging governance structure enabled by blockchain and widely adopted in DeFi/Web3.
- ▶ **Decentralized**: No centralized authority (management or board); direct democracy by community members.
Autonomous: Automatic enforcement of governance rules and voting outcomes through smart contracts on the blockchain.
Organization: A group of people with a common goal that may or may not have legal considerations.

Rise of Decentralized Governance

- ▶ According to DeepDAO, the number of active DAOs has exceeded 10,000, with over 3.3 million active voters.¹



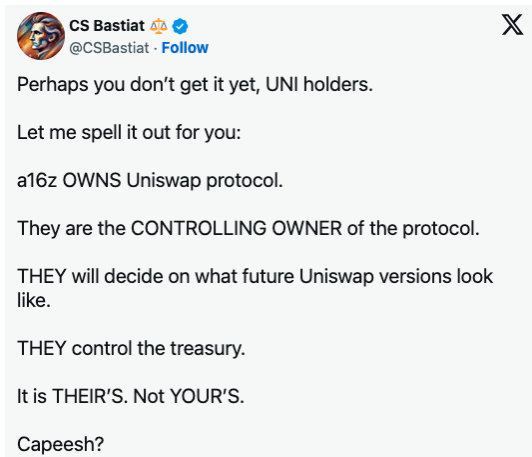
¹<https://deepdao.io/organizations>

Potential Benefits

- ▶ Traditional firms:
 - ▶ Separation of ownership and control; agency problems arise (Jensen & Meckling, 1976; Fama & Jensen, 1983).
 - ▶ Small group making proposals and decide; high information asymmetry and insider trading (Jaffe, 1974).
 - ▶ Large shareholders mitigate coordination issues (the free-rider problem) (Grossman & Hart, 1980; Shleifer & Vishny, 1986).
- ▶ DAOs (advocated to have decentralized governance):
 - ▶ Convergence of ownership and control: stakeholders with decision rights proportional to their ownership of governance tokens, mitigating agency problems.
 - ▶ Transparency: decisions/governance actions recorded on immutable/open blockchain, reducing info. asymmetry.
 - ▶ Simplified governance mechanism: facilitating participation of a broad spectrum of stakeholders.

Challenges Facing DAOs

- ▶ Decentralized governance technologically possible but not a guaranteed economic reality.




Paper in a Nutshell


- ▶ **Is DAO governance indeed decentralized?**
→ No. Governance activity is often highly concentrated among a small group of actors.
- ▶ **Do DAOs face similar governance issues as observed in traditional firms?**
→ Yes. The free-rider problem is worse in DAOs (underparticipation). Agency problem and insider trading re-emerge.
- ▶ **Are there observable economic consequences?**
→ Yes. DAOs with higher level of conflicts of interest experience larger decreases in Total Value Locked (TVL) following market crashes.
- ▶ **Are there mechanisms for mitigating the governance issues?**
→ Yes. Voting designs that enhance community monitoring or limit large stakeholders' voting power offer partial remedies.

Proposals in DAOs

- ▶ What are the proposals about?
Launch of new products, modifications to protocol parameters, allocation of treasury assets, etc.
- ▶ Who come up with the proposals?
Core team members, service providers, other token holders

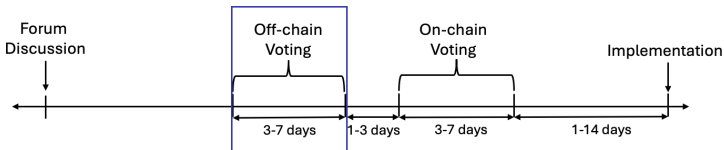
 XG17 Core Closed

[ARFC] Renew LlamaRisk as Risk Service Provider
Author: LlamaRisk Date: 2024-10-02 Summary We'll keep this short. When we initially applied to serve Aave as a risk service provider, our primary goal was ...

 XG17 Core Closed

[ARFC] Reduce Reserve Factor on wstETH
Title: [ARFC] Reduce Reserve Factor on wstETH Author: ACI (Aave Chan Initiative) Date: 2024-06-24 Summary For further alignment with the upcomin...

Governance Process



- ▶ **Forum Discussion**: A proposer posts a thread outlining the intended changes or initiatives on the community's discussion forum to gather feedback from other members.
- ▶ **Off-chain Voting**: In some DAOs, an initial voting round may occur off-chain using platforms like Snapshot.
- ▶ **On-chain Voting**: If the proposal gains sufficient preliminary support off-chain, it may move to the on-chain voting phase.
- ▶ **Implementation**: After a proposal achieves a quorum and receives a majority of affirmative votes to pass, it will get implemented through smart contracts on the blockchain.

Data and Sample

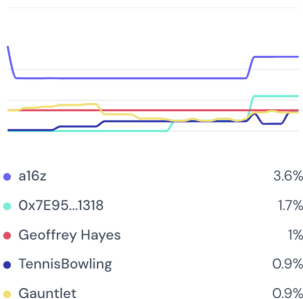
- ▶ Proposals with votes in the top quartile in a DAO whose native token is listed on CoinGecko during 2020-2024. (2988 proposals in 216 DAOs)
- ▶ **Information on DAO proposals and voting records from Snapshot**
 1. DAO info: name, token contract, proposal managers' wallet addresses
 2. Proposal characteristics: title, timeline, voting strategy, number of votes cast, scores for each option
 3. Voting records: addresses of voters, each voter's voting power and selected option
- ▶ **Token price data from CoinMarketCap**
price, volume, market cap, circulating supply
- ▶ **On-chain transaction data from BigQuery**
sender address, recipient address, transaction time, number of tokens transferred, transaction hash

Summary Statistics

	Obs.	Mean	SD	Min	Median	Max
DAO Characteristics:						
Number of Proposals per DAO	216	13.833	33.313	1.000	5.000	392.000
Has Forum	216	0.458	0.499	0.000	0.000	1.000
Proposal Characteristics:						
Duration	2,988	5.306	3.226	0.000	5.000	16.000
Num of Voting Strategies	2,988	3.013	2.331	1.000	2.000	8.000
Delegation	2,988	0.388	0.487	0.000	0.000	1.000
Quadratic Voting	2,988	0.012	0.108	0.000	0.000	1.000
Num of Voters	2,988	2,369.180	27,217.686	2.000	86.000	510,523.000
Support Ratio of Winning Option	2,988	0.844	0.243	0.027	0.991	1.000
Participation Rate	2,554	0.063	0.115	0.000	0.022	0.994
Gini	2,900	0.801	0.202	0.000	0.863	0.999
Top Decile Voters (%)	2,569	0.762	0.230	0.029	0.828	1.000
Largest voter (%)	2,900	0.375	0.242	0.002	0.312	1.000
Blockvoters (%)	2,900	0.762	0.240	0.000	0.839	1.000
Top Voters%	2,569	0.762	0.230	0.029	0.828	1.000

Stylized Facts: Centralized Governance

- ▶ **Low Participation Rates:** Only 6.3% of total eligible votes are cast per proposal, far below the 70%-80% participation rates in traditional firms.
- ▶ **Concentrated Voting Power:** The Gini coefficient for voting power distribution is 0.8. The top decile voters control 76.2% of the votes, and blockvoters (with over 5% of total votes) collectively account for 75.7% — far exceeding the 39% stake of blockholders in public firms.
- ▶ **Top voters:** Core team members, institutional investors, third-party service providers, and key opinion leaders.



Governance Influencers on Snapshot

- ▶ Proposal managers: Wallets listed on the settings page with granted permissions to manage the Snapshot space and proposals.
- ▶ Top Decile Voters: Wallets with voting power is in the top decile among all voters on a given proposal.

Members	
0x5d49...d60d	<button>granted</button>
Alice	<button>granted</button>
0xe2d6...08ae	<button>granted</button>
XGT7	<button>granted</button>
aave-labs.eth	<button>granted</button>
0xed03...8622	<button>granted</button>
monetsupply.eth	<button>granted</button>
state-layer.eth	<button>granted</button>
0x2357...66e6	<button>granted</button>
0x60c8...1fbf	<button>granted</button>
aavechan.eth	<button>granted</button>
kartoja1.eth	<button>granted</button>

Closed

[ARFC] Launch aUSDC GSM on Ethereum

Aave by TokenLogic

Share

title: [ARFC] Launch aUSDC GSM on Ethereum
author: @karpatkey_TokenLogic
created: 2024-10-18

Summary

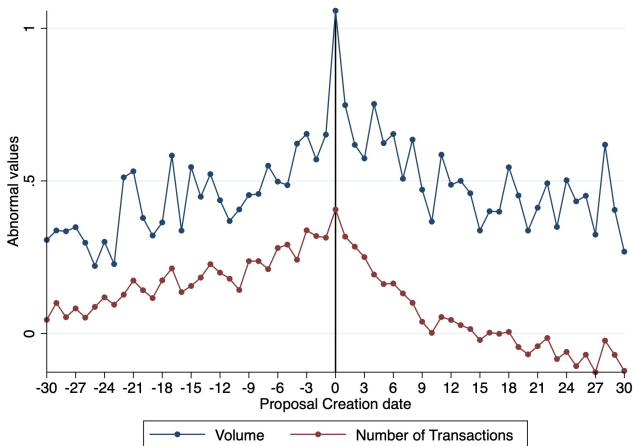
This publication proposes deploying a new aUSDC GHO Stability Module (GSM) and migrating USDC from the existing GSM on Ethereum.

Votes

aci.eth	YAE	367K AAVE
eez3al.eth	YAE	173K AAVE
Areta	YAE	101K AAVE
TokenLogic	YAE	47K AAVE
Wintermute Governance	YAE	45K AAVE
StableLab	YAE	40K AAVE

View all

Abnormal Trading around Proposal Creation



Abnormal Trading: Active vs. Passive Investors

$$Abvol_{iptd} = \beta_0 + \beta_1 Day[-30, -1]_{iptd} + \beta_2 VotingPeriod_{iptd} + \beta_3 Day[+1, +30]_{iptd} + \theta' Controls_{id} + \lambda_d + \sigma_i + \epsilon_{iptd}$$

	(1) All Investors	(2) Active Investors	(3) Passive Investors	(4) Diff.(2)-(3)
Day[-30, -1]	0.168** (0.033)	0.482*** (0.000)	0.192** (0.049)	0.290*** (0.001)
Voting period	0.176** (0.047)	0.762*** (0.000)	0.201* (0.067)	0.561*** (0.000)
Day[+1, +30]	0.224** (0.026)	0.422*** (0.001)	0.263** (0.039)	0.159* (0.075)
Size	-0.022 (0.487)	-0.052 (0.281)	-0.020 (0.539)	
Return volatility	0.019** (0.014)	0.014* (0.057)	0.019** (0.022)	
AbReturn	0.870*** (0.000)	0.720** (0.039)	0.992*** (0.001)	
Year-Month FE	Yes	Yes	Yes	
DAO FE	Yes	Yes	Yes	
Adj. R ²	0.101	0.030	0.099	
Obs.	252,331	245,075	252,156	

- ▶ Active investors exhibit a more pronounced increase in trading volume before proposal creation compared to passive investors.

Abnormal Trading by Active Investors

	(1) Proposal Managers	(2) Top Voters	(3) Bottom Voters	(4) Diff. (2)-(3)
Day[-30, -1]	0.592* (0.087)	0.525*** (0.001)	0.179*** (0.002)	0.346** (0.033)
Voting period	0.938** (0.028)	0.802*** (0.000)	0.339*** (0.002)	0.463*** (0.005)
Day[+1, +30]	0.773 (0.182)	0.290*** (0.009)	-0.071 (0.355)	0.361** (0.010)
Size	-0.579** (0.019)	-0.103 (0.126)	-0.040 (0.330)	
Return volatility	0.141*** (0.000)	0.024*** (0.000)	0.038*** (0.000)	
AbReturn	2.088** (0.044)	0.930*** (0.000)	0.549* (0.090)	
Year-Month FE	Yes	Yes	Yes	
DAO FE	Yes	Yes	Yes	
Adj. R ²	0.041	0.027	0.025	
Obs.	136,886	196,613	110,325	

- ▶ Proposal managers and top voters are the primary contributors to the volume spike.

Centralization and Insider Trading – Buy-Sell Imbalance

	Proposal Managers		Top Voters	
	(1)	(2)	(3)	(4)
	Neg. CAR	Pos. CAR	Neg. CAR	Pos. CAR
Day[-30,-1]	-0.009 (0.544)	0.039** (0.040)	0.125*** (0.003)	0.144*** (0.000)
Size	-0.001 (0.924)	-0.023 (0.220)	-0.016*** (0.000)	-0.017*** (0.000)
Return Volatility	-0.001 (0.957)	0.156 (0.119)	-0.009*** (0.000)	0.004 (0.845)
AbReturn	-0.078 (0.144)	-0.109 (0.172)	-0.095* (0.097)	-0.161*** (0.007)
Year-Month FE	Yes	Yes	Yes	Yes
DAO FE	Yes	Yes	Yes	Yes
Adj. R ²	0.253	0.256	0.049	0.052
Obs.	6,706	8,897	25,649	31,666

- ▶ Proposal managers likely have mixed motives of insider trading and vote accumulation when trading tokens before proposal creation.
- ▶ Top voters consistently make more purchases before proposal creation regardless of a proposal's price impact, indicating their dominant incentive to accumulate voting power.

Profitability of Trades

$$TradeProfit_{ijt} = \beta_0 + \beta_1 Day[-30, -1]_{itd} + \theta' Controls_{id} + \lambda_{ijt} + \epsilon_{ijt}$$

	Proposal Managers		Top Voters	
	(1)	(2)	(3)	(4)
Day[-30,-1]	0.131** (0.194)	0.095** (0.910)	-0.058 (0.035)	0.001 (0.044)
Size		-0.080*** (0.000)		0.059*** (0.000)
Return Volatility		-0.018* (0.064)		-0.000 (0.880)
AbReturn		-0.560*** (0.000)		0.242 (0.143)
Trade Size		0.092*** (0.000)		0.022*** (0.000)
Investor × DAO × YearQuarter FE	Yes	Yes	Yes	Yes
Adj. R ²	0.079	0.488	0.032	0.194
Obs.	79,131	73,487	283,527	253,024

- ▶ Proposal managers earn 9.5% higher market-adjusted returns when trading tokens prior to proposal creation, while top voters achieve no significant abnormal returns, further suggesting different trading motives of the two groups.

DAO Characteristics and Profitability of Insider Trades

	Has Forum		DAO Size		Gini		Top Voters%	
	(1) No	(2) Yes	(3) Low	(4) High	(5) Low	(6) High	(7) Low	(8) High
Day[-30, -1]	0.158*** (0.000)	0.036*** (0.000)	0.185*** (0.000)	0.002 (0.832)	-0.005 (0.713)	0.159*** (0.000)	-0.004 (0.765)	0.171*** (0.000)
Size	-0.080*** (0.000)	-0.050 (0.271)	-0.085*** (0.000)	0.003 (0.415)	-0.002 (0.902)	-0.079*** (0.000)	-0.002 (0.919)	-0.083*** (0.000)
Return volatility	-0.096 (0.516)	-0.006 (0.131)	-0.204*** (0.000)	-0.725 (0.185)	-0.006 (0.958)	-0.013** (0.013)	0.001 (0.994)	-0.169 (0.118)
AbReturn	-0.627*** (0.000)	-0.077*** (0.000)	-0.661*** (0.000)	-0.035 (0.363)	-0.009 (0.705)	-0.659*** (0.000)	-0.014 (0.392)	-0.648*** (0.000)
Trade Size	0.026 (0.802)	0.089*** (0.000)	0.159*** (0.000)	-0.025 (0.593)	0.033* (0.084)	0.072 (0.166)	-0.076 (0.187)	0.104 (0.170)
Investor × DAO × YearQuarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.531	0.338	0.554	0.111	0.138	0.540	0.138	0.541
Obs.	44,009	29,242	41,849	4,330	5,318	44,069	4,050	44,104

- Insider trading is more profitable in small DAOs with opaque information environment and concentrated voting power.

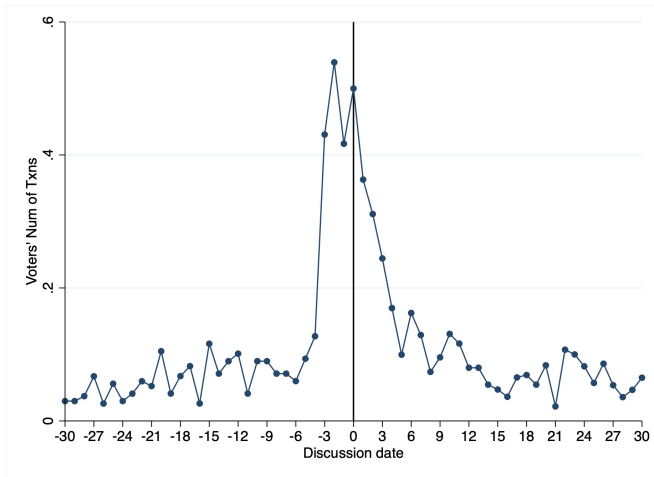
Effects of Voting Designs

	Delegation		Quadratic Voting	
	(1) No	(2) Yes	(3) No	(4) Yes
Day[-30, -1]	0.097** (0.042)	-0.012 (0.166)	0.095** (0.045)	0.005 (0.949)
Size	-0.080*** (0.000)	0.003 (0.762)	-0.080*** (0.000)	0.003 (0.777)
Return volatility	-0.016* (0.051)	-0.072*** (0.000)	-0.015* (0.051)	-0.071*** (0.000)
AbReturn	-0.563*** (0.000)	-0.176*** (0.000)	-0.562*** (0.000)	-0.179*** (0.000)
Trade Size	0.093*** (0.000)	0.136*** (0.000)	0.092*** (0.000)	0.137*** (0.000)
Investor \times DAO \times YearQuarter FE	Yes	Yes	Yes	Yes
Adj. R ²	0.492	0.587	0.491	0.589
Obs.	70,547	29,536	73,180	26,905

- ▶ Delegation improves the monitoring of blockvoters by community members.
- ▶ Quadratic voting reduces the influence of blockvoters on voting outcomes.
- ▶ Both strategies effectively reduce the profitability of insider trading.

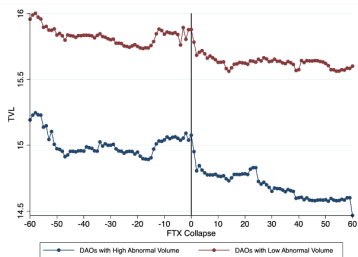
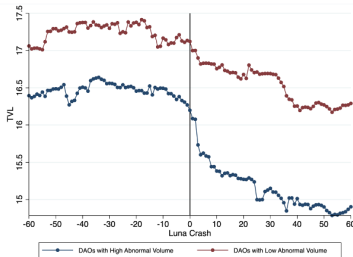
Insider Trading of External Tokens

- Unique setting of lending protocols: Values of external tokens are influenced by proposals, but these tokens do not confer any voting power.



Consequences of Conflicts of Interest

- ▶ How Total Value Locked (TVL) of DAOs with varying levels of conflicts of interest changes during two market-wide adverse shocks: the Terra-Luna crash and the FTX collapse.



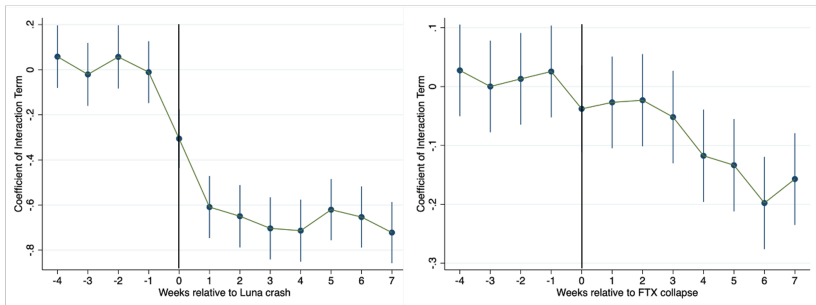
Effect of Negative Shocks on DAOs' TVL

$$\ln(TVL_{ijt}) = \beta_0 + \beta_1 Treatment_{ij} \times Post_t + \beta_2 Treatment_{ij} + \beta_3 Post_t + \theta' Controls_{ijt} + \lambda_j + \epsilon_{ijt}$$

	(1) Luna	(2) FTX
Treatment × Post	−0.189** (0.025)	−0.446*** (0.000)
Treatment	0.628*** (0.000)	0.255*** (0.002)
Post	−0.701*** (0.000)	0.065 (0.376)
Num of Chains	0.242*** (0.000)	0.167*** (0.000)
Size	0.177*** (0.000)	0.095*** (0.000)
Return	−0.459* (0.082)	−0.303 (0.489)
Industry FE	Yes	Yes
Adj. R ²	0.496	0.213
Obs.	8,984	11,088

- DAOs with higher conflicts of interest experience significantly larger decreases in TVL following the two market shocks, as investors may perceive these DAOs as having greater exposure to governance risk.

Dynamic Effects of Luna/FTX Crash



- ▶ No significant pre-shock trends, consistent with the parallel trend assumption.
- ▶ The adverse effects begin immediately after the Luna crash and four weeks after the FTX collapse, persisting throughout the sample period.

Contribution

► Corporate governance and shareholder voting

1. Examine governance issues in a novel organizational form, including free-rider problem (Grossman & Hart, 1980; Shleifer & Vishny, 1986), agency problem (Jensen & Meckling, 1976; Fama & Jensen, 1983), insider trading (Jaffe, 1974), adding to the decades-long debate on efficient corporate governance design.
2. Leveraging the transparency of blockchain data, we match investors' trading activity with their voting behavior in DAOs, providing direct evidence of vote trading (Bethel et al., 2009; Christoffersen et al., 2007).

► Insider trading in corporations

1. Extends insider trading literature (Cohen et al., 2012; Dechow et al., 2016; Blackburne et al., 2021) by analyzing this phenomenon in the novel context of DAOs, highlighting the issue of insider trading in decentralized governance.

► Blockchain-based governance

1. Emerging studies on promises and challenges of DAOs (Appel & Grennan, 2023; Fritsch et al., 2024; Jiang & Li, 2024; Han et al., 2023).
2. Adding to broader discussions on economic tensions of decentralization in Web3. (Cong & He, 2019; Cong, He, & Li, 2021; Cong et al., 2022; Cong et al., 2025; Sockin & Xiong, 2023; Ferreira & Li, 2024).

Conclusion

1. Governance in DAOs is highly centralized, with low participation rates (6.3%) and the top 10% of voters controlling 76.2% of the voting power.
2. Governance influencers, including proposal managers and top voters, accumulate voting power through token trading before proposals.
3. Proposal managers engage in profitable insider trading, earning an average market-adjusted return of 9.5%; profitability more pronounced in small DAOs (opaque info. environment & high voting concentration).
4. Voting designs that enhance community monitoring or limit large stakeholders' voting power can partially mitigate insider trading.
5. DAOs with higher levels of conflicts of interest experience larger declines in Total Value Locked (TVL) following adverse market shocks.
6. DAOs currently do not solve the governance problems of traditional firms; better design and regulation needed.