# Centralized Governance in Decentralized Organizations[*]

Lin William Cong[†] Daniel Rabetti[‡§] Charles C.Y. Wang[¶] Yu Yan[‖]

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**Abstract**

We systematically document governance centralization in decentralized autonomous organizations (DAOs) and study its drivers and economic implications. Using multiple data sources and granular on-chain transactional data, we compare our findings to those in corporate finance (and venture startup) settings, to derive several key insights. Unlike traditional firms, DAOs, including most Decentralized Finance (DeFi) projects, have lower participation rates and more concentrated voting power. Moreover, these governance features result in blockvoters controlling 76.2% of the voting power in decisions. Examining the economic implications of centralization, we observe significant abnormal trading activity around governance proposals. Analyzing trading behavior, we show that while blockvoters focus on influencing governance outcomes, proposal managers engage in insider trading—yielding an average market-adjusted return of 9.5%. The combination of concentrated voting power and insider trading can be value-destroying in the long run, particularly during times of crisis when governance becomes central to the survival of business organizations.

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[†]Cornell University SC Johnson College of Business (Johnson), ABFER, and NBER, will.cong@cornell.edu.
[‡]Corresponding Author: National University of Singapore (NUS) Business School, 15 Kent Ridge Drive, Singapore, 119245.
[§]Harvard Business School (visiting), drabetti@hbs.edu.
[¶]Harvard Business School and European Corporate Governance Institute (ECGI), cwang@hbs.edu.
[‖]National University of Singapore (NUS) Business School, yu.yan@u.nus.edu.

# Conflict of Interest

The authors have no financial relationships or other sources of potential conflicts of interest.

# 1 Introduction

Governance is a cornerstone of business success, shaping how organizations are controlled and managed (Shleifer and Vishny, 1997; La Porta et al., 1998). In traditional corporations, where ownership and control are separated, governance follows a hierarchical structure: shareholders elect the board of directors, who appoint managers to oversee operations. Not only are firm policies shaped by relatively exclusive groups of managers and boards, but shareholder voting is often dominated by a few blockholders and activists (Iliev et al., 2015; Yermack, 2010).

An alternative model of governance as advocated in Decentralized Autonomous Organizations (DAOs) has been adopted by most Decentralized Finance (DeFi) projects. Instead of centralizing decision-making in managers and boards, DAOs rely on a decentralized voting process to govern operations (Harvey and Rabetti, 2024). Governance token holders can directly participate in decision-making by creating and voting on proposals. Voting outcomes are automatically enforced through smart contracts on the blockchain. As of early 2025, the number of active DAOs has surpassed 10,000, with more than 3.3 million voters. Figure 1 illustrates the monthly total assets owned From January 2021 to March 2025, the total value of assets in DAO treasuries increased dramatically from $520.7 million to $22.5 billion, with substantial increases occurring in 2023.[1] Despite the well-intended design and growing popularity of DAOs, their governance structure and voting dynamics in practice lack a systematic investigation.

To this end, we closely examine four key aspects of DAOs. First, we assess whether DAO governance is truly decentralized by analyzing the distribution of voting rights among participants. Second, we examine vote trading before proposal creation to determine the existence of a vote market and how large voting blocks form. Third, we explore how concentrated voting power leads to conflicts of interest among stakeholders and facilitates insider trading. Finally, we analyze whether high voting power concentration, combined with insider trading, harms the economic development of DeFi protocols. Overall, our study provides one of the most comprehensive assessments of the levels and economic implications of centralized governance in decentralized organizations.

[Figure 1]

[1]Monthly total assets owned, based on statistics from DeepDAO, a tracking platform: https://deepdao.io/organizations. A few DAOs were launched in 2017—2019, a period characterized by token offerings and frauds (e.g., Howell et al., 2020; Lyandres et al., 2022; Davydiuk et al., 2023; Lyandres and Rabetti, 2024; Gefen et al., 2024; Cong et al., 2024).

As an organizational innovation, DAOs are believed to have several advantages over conventional corporations (e.g., Bena and Zhang, 2023). First, DAOs promote a direct democracy governance model, where stakeholders have decision rights proportional to their ownership of governance tokens. This overlap between principals and agents can potentially reduce the agency problems often seen in traditional corporations, where ownership and control are separated (Jensen and Meckling, 1976; Fama and Jensen, 1983). Moreover, DAOs intend to involve a broad spectrum of stakeholders—ranging from investors and developers to consumers—in the decision-making process, which can facilitate community building and promote a sustainable ecosystem (Li et al., 2021; Cardillo et al., 2023). Another critical benefit of DAOs is transparency. All decisions and governance actions within a DAO are recorded on the blockchain, creating an immutable and publicly accessible ledger. This real-time transparency allows any member or outsider to audit or review the organization's activities, likely minimizing the risk of opaque decision-making and reducing information asymmetry (Cong and He, 2019).[2]

However, all these advantages depend on DAOs being sufficiently decentralized, which is technologically possible but may not be an economic reality.[3] For example, in Uniswap, the largest decentralized exchange on Ethereum, venture capital firm Andreessen Horowitz (a16z) holds a significant stake in UNI tokens, exerting substantial influence on governance.[4] Concerns over "Uniswap controlled by a16z" have sparked widespread debate within the crypto community.[5] This concentration of power undermines the core principles of DAOs, raising the risk of governance being dominated by a few influential actors.

We start our analysis by investigating whether governance in DAOs is indeed decentralized. Using granular proposal and voting data from a popular voting platform, we document that the overall participation rate in DAOs is notably low, averaging around 6.3%—significantly lower than the 70%-80% participation rates observed in traditional corporations (Larcker and Tayan, 2020). Further analysis reveals a striking concentration of voting power: top-decile voters control 76.2% of the realized total voting power. Applying blockchain forensics with Ethereum Name Service (ENS), we identify four primary categories to which top-voters belong: core team members, institutional investors, third-party service providers, and other key opinion leaders—prominent figures including active community members and industry

[2] See Lee et al., 2024 and Luo et al., 2024 for blockchain adoption benefits in the corporate setting.

[3] A similar concern about mining centralization was widespread among practitioners with the rise of mining pools. However, Cong et al. (2021) dispelled the myth with convincing economic analysis and empirical evidence.

[4] See https://decrypt.co/120653/uniswap-controlled-a16z-crypto-twitter-split-over-vc-firms-governance-move.

[5] See "Anti-competition cartels in DeFi are real" at https://x.com/CSBastiat/status/1622201701921964035.

experts.[6] These investors typically hold a large number of governance tokens or receive extensive delegations from other community members, granting them considerable influence over voting outcomes.[7] Our findings suggest that DAOs thus far fall short of delivering the promise of decentralized governance.

Next, we analyze governance token trading before proposal creation. Prior research suggests that shareholders acquire voting rights ahead of key proposals to increase their influence, typically through direct spot market trading (Fos and Holderness, 2023; Bethel et al., 2009) or stock borrowing in the equity loan market (Christoffersen et al., 2007; Hu and Black, 2007; Aggarwal et al., 2015). Motivated by this, we examine the pre-governance proposals token trading behavior of two groups of governance participants—proposal managers and top decile voters—around proposal events on Snapshot, a widely used off-chain voting platform. Leveraging on-chain transaction data from BigQuery, we find evidence of abnormal trading of tokens during the month leading up to DAO proposal creation. Specifically, we observe that total trading volume increases by 16.8% during this period. Proposal managers and top voters are the primary contributors to this volume spike, with volume growths of 59.2% and 52.5%, respectively.

The concentrated voting power and unbalanced engagement in governance expose DAOs to governance vulnerabilities, including the risk of governance capture by a few influential actors. For example, on April 17, 2022, Beanstalk, a permissionless fiat stablecoin protocol, suffered a governance attack in which a malicious actor exploited flashloans to amass significant voting power quickly, and passed two proposals that drained approximately $181 million worth of tokens from Beanstalk's treasury.[8] In a recent incident, a whale known as Humpy in the Compound DAO manipulated the voting process to push through a proposal that directed $24 million worth of COMP tokens to a yield-bearing protocol he controlled.[9] These examples highlight that the concentration of voting power in the hands of a few large token holders fosters conflicts of interest between blockholders and minority investors, undermining equality and fairness in the decentralized system. A particularly concerning consequence of this power imbalance is the potential for insider trading. Active participants are deeply involved in the decision-making process and wield substantial influence over its development. Their involvement grants them privileged access to non-public information, creating a notable information advantage over other stakeholders.

[6] The Ethereum Name Service (ENS) is a decentralized naming protocol built on the Ethereum blockchain that links user identities to wallet addresses. Blockchain forensics is the practice of analyzing on-chain data to draw economic inferences.

[7] This level of centralization mirrors patterns seen in traditional startups, where founders and early-stage investors hold significant equity stakes and control rights (Hellmann and Puri, 2002; Pollman, 2019).

[8] https://medium.com/immunefi/hack-analysis-beanstalk-governance-attack-april-2022-f42788fc821e.

[9] www.coindesk.com/markets/2024/07/29/comp-down-67-after-supposed-governance-attack-on-compound-dao/.

This access raises concerns about whether such insiders might use this advantage to engage in opportunistic trading, thereby creating a potential wealth transfer from minority investors. On the one hand, the lack of regulatory oversight in the DAO space, combined with the anonymity provided by blockchain technology, complicates the tracking of insider trades and reduces the legal risks associated with such activities, thereby contributing to the likelihood of insider trading. On the other hand, the decentralized nature of DAO governance dilutes insiders' ability to exert effective control over decision-making processes. Additionally, the transparency afforded by blockchain technology—where all transactions are recorded and made publicly accessible in near real-time (e.g., Sokolov, 2021; Amiram et al., 2022; Makarov and Schoar, 2022; DeSimone et al., 2025)—constrains the profitability of insider trading. Decentralized governance and blockchain transparency mitigate insiders' incentive and ability to engage in opportunistic trading. Therefore, the extent of insider trading in DAOs remains an open and empirical question.

Our examination of insider trading mechanisms starts with analyzing the trading behavior of proposal managers and blockvoters around the time of proposal creation. If trading is driven by insider information, we expect governance influencers to actively purchase tokens before proposals that are anticipated to positively impact token prices, thereby generating abnormal positive returns. Consistent with this conjecture, we find that proposal managers increase their token purchases before the creation of value-enhancing proposals. However, we find no such evidence of trading activity before proposals associated with negative CARs. Interestingly, blockvoters consistently increase token purchases before proposal creation, regardless of a proposal's subsequent price impact. This pattern suggests that while proposal managers actively engage in insider trading, blockvoters primarily accumulate voting power to influence governance outcomes, effectively rubber-stamping proposals.

Next, we examine whether governance influencers profit from trading before proposal creation. Our findings suggest that proposal managers earn 9.5% higher market-adjusted returns when trading tokens before proposal creation, compared to trading shortly afterward. In contrast, blockvoters do not derive significant short-term returns. The profitability of insider trading is more pronounced in small DAOs with worse information environments and concentrated voting power, where governance influencers have greater information advantage and easier influence over voting outcomes. In contrast, voting strategies that enhance community monitoring or limit blockholders' voting power mitigate insider trading's profitability, suggesting that market solutions can effectively reduce insider trading.

A concern arises as one cannot disentangle vote buying from trading based on token valuation, as both are intertwined in the full sample, potentially contaminating our previous claims of insider trading. As a robustness check, we leverage the unique setting of the Compound protocol—a lending platform where the value of interest-bearing tokens (cTokens) is influenced by proposal outcomes, yet these tokens do not carry voting rights. Our analysis reveals that Compound voters engage in 6.5 times more transactions of cTokens whose value is influenced by a proposal in the six days leading up to the proposal creation. This pattern is consistent with informed trading behavior, alleviating concerns that voting power accumulation considerations drive token trading near governance proposals.

Finally, we examine the economic implications of conflicts of interest in DAOs. Following Cong et al. (2023), we analyze how the total value locked (TVL) in DAOs with varying levels of conflicts of interest captures their economic responses to market-wide negative shocks.[10] The identification strategy consists of testing the implications of insider trading on DAOs economic activity around two major crises: the Luna-Terra crash and the FTX collapse. We employ a DiD design, categorizing DAOs based on whether their abnormal trading volume in the month before proposal creation is above or below the sample median. We then compare their TVL before and after these events. DAOs with higher conflicts of interest experienced significantly greater TVL declines following market shocks 18.9% (4.6%) more after the Luna crash (FTX collapse) compared to DAOs with lower conflicts of interest. Our findings are robust across multiple checks, alternative specifications, and empirical techniques aimed to mitigate endogeneity concerns. Overall our results suggest that conflicts of interest—exacerbated by voting power concentration and rubber-stamping stakeholders—are detrimental to DeFi protocols, particularly during crises when governance is critical to survival.

Our insights are not derived without caveats. First, while our study examines one of the largest samples in the DAO literature, our findings are mostly limited to large DAOs with available data. Given the rapid growth of DAOs, future research could focus on newer ventures to capture emerging governance dynamics. Additionally, our proxy for abnormal trading volume may include transfers unrelated to vote trading, such as wallet transfers between the same owner. Future studies could refine identification strategies to better isolate transfers linked to vote trading. Moreover, although we employ strategies to differentiate insider trading from vote buying, such as the Compound analysis, and we employ exogenous market-wide shocks to test the impact of insider trading on DAOs economic growth, our results

[10] TVL (Total Value Locked) is a key metric in crypto, representing the total dollar value of assets locked in a DeFi protocol. Conceptually, TVL is akin to a bank's total deposits, making it useful for studying decentralized finance.

should be interpreted cautiously in terms of causality. Future research could exploit alternative identification strategies to support establishing causal pathways. Despite these limitations, our study provides an initial assessment of the determinants and economic implications of DAO centralization.

Our study contributes to several threads of literature, starting with the extensive one on shareholder voting and corporate governance. Voting is a fundamental channel through which shareholders exercise control over corporate decisions (Yermack, 2010; Larcker and Tayan, 2020; Zachariadis et al., 2020). Existing studies have documented that shareholders strategically acquire voting rights before record dates—either through trading or borrowing shares—to sway proposal outcomes (Bethel et al., 2009; Christoffersen et al., 2007). However, most studies fail to match specific investors' trading behaviors with their voting behaviors, and thus provide only aggregate-level evidence of the correlation between trading and voting. Leveraging the transparency of blockchain data, we match investors' trading activity with their voting behavior in DAOs, providing direct evidence of vote trading.

We contribute to the growing literature on blockchain-based governance by examining two key aspects of governance and voting dynamics in DAOs.[11] First, while DAOs are designed to promote inclusive and democratic decision-making, we find low participation rates and highly concentrated voting power. These results align with existing studies on DAO governance (Appel and Grennan, 2023b,a; Fritsch et al., 2024; Jiang and Li, 2024; Laturnus, 2023), adding to broader discussions on economic tensions in decentralized organizations (Cong and He, 2019; Sockin and Xiong, 2023; Fracassi et al., 2024). Ferreira and Li (2024) propose a model showing that DAOs face a trilemma between autonomy, decentralization, and efficiency. Our study complements this by providing empirical evidence of centralization in DAOs and revealing the economic mechanisms driving it. Second, token-based decentralized governance can better align founders' interests with users' (Bena and Zhang, 2023) whereas centralized structures in DAOs can create conflicts of interest among stakeholders (Das et al., 2023; Fan et al., 2024). Han et al. (2023) and Han et al. (2025) show that concentrated ownership fosters conflicts between large participants ("whales") and smaller ones, negatively affecting platform growth. Similarly, Bellavitis and Momtaz (2024) finds that deviations from decentralization undermine DAO value. Our paper documents a new type of conflict of interest in DAOs between informed and less informed participants, which exacerbates platform instability during market shocks.

Finally, our study expands the broader corporate governance literature by analyzing insider trading

[11] Appel and Grennan (2023b) and Han et al. (2025) provide an excellent introduction to DAOs.

in the unique context of DAOs. Prior research has extensively documented how various stakeholders, including corporate executives (Cohen et al., 2012; Dechow et al., 2016; Blackburne et al., 2021; Jagolinzer et al., 2020), independent directors (Arif et al., 2022; Kim and Oh, 2023), industry peers (Deuskar et al., 2024), suppliers (Alldredge and Cicero, 2015), business partners (Mehta et al., 2021), and banks (Haselmann et al., 2021), trade ahead of material, non-public information events and earn abnormal profits from such trades. Félez-Viñas et al. (2022) find evidence of insider trading in the crypto market before exchange coin listing announcements. Our paper extends the analysis to DAOs—a novel environment characterized by decentralized governance, a lack of regulatory oversight, and transparent yet anonymous trading activities. We find that information asymmetry in DAOs allows stakeholders with privileged access to exploit less-informed investors, adding to the broader literature on misconducts in the crypto space (Amiram et al., 2022; Cong et al., 2023, 2024; Li et al., 2021; Rabetti, 2023; Gefen et al., 2024). These findings offer new insights into insider trading in decentralized ecosystems, contributing to the increasing awareness of the pros and cons of decentralized emerging technologies.

# 2 Institutional Background and Data

## 2.1 Institutional Details of DAOs

Decentralized Autonomous Organizations (DAOs) are a key innovation emerging from the cryptocurrency and blockchain ecosystem. They represent a new form of governance and coordination for blockchain-based projects. By encoding governance rules in smart contracts on the blockchain, DAOs automate governance processes, including submission of proposals, design of voting mechanisms, and execution of voting outcomes, removing the need for centralized management to lead the decision-making process. DAOs establish their own governance frameworks, which outline the rules and processes of decision-making. These frameworks typically specify participant eligibility, the methods used to calculate voting power for token holders, the criteria for proposal acceptance, and the mechanisms for implementing approved proposals on the blockchain. For instance, Gnosis DAO's governance framework allows any member to submit a proposal, but it must pass through two stages before being opened for voting. Only members holding at least one governance token are eligible to vote.[12] Core teams of DAOs typi-

[12] https://deepdao.io/knowledge/1Q1xCztMeB12PIZe2ytTwo.

cally use online platforms, particularly social media channels such as Twitter and Discord, to facilitate communication with their members.

Decisions in DAOs are made through a token-based voting system with governance tokens as a central component. Most projects integrate governance functions into their native tokens, while others issue separate tokens for governance and utility purposes.[13] In DAOs that implement governance using frameworks like the Compound Governor contract, governance tokens need to be explicitly delegated—either to the token holders themselves (self-delegation) or to representatives—to activate their voting power. Stakeholders with (activated) governance tokens can participate in decision-making by creating and voting on proposals that determine DAOs' operations and allocation of resources, including which new products or features to develop, which budget structure, and which partnerships to find.

A DAO's governance process typically consists of four phases: forum discussion, off-chain voting, on-chain voting, and implementation. Figure 2 plots a DAO's governance process timeline. The process usually begins with an open discussion in a community forum. Here, a member (often referred to as the proposer) posts a detailed proposal outlining the intended changes or initiatives. This forum serves as a space for community members to provide feedback, ask questions, and suggest modifications to the proposal. The discussion usually takes a few days to several weeks, depending on the proposal's complexity. After incorporating feedback from the forum discussion, the proposer drafts the final version of the proposal. This draft is then submitted for voting. In some DAOs, an initial voting round may occur off-chain using platforms like Snapshot. Off-chain voting is typically gas-free, making it a cost-effective way for members to express their preferences. DAOs can set up voting strategies to calculate the number of votes for each voter based on the number of governance tokens in their linked wallets prior to the proposal creation date. Typically, the more tokens an investor holds, the more vote power they have. This stage usually lasts for 3-7 days. The proposal may move to the on-chain voting phase if it gains sufficient preliminary support. DAO members' votes are submitted as transactions during this phase and recorded directly on the blockchain. Once a proposal achieves a quorum and receives a majority of affirmative votes to pass, it is implemented through smart contracts, ensuring that the decisions made by the community are enforced without requiring a centralized authority.

[Figure 2]

[13]Native tokens perform functions within each blockchain ecosystem and provide access to the platform's services.

DAOs can implement governance through either off-chain voting, on-chain voting, or a combination. In a hybrid voting scheme, off-chain voting is commonly used as a preliminary phase to gauge the community's stance on a proposal. Only proposals that pass this initial stage move on to on-chain voting. In some DAOs, representatives or trusted members may replicate the results of off-chain votes onto the blockchain to trigger the execution of smart contracts while saving transaction fees associated with on-chain activity. Therefore, for DAOs using off-chain voting, substantive decision-making often occurs during the off-chain phase. In contrast, the on-chain phase is primarily used to formalize and implement the outcome.

## 2.2 Data and Sample

To provide an empirical investigation of the governance in DAOs, we draw data from several sources. Information on DAO proposals and voting records is obtained from Snapshot, a popular off-chain voting platform that allows DAOs to create proposals and manage votes without gas fees. We start by downloading all DAOs available on Snapshot as of September 1, 2023. Given that Snapshot allows anyone to create and feature a DAO on its voting platform, most DAOs listed are relatively small and lack substantive underlying business activities. Therefore, we only keep DAOs with native ERC-20 tokens listed on CoinGecko, which resulted in a reduced sample of 342 DAOs. Each DAO's Snapshot page lists proposal manager accounts (wallet addresses) that have been granted high-level permission to manage the space and its proposals. They are likely core team members engaged in the DAO's internal operations. Since the governance rules of DAOs are enforced by smart contracts, any operational changes, even minor ones, necessitate the creation of a proposal. We only keep proposals with votes in the top quartile for each DAO to focus on impactful governance activities. These proposals are likely critical to the DAO's operation and management. Finally, we ended up with 2,988 proposals in 216 DAOs on Snapshot during 2020-2024. Information on proposals includes a DAO's name, proposal title, body, and timeline (i.e., created date, start and end date of voting), voting strategy, number of votes cast, and scores for each option.

Next, we retrieve information on voting records from Snapshot using its API, which contains the addresses of voters, each voter's voting power, and selected choice. Moreover, we gather delegation data on the sample DAOs from Snapshot's delegation panels. Each delegate listed on the delegation panel provides information such as their wallet address, a statement regarding their role or intentions, the number of delegations they have received, and their total voting power. However, Snapshot's panels only display delegations facilitated through their platform. A subsample of DAOs adopts a hybrid voting scheme that combines both off-chain and on-chain voting. To account for delegations facilitated through smart contracts on the blockchain, we supplement this data with information from Tally, a popular on-chain governance platform.

To study the behavior of governance participants around proposal events, we complement the DAO voting data with on-chain transactions from BigQuery, a publicly available parsed Ethereum dataset. The dataset compiles transaction-level data covering token address, sender address, recipient address, transaction time, number of tokens transferred, and transaction hash (transaction identifier) for each on-chain transaction. We aggregate transaction volume at the daily level for each native token in our sample. We focus on on-chain volume because on-chain volume is recorded and validated on the blockchain through consensus mechanisms, ensuring high security and immutability. In contrast, off-chain volume occurs outside the blockchain and is susceptible to manipulation (Amiram et al., 2020; Cong et al., 2023). Finally, we collect price information on DAOs' native tokens from CoinMarketCap, a leading platform for tracking the market data of crypto assets. CoinMarketCap aggregates trading information from over 200 crypto exchanges, offering daily data on opening, closing, high and low prices, volume, and market capitalization (in dollars) for over 10,000 crypto assets. CoinMarketCap includes active and defunct cryptocurrencies, which helps mitigate survivorship bias (Liu and Tsyvinski, 2021). We merge DAO voting data with on-chain transactions and token price data using the token address.

# 3 Governance Concentration

## 3.1 Governance Proposals

Table 1 presents the summary statistics for characteristics of DAOs and proposals in our sample. A typical DAO has 13.83 significant proposals on Snapshot. About 46% of DAOs in the sample have an open discussion forum, and 16.7% of DAOs have non-empty delegation panels. Regarding proposal characteristics, the voting period for a proposal is about 5.3 days. A proposal usually employs three voting strategies to calculate the voting power of token holders. About 38.8% and 1.2% of proposals adopt delegation strategy and quadratic voting strategy, respectively. 2,369 voters cast a vote on an average proposal. Most proposals get passed with a high support ratio of 84.4%. Approximately 52.6% of proposals are created by proposal managers who are likely core team members in the DAOs. 30.2% of proposals are created by voters who also cast votes on the proposals, with 46.3% of the proposals created by top decile voters. The fraction of proposals initiated by proposal managers is notably lower than the fraction of proposals submitted by management in traditional corporations, where over 90% of proposals at shareholder meetings are submitted by management (Calluzzo and Kedia, 2019; Cvijanović et al., 2016; Babenko et al., 2023). This difference suggests that DAO governance may be more decentralized, as a significant portion of proposals are initiated by investors outside the core team. However, our identification of core team members is limited to those explicitly listed on Snapshot, and the anonymity provided by blockchain technology may obscure additional proposals created by team members. As such, it remains unclear whether DAOs are genuinely more decentralized in terms of proposal creation. Of the proposals initiated by proposal managers, 97.5% are approved, and 7.9% are contentious with a support ratio between 0.4 and 0.6, resembling the high support rate typically observed for management proposals in traditional corporations (Calluzzo and Kedia, 2019; Cvijanović et al., 2016).

The participation rate, defined as the proportion of votes cast to the total eligible votes, is approximately 6.3% for an average proposal in our sample, which is notably lower than the rates observed in traditional corporations.[14] The average voting participation rate is around 70% to 80% of shares outstanding for public firms in the U.S. (Larcker and Tayan, 2020; Zachariadis et al., 2020). Several factors contribute to this disparity. First, casting an informed vote in DAO governance demands significant time and effort, as participants must comprehend intricate technological and economic mechanisms underpinning the organization. The associated high cognitive and participation costs often discourage token holders from voting. Moreover, those who do engage in governance rarely receive financial incentives for their contributions, leading to a free-rider problem. As a result, the overall participation rate in DAOs remains relatively low (Jiang and Li, 2024; Laturnus, 2023).

## 3.2 Voting Power

To evaluate the degree of centralization in DAO governance, we calculate two metrics that measure the inequality in the distribution of voting power: the Gini coefficient for votes cast on a proposal and the

[14] We estimate eligible votes using the number of circulating tokens on the proposal creation date (or the closest prior date if that data is unavailable). However, this estimate may not be exact, as some proposals allow voting with multiple token types beyond the governance token or use a conversion rate other than one-to-one between governance tokens and votes. We exclude proposals with participation rates exceeding 100%.

fraction of votes controlled by top decile voters in a proposal. As a significant portion of delegated votes are unexercised, we base our calculations on votes cast on proposals to capture the distribution of voting powers that are exercised. On average, the Gini coefficient for voting power distribution in a proposal is about 0.8. The top decile voters control 76.2% of a proposal's voting power, with the largest voter alone holding 37.5%. Blockvoters—voters with votes exceeding 5% of a proposal's total votes—collectively account for 75.7% of the voting power. This degree of centralization surpasses that observed in traditional corporations. Holderness (2009) document that blockholders in public firms (shareholders who own at least 5% of the firm's common stock) collectively own 39% of the voting power on average. The average size of the largest shareholder is 26%.

By analyzing the Ethereum Name Service (ENS) names linked to the wallet addresses of the top voters or reviewing their statement in the delegation page, we identify four primary categories to which they belong: core team members, institutional investors, third-party service providers, and Key Opinion Leaders (KOLs), which may be either individuals or groups. Let's use Compound, a lending protocol, as an example to understand blockvoter's composition in DAO governance. The voter with the largest voting power in Compound is a16z, a venture capital fund specializing in investments in crypto and Web-3 startups. The second-largest voter is Geoffrey Hayes, the CTO of Compound, followed by an active community member operating under the pseudonym TennisBowling. Another prominent voter is Gauntlet, a firm employed by Compound to offer risk management services. The left panel of Figure 3 illustrates the evolution of voting power among the top five voters in Compound. A16z consistently holds more than twice the voting power of the second-largest voter throughout the observed period. The voting power of the second-largest voter increases over time, while the power held by other voters remains relatively stable. The composition of blockvoters varies significantly across DAOs. While some DAOs are dominated by core team members and institutional investors, others feature a substantial proportion of blockvoters who are KOLs with specialized expertise in the crypto sector. Moreover, the evolution of voting power demonstrates considerable differences across DAOs. For instance, the right panel of Figure 3 illustrates the voting power dynamics in Arbitrum, a layer-2 scaling solution built on Ethereum. Unlike Compound, where voting power remains relatively stable among top voters, Arbitrum exhibits more dynamic and upward trends in voting power among its leading participants. This highlights the diversity in voting power trajectories across different DAOs.

While DAOs aim for decentralization, voting power often becomes concentrated among large token holders such as founders and early-stage investors—resembling the power structure seen in traditional startups. In startups, equity ownership is restricted and typically illiquid. Founders and early investors influence governance through preferred shares and board seats (Hellmann and Puri, 2002; Pollman, 2019). In contrast, DAOs are crowd-owned, where governance tokens—representing voting rights—are widely accessible and actively traded on secondary markets, allowing for a more fluid redistribution of decision-making power. Despite their distinct governance model, DAOs exhibit a high degree of centralization as startups, driven by the initial distribution of tokens and the dynamics of vote trading.

[Figure 3]

Figure 4 illustrates the evolution of voting power concentration over time, where the x-axis represents the chronological order of proposals within a DAO (e.g., "1" denotes the first proposal, "2" the second, and so forth). The figure shows the average Gini coefficient and the share of voting power held by the top decile voters for the first 30 proposals. Both metrics begin at high levels and exhibit a clear upward trend as DAOs grow over time, indicating an increasing concentration of voting power.

[Figure 4]

The initial concentration of voting power can be attributed to the concentrated token allocation schemes in DAOs. According to Pantera Capital, early-stage investors and core team members receive disproportionately large allocations—approximately 28.8% and 20.6%, respectively—of the tokens distributed among eligible voters. When analyzing active voters, these groups of investors hold an even greater share due to their heightened engagement in DAO governance, which grants them substantial influence over voting outcomes.

Economic forces such as token trading exacerbate this concentration of voting power. Token holders who aim to influence proposal outcomes can strategically accumulate voting power by purchasing tokens from less-engaged investors before the voting process. The absence of stringent regulatory oversight on pre-proposal token trading, combined with minimal disclosure requirements for significant ownership stakes, facilitates the token accumulation without drawing attention from other stakeholders or regulators. This dynamic can result in a concentration of voting power among a few active participants. Consistent with this hypothesis, participants in proposal voting—particularly those with substantial voting power—are expected to engage in increased token trading activity before the proposal's creation date.

# 4 Token Trading by Governance Participants

We start testing the hypothesis by plotting the trading activities around the proposal creation of two groups of governance participants on Snapshot—proposal managers and voters. On a DAO's Snapshot settings page, there is a list of accounts (wallet addresses) that are granted permissions to manage the space and its proposals.[15] These roles range from Admin, who can edit space settings and archive proposals, to Moderators, who can manage proposals within the space and create new ones. These proposal managers are responsible for reviewing submitted proposals and facilitating the governance process and are likely core team members engaged in the DAO's internal operations. In addition to these addresses, we also consider voters to capture token holders with an interest in a proposal. Figure 5 plots the average abnormal trading volume and the abnormal number of transactions by proposal managers and voters in the [-30,30] window around the creation date of a proposal. Abnormal trading volume (abnormal number of transactions) is the ratio of daily trading volume (number of transactions) to the average daily trading volume (number of transactions) from 90 days to 30 days before the creation date minus one. We observe an abnormal increase in the investors' trading of native tokens before the creation of DAO proposals. Volume increases ahead of the proposal creation by about 34% above the level in the estimation period, jumps by another 45% on the proposal creation date, and then declines to the previous level 30 days after the proposal is created. The number of transactions exhibits a similar pattern: it increases by 33% 30 days before the proposal creation and then reverts to the previous level 30 days after. This pattern indicates that proposal managers and voters start to trade native tokens more intensively approximately one month before the proposal creation.

[Figure 5]

To more rigorously compare the trading behavior of different investors surrounding proposal events, we estimate the following regression model:

$$\begin{aligned} Abvol_{i,p,t,d} = \beta_0 + \beta_1 Day[-30,-1]_{i,p,t,d} + \beta_2 VotingPeriod_{i,p,t,d} + \beta_3 Day[+1,+30]_{i,p,t,d} \\ + \theta' Controls_{i,d} + \lambda_d + \sigma_i + \epsilon_{i,p,t,d} \end{aligned} \tag{1}$$

[15] Space is an organization's account on Snapshot. It serves as a hub for all proposals related to the organization and a source of information for the users.

where $Abvol_{i,p,t,d}$ represents abnormal trading volume, calculated as the percentage increase in trading volume on the trading day $d$ relative to the average trading volume during the estimation window, which is the period from 90 to 60 days before the creation of proposal $p$ by DAO $i$ at time $t$. For each proposal, we include a time window starting 60 days before the proposal creation and extending to 30 days after the voting ends. We introduce several indicator variables to capture the effect of proposal events on trading volume. $Day[-30,-1]_{i,p,t,d}$ equals one for the 30 days leading up to the proposal creation and zero otherwise. $VotingPeriod_{i,p,t,d}$ equals one for days during the voting period, typically 7 days, and zero otherwise. $Day[+1,+30]_{i,p,t,d}$ equals one for the 30 days following the conclusion of voting and zero otherwise. These indicator variables capture the incremental changes in abnormal trading volume relative to the control period in the [-60, -31] window. Additionally, we control for a set of variables that may influence investor trading volume, including the logarithm of market capitalization on the trading day (*Size*), return volatility (*Return Volatility*), and abnormal return (*AbReturn*) over the [-7,-1] window before the trading day. DAO fixed effects and year-quarter fixed effects are included to account for DAO-specific characteristics and time trends.

We first estimate the regression for the total trading volume. The results are reported in column (1) of Table 2. The findings show that total trading volume increases by 16.8% in the month preceding proposal creation, remains elevated during the voting period, and increases by 22.4% in the month following the conclusion of voting. To identify the investors contributing to this volume increase, we categorize investors into passive and active investors. Active investors refer to those who play a role in advancing the proposal, including proposal managers and voters. All other investors are classified as passive. Columns (2) and (3) display the results for active and passive investors, respectively. The analysis shows active investors exhibit a more pronounced increase in trading volume around proposal events than passive investors. Specifically, active investors' trading volume increases by 48.2% before proposal creation and by 76.2% during the voting period, whereas passive investors' trading volume increases by only 19.2% and 20.1% over the same periods. The difference between these groups is statistically significant, as indicated in Column (4). Furthermore, unlike passive investors, whose trading volume peaks after the voting concludes, active investors exhibit the most significant increases in trading volume before and during the voting period, indicating their tendency to accumulate votes and influence proposal outcomes.

[Table 2]

Table 3 decomposes active investors into proposal managers and voters, and investigates their trading behavior separately. Columns (2) and (3) show that proposal managers and voters significantly increase their trading activities by 59.2% and 52.7%, respectively, in the month leading up to the creation of a proposal. This heightened trading activity intensifies during the voting period, with increases of 93.8% for proposal managers and 82.5% for voters. Following the voting period, voters display an abnormal trading volume of 37.9%. In contrast, the trading volume for proposal managers returns to a statistically indistinguishable level from the control period. Column (4) compares the estimates on the time indicators for voters and proposal managers and finds no significant differences between the two groups, suggesting that both engage in token trading around proposal events.

[Table 3]

Among voters, those with greater voting power are hypothesized to engage more in token trading before the proposal creation. In Table 4, we divide voters into deciles based on their voting power on a proposal and examine their abnormal trading volumes separately. The analysis reveals a significant disparity between the two groups: top voters exhibit abnormal trading volume increases of 52.5% before the voting period and 80.2% during the voting period, whereas bottom voters show corresponding increases of 17.9% and 33.9%, respectively. These findings are consistent with our expectations.

[Table 4]

To summarize our findings, we observe a notable increase in abnormal trading volume before proposal events, primarily driven by proposal managers and top voters who actively participate in the governance process and possess significant voting power. This unbalanced trading behavior supports the hypothesis that blockvoters accumulate voting power before proposal creation, leading to the skewed distribution of voting power in DAOs.

# 5 Insider Trading

While DAOs are designed to facilitate a flat governance structure, where all token holders can participate in shaping the organization's direction, our findings reveal that participation is limited and voting power is heavily concentrated. Proposal managers and top voters are the most active participants in

DAO governance, who frequently initiate and cast votes on proposals. Their substantial token holdings through trading before proposals grant them considerable influence over the organization's trajectory. Compared to other stakeholders, these investors often possess superior information about operational developments and the organization's future direction. We refer to them as DAO insiders hereinafter.

As documented in the corporate finance literature, officers, directors, and significant shareholders who possess material nonpublic information about a listed firm have the incentive to exploit such information advantage by buying or selling the company's securities before the information is made public (Cohen et al., 2012; Dechow et al., 2016; Blackburne et al., 2021; Jagolinzer et al., 2020). Insider trading is prohibited in financial markets under insider trading laws. There are several reasons why insider trading may exist in the context of DAOs. First, DAOs lack a standard legal structure that subjects them to a well-defined regulatory framework (Makarov and Schoar, 2020). DAOs whose tokens are classified as securities are required to comply with SEC regulations, but the classification of DAO tokens remains contentious and open to interpretation, leaving the legal status of DAOs ambiguous. As a result, insider trading regulations typically do not apply to DAOs, leading to limited regulatory oversight in this area. Moreover, the anonymity inherent in blockchain technology complicates the identification of wallets belonging to project insiders. The inability to establish users' legal identities makes holding stakeholders accountable for their actions difficult. The absence of a regulatory framework, combined with blockchain's anonymity, exacerbates the challenge of monitoring insider transactions and reduces the legal risks associated with such activities. On the other hand, DAOs' decentralized structure disperses decision-making rights among token holders, allowing the broader community to participate directly in governance and influence the organization's direction. This dispersion of power limits the effective control insiders can exert over DAO decisions and increases their uncertainty about voting outcomes and associated market reactions, which likely mitigates their incentives to front-run. In addition, the transparency offered by blockchain technology ensures that all transactions are recorded and publicly accessible in near real-time, which diminishes the potential profitability of insider trades and harms insiders' ex-ante incentive. Based on these arguments, whether insider trading occurs in DAOs remains an open question.

## 5.1 Buy-Sell Imbalance Around Proposal Creation

We start examining governance participants' insider trading by analyzing their token trading behavior around the time of proposal creation. We have shown that these investors exhibit abnormal trading activities before proposal creation. These trading behaviors can be driven by either the incentive to acquire votes or insider information. The two motives yield distinct predictions regarding trading directions before proposal events. Voting power accumulation suggests increased purchases prior to proposal creation, irrespective of the proposal's expected value impact. In contrast, insider trading is associated with strategic trading behaviors: more purchases before proposals with positive CARs and more sales before proposals with negative CARs. The asymmetric trading patterns between value-enhancing and value-destroying proposals provide a framework for distinguishing between vote accumulation and insider trading. To investigate this, we first estimate market-adjusted cumulative abnormal returns (CARs) within a [-3,3] window around the proposal creation date, and categorize proposals based on whether their CARs are positive or negative. The average (median) CAR for the sample proposals is 0.040 (0.018), indicating that, on average, proposals are perceived as value-enhancing.

[Table 5]

We then examine the buy-sell imbalance of proposal managers and top voters to understand their trading directions around proposal events. Buy-sell imbalance is calculated as insiders' net purchase volume (purchase volume minus sales volume) scaled by their total trading volume on a given day. The analysis includes trading days in the [-30, 30] window around the creation dates of proposals, where we regress insiders' buy-sell imbalance on the $Day[-30,-1]$ indicator along with other control variables specified in Eq. (1), conditional on whether the proposal generates positive or negative returns. The results are presented in Table 5. For proposals with positive CARs, proposal managers exhibit a 3.9% higher buy-sell imbalance in the period before proposal creation compared to the period following it. However, for proposals with negative CARs, there is no significant difference in buy-sell imbalance before and after proposal creation. This pattern indicates that proposal managers may have mixed motives when trading tokens before proposal creation. For proposals with negative CARs, the positive effects of vote accumulation are partially offset by the negative impact of insider trading, resulting in an insignificant net effect on overall trading behavior. In contrast, top voters consistently make more purchases before proposal creation regardless of whether the proposal has positive or negative CARs, indicating their strategic accumulation of voting power to influence voting outcomes.

## 5.2 Profitability of Insider Trades

Short-term profitability provides another way to differentiate insider trading from vote accumulation. While insiders trade before proposal creation to capitalize on short-term gains, trades driven by vote accumulation are typically motivated by the pursuit of long-term value appreciation and may not yield significant immediate profits. Thus, we compare the short-term profitability of insider trades made in the [-30,-1] window around proposal creation to those made over the [0,30] window using the specification:

$$TradeProfit_{i,j,t,d} = \beta_0 + \beta_1 Day[-30,-1]_{i,t,d} + \theta' Controls_{i,d} + \lambda_{i,j,d} + \epsilon_{i,j,t,d} \quad (2)$$

where $TradeProfit_{i,j,t,d}$ is measured as BHAR15, the 15-day market-adjusted abnormal buy-and-hold returns (multiplied by -1 for sales) of a transaction made by investor j on trading day d, around a proposal created at time t for DAO i. $Day[-30,-1]_{i,t,d}$ is an indicator that takes the value of one if the trade occurs during the [-30,-1] window before the creation of a proposal, and zero if it occurs during the [0, +30] window following it. Besides the control variables in Eq. (1), we additionally control for $TradeSize$, which is the number of tokens traded as a percentage of the token circulating supply on a trading day. $Investor \times DAO \times YearQuarter$ fixed effects are included to facilitate the comparison of trades made by the same investor within the same DAO during the same year-quarter.

We estimate Eq. (2) for the trades made by proposal managers and top voters separately, with the results reported in Table 6. The coefficients on $Day[-30,-1]$ are positive and significant for proposal managers, as shown in columns (1) and (2). Specifically, proposal managers earn 9.5% higher market-adjusted returns when trading tokens before proposal creation. In contrast, top voters do not achieve significant short-term abnormal profits from their trades before proposal events. This finding, together with the results in Table 5, further suggests that top voters and proposal managers likely have different trading motives. The fact that top voters make more purchases before proposal creation irrespective of a proposal's price impact, and earn no significant short-term gains, supports the notion that top voters purchase tokens before proposal creation to accumulate voting power, intending to achieve voting outcomes that increase platform value and lead to token appreciation in the long run. In subsequent tests, we only include proposal managers' trades to study the factors that affect insider trading profitability.

[Table 6]

## 5.3 DAO Characteristics and Profitability of Insider Trades

We further explore cross-sectional variations in insider trading profitability. We expect insider trades to be more profitable in small DAOs with worse information environments, where the information asymmetry between insiders and outsiders is likely higher. We use a DAO's market capitalization as a proxy for its size and the presence of an open discussion forum for the quality of the DAO's information environment. Typically, a DAO's governance process requires a proposer to post a thread on the community's discussion forum to gather members' feedback before creating a formal proposal on Snapshot. An open discussion process is crucial as it facilitates communication among community members and reduces information asymmetry between insiders and outsiders.

We divide the DAOs into two groups based on whether they have an open discussion forum, and whether their size, proxied by market capitalization, is in the top or bottom quartile of the sample DAOs. We re-estimate Eq. (2) for each subgroup of DAOs. The results are reported in column (1)-(4) of Table 7. Our results show that proposal managers in DAOs without a discussion forum and DAOs whose size is in the bottom quartile earn 66.3% and 94.7% higher abnormal returns than the sample average.[16] Furthermore, the number of insider trades around proposal events is larger in smaller DAOs and in DAOs without a discussion forum, consistent with a better information environment deterring insider trading.

[Table 7]

Furthermore, we expect insider trades to be more profitable in DAOs with concentrated voting power. The significant influence exercised by large investors reduces the uncertainty of voting outcomes, potentially translating into increased profitability of insider trades. To test this hypothesis, in columns (5) to (8) of Table 7, we divide DAOs into two groups based on whether their average Gini coefficient of voting power distributions in proposals or the average fraction of voting power held by top decile voters, falls into the top or bottom quartile of the sample. We find more insider trades and greater abnormal returns on these trades in DAOs where voting power is more concentrated.

[16] The calculation is as follows: $(0.158 - 0.095)/0.095 = 0.663$ and $(0.185 - 0.095)/0.095 = 0.947$.

## 5.4 Effects of Voting Strategies

The challenges associated with decentralized governance have garnered significant attention, prompting various mechanisms aimed at addressing issues such as low participation rates and concentrated voting power. One such mechanism is the delegation strategy, which allows community members to delegate their voting power to a representative who votes on their behalf. Delegates are held accountable to the members who have entrusted their votes, and members can revoke or reassign their delegation if they are dissatisfied with the delegate's performance. This strategy enables members who may lack the time or expertise to participate in every decision to have still their interests represented, thereby enhancing overall participation and engagement in the DAO's governance. Given that the delegation strategy improves the monitoring of blockvoters by community members, it is anticipated to reduce the insiders' ability to exploit private information. Additionally, quadratic voting is designed to overcome the limitations of traditional one-token-one-vote systems by scaling the voting power to the square root of the voter's token holdings. For example, investors with 100 tokens are granted 10 votes. By making voting power a concave function of token holdings, quadratic voting helps to protect minorities and reduce the influence of blockvoters on voting outcomes, therefore mitigating insider trading.

To evaluate the effectiveness of the two strategies, we identify proposals that utilize either the delegation or quadratic voting strategy and estimate Eq. (2) for trades made by proposal managers surrounding these proposals, compared to those associated with proposals that do not employ these strategies. As reported in Table 8, both strategies effectively reduce the profitability of insider trading. After employing the delegation (quadratic voting) strategy, abnormal returns decline from 9.7% (9.5%) to levels statistically indistinguishable from zero. These findings suggest that insider trading in decentralized governance systems can be mitigated by adopting well-designed voting mechanisms that either enhance community oversight or limit the voting power of large stakeholders.

[Table 8]

## 5.5 Insider Trading of External Tokens

To further separate insider trading from vote accumulation, we leverage the unique setting of a lending protocol, Compound, where the value of its interest-bearing tokens (cTokens) is influenced by proposals but do not confer any voting rights. Compound is a decentralized, Ethereum-based lending protocol that enables users to lend and borrow cryptocurrency assets. When lenders supply cryptocurrency assets to the platform's liquidity pools, they receive cTokens in return for the assets they deposit, representing their share of the liquidity pool. These cTokens accrue interest through an exchange rate mechanism: over time, each cToken can be redeemed for an increasing amount of the underlying asset. Lenders earn interest by redeeming cTokens for more underlying assets based on the exchange rate at the time of redemption. This exchange rate, automatically adjusted by the protocol, depends on the supply and demand of the underlying asset within the pool and can be altered through the governance process. While the value of cTokens is affected by governance proposals, cTokens do not grant voting power, annlowing us to differentiate informed trades from those motivated by voting power accumulation.

[Figure 6]

Taking advantage of this setting, we investigate whether voters in Compound trade cTokens whose value is influenced by a proposal before the proposal is posted. Compound has an open discussion forum where a proposer must post a thread before creating a formal proposal for on-chain voting. As illustrated in Figure 6, the number of cToken transactions by voters rises by about 6.5 times approximately six days before the forum thread is created, followed by a decline back to previous levels within six days after the discussion date, providing evidence of informed trading.[17]

## 6 Consequences of Conflicts of Interest

Thus far, we have shown that proposal managers and top voters engage in abnormal trading activities before proposal creation, driven both by the intention to accumulate voting power and by insider trading motives. If a DAO consistently exhibits high levels of abnormal trading before proposal events, it may indicate that its members are more aggressively engaging in insider trading or competing for voting power. Such behavior reflects conflicts of interest within the DAO. These conflicts of interest are likely to result in detrimental real consequences for the DAO's overall performance.

[17] Although cTokens can be transferred and traded like other ERC-20 tokens, price data for cTokens is not available on CoinMarketCap. Therefore, we cannot directly test the profitability of these cToken trades. A viable alternative for assessing the economic benefits of insider trading with cTokens is to gather data on deposit and borrowing interest rates from transaction logs in blockchain records. This remains a future task on our research agenda.

## 6.1 Identification Strategy

To assess the impact of conflicts of interest on DAO performance, we use a popular metric in the crypto sector—Total Value Locked (TVL), which refers to the total value of digital assets locked or staked in a decentralized finance (DeFi) protocol. We examine how conflicts of interest influence a DAO's TVL, mainly when governance quality is prominent. Specifically, we investigate how the 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.

Luna is the native token of the Terra blockchain. In May 2022, TerraUSD (UST), an algorithmic stablecoin that was designed to maintain a $1 peg to the US dollar through a mint-and-burn mechanism involving Luna, lost its peg and caused a massive sell-off, leading to Luna's hyperinflation and a crash in price. The Luna network collapse, the largest crypto crash ever, entails an estimated $60 billion wipeout.

FTX was a major cryptocurrency exchange founded by Sam Bankman-Fried. In November 2022, it was revealed that its sister company, Alameda Research, had heavily used FTX customer funds to cover its risky investments, causing a liquidity crisis. The exchange filed for bankruptcy after failing to meet customer withdrawal demands, leading to widespread losses and triggering broader concerns across the crypto industry regarding governance and financial management. The crypto market reacted sharply to the Luna crash and the FTX collapse, causing a substantial drop in prices and trading volumes for a wide range of crypto assets.

We hypothesize that DAOs with higher levels of conflicts of interest are more adversely affected, as investors may perceive these DAOs as having greater exposure to governance risk.

## 6.2 Analysis and Results

To evaluate this, we categorize DAOs into two groups based on whether their average abnormal trading volume in the month preceding proposal creation dates is above or below the sample median. Figure 7 illustrates the average daily TVL (logarithmic scale) for the two groups of DAOs over a [-60,60] window surrounding the Luna crash and FTX collapse. Overall, DAOs with higher levels of conflicts of interest exhibit lower TVL. Following these shocks, both groups experience a significant decline in TVL, with the reduction being more substantial for DAOs with greater levels of conflicts of interest.

[Figure 7]

To quantify the difference between the two groups, we estimate the following DID model:

$$\ln(TVL_{i,j,t}) = \beta_0 + \beta_1 Treatment_{i,j} \times Post_t + \beta_2 Treatment_{i,j} + \beta_3 Post_t + \theta' Controls_{i,j,t} + \lambda_j + \epsilon_{i,j,t} \tag{3}$$

where $\ln(TVL_{i,j,t})$ represents the natural logarithm of the Total Value Locked (TVL) for DAO i in category j on day t. The variable $Treatment_{i,j}$ is an indicator that equals one if DAO i's average abnormal trading volume before proposal creation is in the top quartile of the sample, and zero if it is in the bottom quartile. $Post_t$ is an indicator that equals one if day t is within the [0,60] window following either the Luna crash on May 9, 2022, or the FTX collapse on November 8, 2022, and zero if it is in the [-60,-1] pre-event window. We also control for several variables that may influence a DAO's TVL, including the number of blockchains on which a DAO operates ($NumofChains$), the logarithm of market capitalization ($Size$), and the daily return ($Return$). We include category fixed effects to control for differences across DAO types, which include decentralized exchanges (DEX), Lending, Yield, Staking, Derivatives, Indexes, Services, and Others.

[Table 9] [Figure 8]

Based on the estimates presented in Table 9, DAOs with higher conflicts of interest experience significantly larger decreases in TVL following the two market shocks. Specifically, these DAOs suffered an 18.9% (44.6%) greater decline in TVL after the Luna crash (FTX collapse) compared to DAOs with lower levels of conflicts of interest. Although Figure 7 shows that DAOs with higher levels of conflicts of interest generally have lower TVLs, the positive coefficients on the $Treatment$ suggest that after controlling for market capitalization and other variables, these DAOs initially have higher TVLs. The negative coefficients on $Post$ in both columns show that these market shocks negatively impacted the TVL of all DAOs. To explore how the effect unfolds over time, we disaggregate the $Post$ variable into weekly indicators from four weeks before the shocks up to seven weeks after. The coefficients on the interactions between the time indicators and the $Treatment$ dummy are plotted in Figure 8, revealing 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. This analysis suggests that DAOs with elevated levels of conflicts of interest are more vulnerable to negative market shocks than their counterparts with lower levels of conflicts of interest.

# 7 Conclusion

Our findings cast doubts on the advocated governance decentralization in DAOs: participation rates in governance are low, and voting power is highly concentrated, with the top decile of voters typically controlling 76.2% of the voting power, which surpasses the level observed in traditional corporate governance. While decentralization is a technological possibility, economic forces in token allocation practices, voter apathy, and token trading pose substantial barriers to its becoming a reality thus far.

Our analysis further shows that governance participants, including proposal managers and top voters, accumulate voting power through token trading activities before the creation of proposals. One concerning implication of this centralized power structure is the prevalence of insider trading, where influential stakeholders leverage their informational advantages to extract wealth from smaller token holders. Specifically, proposal managers achieve 9.5% higher market-adjusted returns by trading ahead of the public disclosure of proposals. The profitability of insider trading is more pronounced in small DAOs with worse information environments and concentrated voting power, where insiders have greater information advantage and influence over voting outcomes. Voting strategies that enhance community monitoring or limit large stakeholders' voting power effectively reduce insider trading's profitability.

The broader implications of our findings point to the potential negative impact of conflicts of interest on DAO stability, particularly during periods of market-wide stress. DAOs with higher levels of conflicts of interest experience larger declines in Total Value Locked (TVL) following market shocks. The study underscores the importance of addressing conflicts of interest in DAO governance and highlights the need for mechanisms that promote transparency and community oversight. As DAOs evolve, ensuring equitable participation will be critical for fostering sustainable and trustworthy ecosystems.

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# Figures

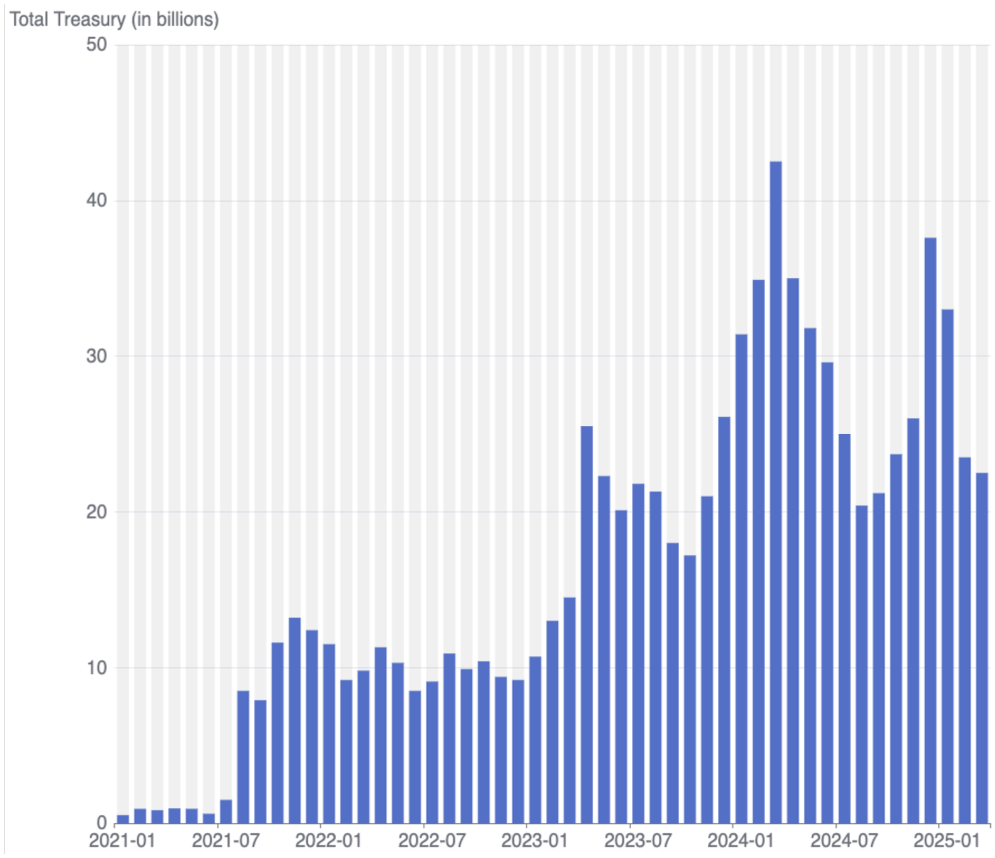


**Figure 1. DAOs' Total Treasury.**
The figure depicts the monthly total assets owned (in billions) and managed by DAOs listed on DeepDAO from January 2021 to March 2025.

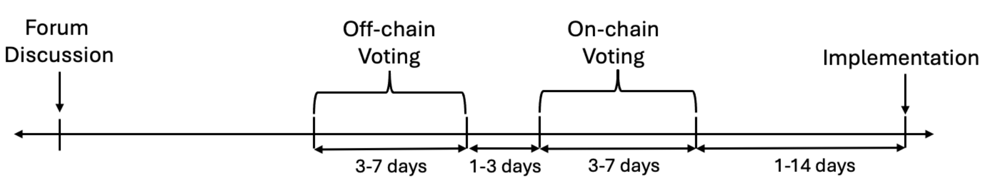


**Figure 2. Timeline of DAOs' Governance Process.**
The figure illustrates the typical timeline of DAOs' governance process and the intervals between each phase.

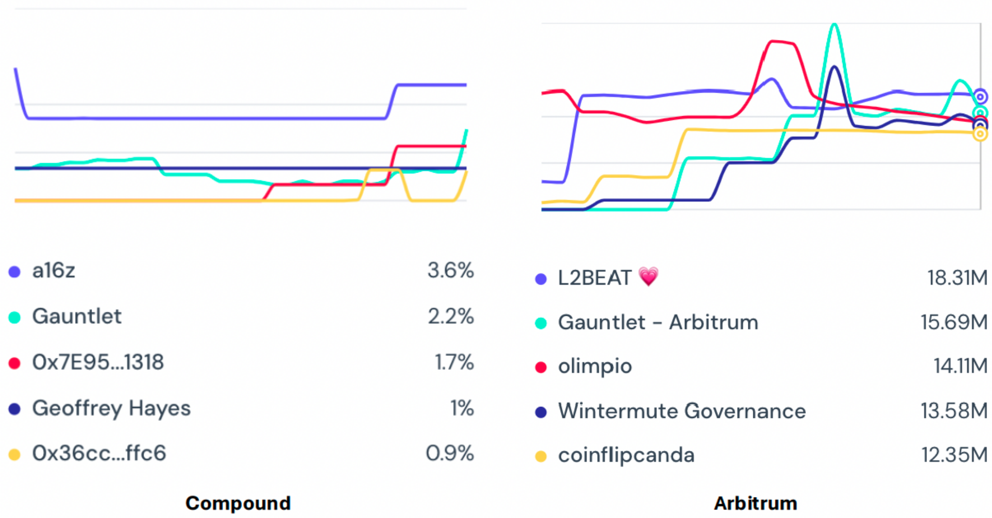


**Figure 3. Evolution of Voting Power by Top Delegates.**
The figure is a snapshot from Tally, which illustrates the monthly evolution of voting power held by the top five delegates in Compound and Arbitrum, respectively, from their listing on Tally (March 1, 2022, for Compound and March 1, 2023, for Arbitrum) through December 1, 2024.

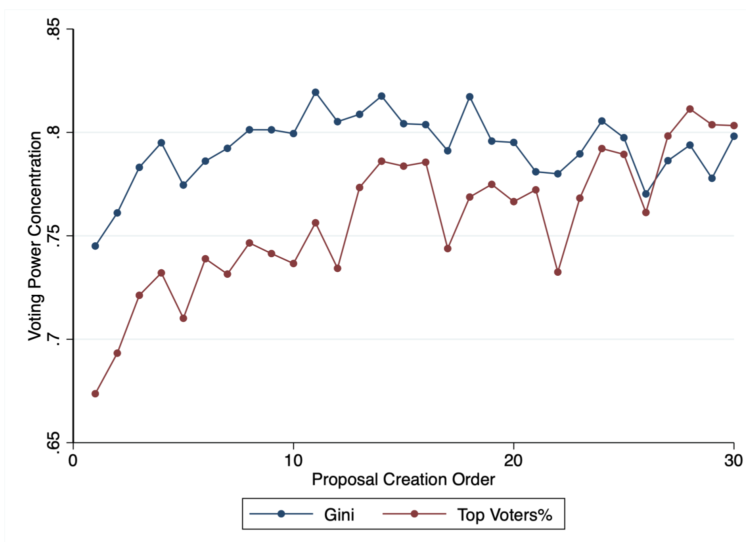


**Figure 4. Evolution of Voting Power Concentration.**
The figure shows the average Gini coefficient and the share of voting power held by the top decile voters for the first 30 proposals in sample DAOs. The x-axis represents the chronological order of proposals within a DAO (e.g., 1 denotes the first proposal, 2 the second, and so forth).

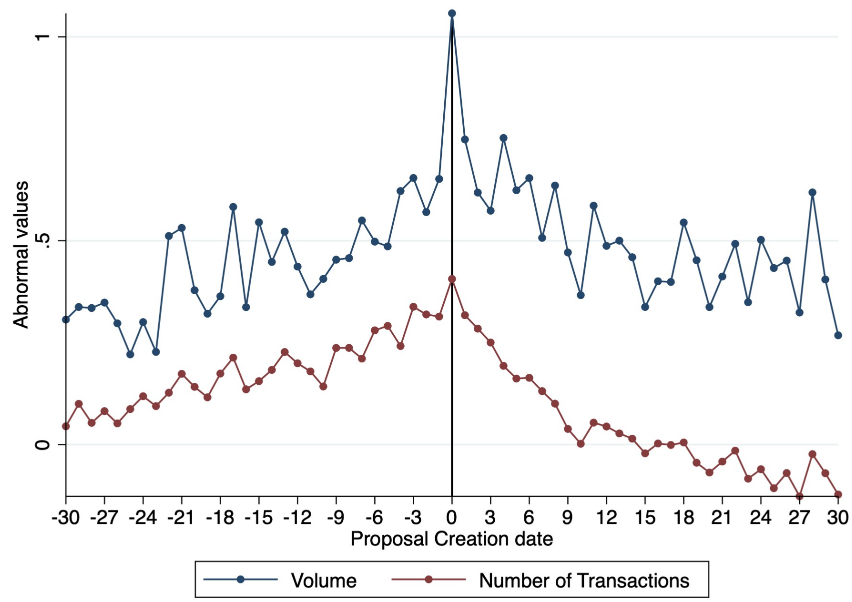


**Figure 5. Abnormal Trading Volume and Number of Transactions around Proposal Creation Date.**
The figure plots the average abnormal trading volume and abnormal number of transactions of proposal managers and voters on days around the creation date of proposals with votes in the top quartile in a sample DAO. Abnormal trading volume (abnormal number of transactions) is the ratio of daily trading volume (number of transactions) to the average daily trading volume (number of transactions) from 90 days to 30 days before the proposal creation minus one.

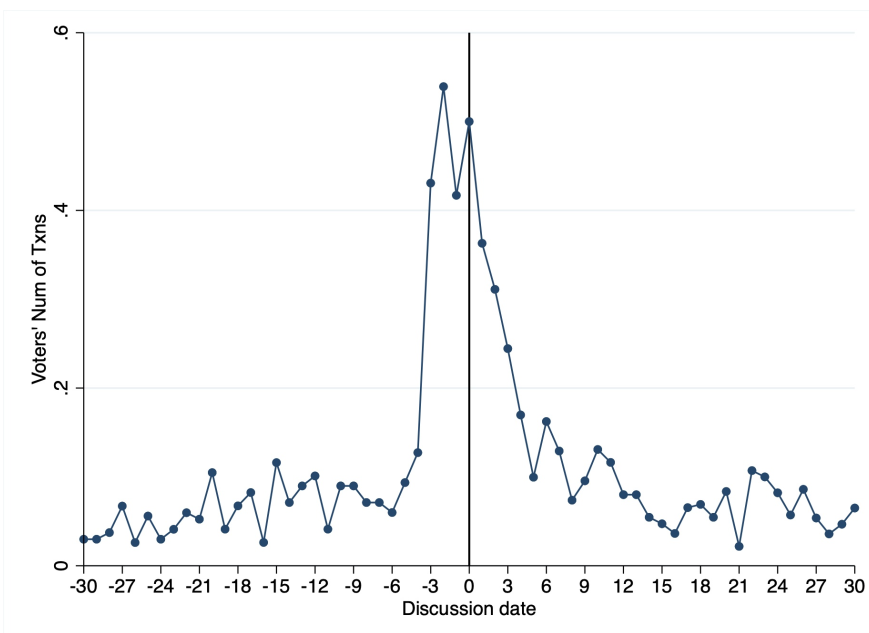


**Figure 6. Voters' Number of Transactions around Compound Proposal Creation.**
The figure plots Compound voters' average number of transactions of cTokens around the discussion date of proposals.

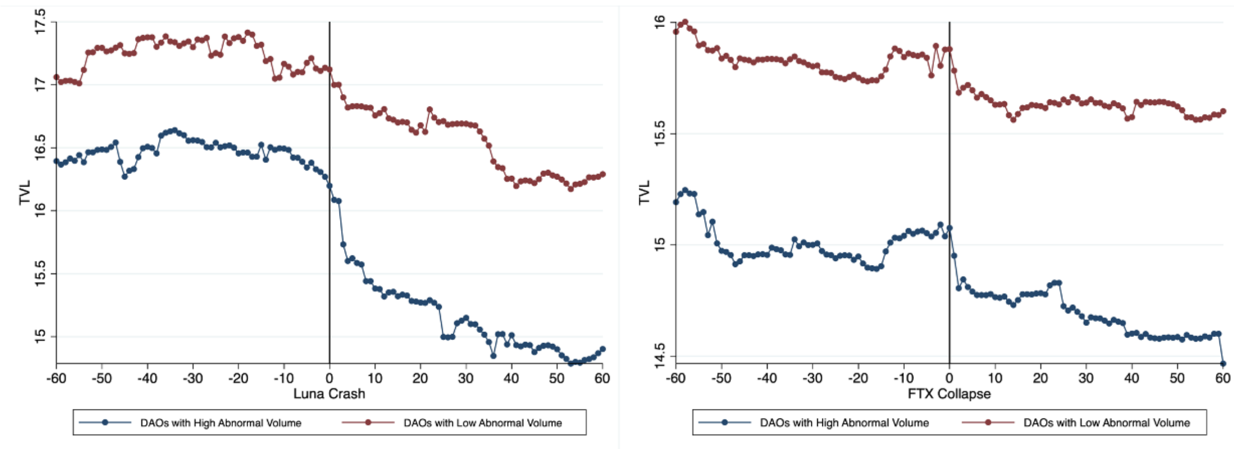


**Figure 7. TVL around Luna/FTX Crash.**
The figure plots the average daily TVL of two groups of DAOs – DAOs with average abnormal trading volume in the one month before proposal creation dates above or below the sample median – in the [-60d, 60d] window around the Luna crash or FTX collapse.

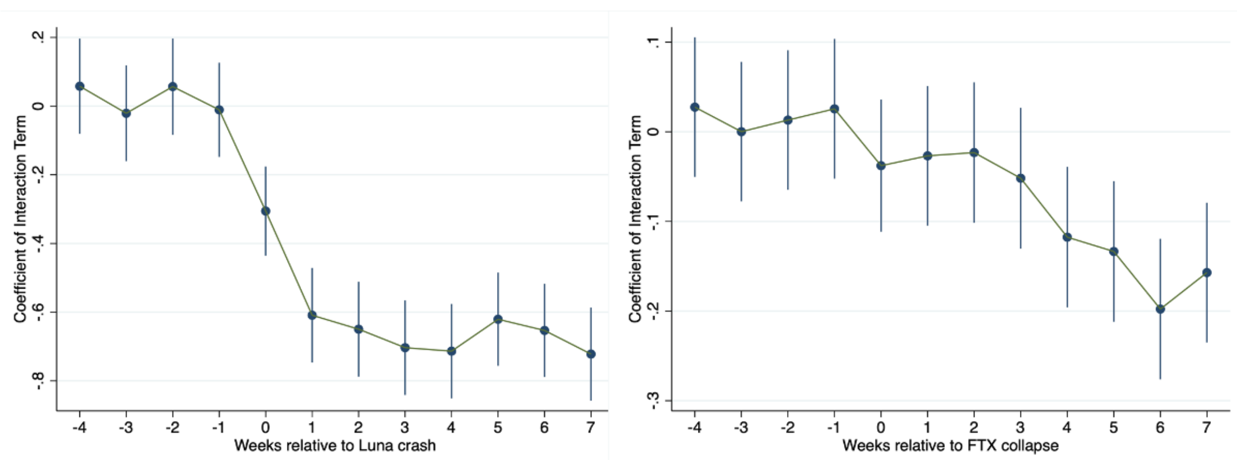


**Figure 8. Parallel Trend and Dynamic Effect of Luna/FTX Crash.**
The figure plots the estimated coefficients on the interaction terms of Treatment and week dummies from a Difference-in-Difference (DID) model in which the dependent variable is DAOs' daily TVL. The sample consists of days in the [-60, 56] window around two negative market shocks – Luna crash and FTX collapse – for all the DAOs with TVL data on Defillama. DAOs are divided into quartiles based on their average abnormal trading volume in the two weeks before proposal creation dates. Treatment is an indicator that equals one if a DAO is in the top quartile, and zero if a DAO is in the bottom quartile. Week dummies take the value of one for days in the week, and zero otherwise.

# Tables

**Table 1. Summary Statistics.**
The table reports the summary statistics of the variables in the sample. All the variables are defined in Appendix A.

| | 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 |
| Proposed by Proposal Manager | 2,988 | 0.526 | 0.499 | 0.000 | 1.000 | 1.000 |
| Proposed by Voter | 2,988 | 0.302 | 0.459 | 0.000 | 0.000 | 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 |
| **Daily Market Metrics:** | | | | | | |
| Abvol | 252,331 | 0.305 | 2.604 | −1.000 | −0.394 | 24.402 |
| Size | 252,331 | 17.844 | 3.794 | 0.000 | 18.457 | 23.641 |
| AbReturn | 252,331 | 0.001 | 0.191 | −1.037 | −0.023 | 6.099 |
| Return Volatility | 252,331 | 0.093 | 1.471 | 0.000 | 0.049 | 80.394 |
| Trade Size | 244,334 | 0.046 | 0.151 | 0.000 | 0.012 | 8.590 |
| TVL | 117,846 | 355.222 | 1,175.815 | 0.000 | 18.542 | 8,724.258 |
| **Insider Trades:** | | | | | | |
| BHAR15 | 374,326 | −0.024 | 0.484 | −5.994 | −0.016 | 5.975 |

**Table 2. Abnormal Trading around Proposal Creation.**
The table reports the estimates from OLS regressions of abnormal trading volume of DAOs' native tokens for different groups of investors. The sample consists of trading days from 60 days before the creation date of a proposal to 30 days after the voting end date of the proposal for all proposals with votes in the top quartile in a sample DAO. The dependent variable is *Abvol*, which is the ratio of daily trading volume to the average daily trading volume from 90 days to 60 days before the proposal creation minus one. *Day[-30,-1]* is an indicator that takes the value of one for trading days in the [-30,-1] window before the proposal creation, and zero otherwise. *Voting Period* is an indicator that takes the value of one for trading days in the voting window, and zero otherwise. *Day[+1,+30]* is an indicator that takes the value of one for trading days in the [+1,+30] window after the voting end date, and zero otherwise. Trading days in the [-60,-31] window are used as the control period. All the control variables are defined in Appendix A. Column (1) presents the estimates for all investors' abnormal trading volume. Column (2) presents the estimates for the abnormal trading volume of active investors involved in advancing the proposal, including proposal managers listed in the administrator section on the DAO's Snapshot page and individuals who cast votes on the proposal. Column (3) presents the estimates for the abnormal trading volume of all other investors, classified as passive investors. Differences between the coefficients in column (2) and (3) are displayed in column (4). The regressions control for year-month fixed effects and DAO fixed effects. The standard errors are clustered by DAO. P-values are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

| | (1) All Investors | (2) Active Investors | (3) Passive Investors | (4) Diff.(2)-(3) |
|---|---|---|---|---|
| **Variables of interest:** | | | | |
| Day[−30,−1] | 0.168** | 0.482*** | 0.192** | 0.290*** |
| | (0.033) | (0.000) | (0.049) | (0.001) |
| Voting Period | 0.176** | 0.762*** | 0.201* | 0.561*** |
| | (0.047) | (0.000) | (0.067) | (0.000) |
| Day[+1,+30] | 0.224** | 0.422*** | 0.263** | 0.159* |
| | (0.026) | (0.001) | (0.039) | (0.075) |
| **Controls:** | | | | |
| Size | −0.022 | −0.052 | −0.020 | |
| | (0.487) | (0.281) | (0.539) | |
| Return Volatility | 0.019** | 0.014* | 0.019** | |
| | (0.014) | (0.057) | (0.022) | |
| AbReturn | 0.870*** | 0.720** | 0.992*** | |
| | (0.000) | (0.039) | (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 | |

**Table 3. Active Investors' Abnormal Trading around Proposal Creation.**
The table reports the estimates from OLS regressions of abnormal trading volume of DAOs' native tokens for different groups of active investors. The sample consists of trading days from 60 days before the creation date of a proposal to 30 days after the voting end date of the proposal for all proposals with votes in the top quartile in a sample DAO. The dependent variable is *Abvol*, which is the ratio of daily trading volume to the average daily trading volume from 90 days to 60 days before the proposal creation minus one. *Day[-30,-1]* is an indicator that takes the value of one for trading days in the [-30,-1] window before the proposal creation, and zero otherwise. *Voting Period* is an indicator which takes the value of one for trading days in the voting window, and zero otherwise. *Day[+1,+30]* is an indicator which takes the value of one for trading days in the [+1,+30] window after the voting end date, and zero otherwise. Trading days in the [-60,-31] window are used as the control period. All the control variables are defined in Appendix A. Column (1) presents the estimates for the abnormal trading volume of active investors involved in advancing the proposal, including proposal managers listed in the administrator section on the DAO's Snapshot page and individuals who cast votes. Columns (2) and (3) present the estimates for proposal managers' and voters' abnormal trading volume, respectively. Differences between the coefficients in column (2) and (3) are displayed in column (4). The regressions control for year-month fixed effects and DAO fixed effects. The standard errors are clustered by DAO. P-values are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

| | (1) Active Investors | (2) Proposal Managers | (3) Voters | (4) Diff.(2)-(3) |
|---|---|---|---|---|
| **Variables of interest:** | | | | |
| Day[−30,−1] | 0.482*** | 0.592* | 0.527*** | 0.065 |
| | (0.000) | (0.087) | (0.000) | (0.860) |
| Voting Period | 0.762*** | 0.938** | 0.825*** | 0.113 |
| | (0.000) | (0.028) | (0.000) | (0.794) |
| Day[+1,+30] | 0.422*** | 0.773 | 0.379*** | 0.394 |
| | (0.001) | (0.182) | (0.000) | (0.504) |
| **Controls:** | | | | |
| Size | −0.052 | −0.579** | −0.026 | |
| | (0.281) | (0.019) | (0.546) | |
| Return Volatility | 0.014* | 0.141*** | 0.009 | |
| | (0.057) | (0.000) | (0.159) | |
| AbReturn | 0.720** | 2.088** | 0.567* | |
| | (0.039) | (0.044) | (0.071) | |
| Year-Month FE | Yes | Yes | Yes | |
| DAO FE | Yes | Yes | Yes | |
| Adj. $R^2$ | 0.030 | 0.041 | 0.029 | |
| Obs. | 245,075 | 136,886 | 234,366 | |

**Table 4. Voters' Abnormal Trading around Proposal Creation.**

The table reports the estimates from OLS regressions of abnormal trading volume of DAOs' native tokens for different groups of voters. The sample consists of trading days from 60 days before the creation date of a proposal to 30 days after the voting end date of the proposal for all proposals with votes in the top quartile in a sample DAO. The dependent variable is *Abvol*, which is the ratio of daily trading volume to the average daily trading volume from 90 days to 60 days before the proposal creation minus one. *Day[-30,-1]* is an indicator that takes the value of one for trading days in the [-30,-1] window before the proposal creation, and zero otherwise. *Voting Period* is an indicator which takes the value of one for trading days in the voting window, and zero otherwise. *Day[+1,+30]* is an indicator which takes the value of one for trading days in the [+1,+30] window after the voting end date, and zero otherwise. Trading days in the [-60,-31] window are used as the control period. All the control variables are defined in Appendix A. Column (1) presents the estimates for the abnormal trading volume of all voters who cast votes on the proposal. Column (2) presents the estimates for the abnormal trading volume of voters whose voting powers are in the top decile among all voters. Column (3) presents the estimates for the abnormal trading volume of voters whose voting powers are in the bottom decile among all voters. Differences between the coefficients in columns (2) and (3) are displayed in column (4). The regressions control for year-month fixed effects and DAO fixed effects. The standard errors are clustered by DAO. P-values are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | | Top | Bottom | |
| | Voters | Voters | Voters | Diff.(2)-(3) |
| **Variables of interest:** | | | | |
| Day[−30,−1] | 0.527*** | 0.525*** | 0.179*** | 0.346** |
| | (0.000) | (0.001) | (0.002) | (0.033) |
| Voting Period | 0.825*** | 0.802*** | 0.339*** | 0.463*** |
| | (0.000) | (0.000) | (0.002) | (0.005) |
| Day[+1,+30] | 0.379*** | 0.290*** | −0.071 | 0.361** |
| | (0.000) | (0.009) | (0.355) | (0.010) |
| **Controls:** | | | | |
| Size | −0.026 | −0.103 | −0.040 | |
| | (0.546) | (0.126) | (0.330) | |
| Return Volatility | 0.009 | 0.024*** | 0.038*** | |
| | (0.159) | (0.000) | (0.000) | |
| AbReturn | 0.567* | 0.930*** | 0.549* | |
| | (0.071) | (0.000) | (0.090) | |
| Year-Month FE | Yes | Yes | Yes | |
| DAO FE | Yes | Yes | Yes | |
| Adj. $R^2$ | 0.029 | 0.027 | 0.025 | |
| Obs. | 234,366 | 196,613 | 110,325 | |

**Table 5. Insiders' Trading Strategy.**
The table reports the estimates from OLS regressions of insiders' buy-sell imbalance. The sample consists of trading days in the [-30, 30] window around the creation dates of proposals with votes in the top quartile in a sample DAO. The dependent variable is *BSI*, which is insiders' purchase volume minus sales volume divided by insiders' total trading volume on a trading day. *Day[-30,-1]* is an indicator that takes the value of one for trading days in the [-30,-1] window before the proposal creation, and zero otherwise. All the control variables are defined in Appendix A. Proposals are classified into two groups based on whether their market-adjusted cumulative abnormal returns (CARs) within a [-3,3] window around the creation date is positive or negative. Columns (1) and (2) present the estimates for proposal managers' buy-sell imbalance around the creation date of proposals with negative CARs and positive CARs, respectively. Columns (3) and (4) present the estimates for top voters' buy-sell imbalance around the creation date of proposals with negative CARs and positive CARs, respectively. The regressions control for year-month fixed effects and DAO fixed effects. The standard errors are clustered by DAO. P-values are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

| | Proposal Managers | | Top Voters | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | Neg. CAR | Pos. CAR | Neg. CAR | Pos. CAR |
| **Variables of interest:** | | | | |
| Day[−30,−1] | −0.009 | 0.039** | 0.125*** | 0.144*** |
| | (0.544) | (0.040) | (0.003) | (0.000) |
| **Controls:** | | | | |
| Size | −0.001 | −0.023 | −0.016*** | −0.017*** |
| | (0.924) | (0.220) | (0.000) | (0.000) |
| Return Volatility | −0.001 | 0.156 | −0.009*** | 0.004 |
| | (0.957) | (0.119) | (0.000) | (0.845) |
| AbReturn | −0.078 | −0.109 | −0.095* | −0.161*** |
| | (0.144) | (0.172) | (0.097) | (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 |

**Table 6. Profitability of Insider Trades.**

The table reports the estimates from OLS regressions of the profitability of insiders' trades around DAO voting. The sample consists of purchases and sales made by insiders in sample DAOs between 30 days before the proposal creation and 30 days after the end of voting. The dependent variable is *BHAR15*, the 15-day market-adjusted abnormal buy-and-hold returns (multiplied by -1 for sales) to insider trades. *Day[-30,-1]* is an indicator that takes the value of one if the insider trade occurs during the [-30,-1] window before the proposal creation and zero otherwise. All the control variables are defined in Appendix A. Columns (1) and (2) present the estimates for trades made by proposal managers. Columns (3) and (4) present the estimates for trades made by top voters. The regressions control for investor-DAO-year-quarter fixed effects. The standard errors are clustered by the proposal manager. P-values are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

| | Proposal Managers | | Top Voters | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| **Variable of interest:** | | | | |
| Day[−30,−1] | 0.131** | 0.095** | −0.058 | 0.001 |
| | (0.035) | (0.044) | (0.194) | (0.910) |
| **Controls:** | | | | |
| Size | | −0.080*** | | 0.059*** |
| | | (0.000) | | (0.000) |
| Return Volatility | | −0.018* | | −0.000 |
| | | (0.064) | | (0.880) |
| AbReturn | | −0.560*** | | 0.242 |
| | | (0.000) | | (0.143) |
| Trade Size | | 0.092*** | | 0.022*** |
| | | (0.000) | | (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 |

**Table 7. DAO Characteristics and Insider Trading Profitability.**

The table reports the estimates from OLS regressions of the profitability of insiders' trades in different groups of DAOs. The sample consists of purchases and sales made by proposal managers in sample DAOs between 30 days before the proposal creation and 30 days after the end of voting. The dependent variable is *BHAR15*, the 15-day market-adjusted abnormal buy-and-hold returns (multiplied by -1 for sales) to insider trades. *Day[-30,-1]* is an indicator that takes the value of one if the insider trade occurs during the [30,0) window before the proposal creation and zero otherwise. All the control variables are defined in Appendix A. Columns (1) and (2) present the estimates for trades made by proposal managers in DAOs without a discussion forum versus those with a discussion forum, respectively. Columns (3) and (4) present the estimates for trades made by proposal managers in DAOs whose market capitalization is in the bottom quartile among the sample DAOs versus those whose market capitalization is in the top quartile, respectively. Columns (5) and (6) present the estimates for trades made by proposal managers in DAOs whose average Gini coefficient of voting power distributions in proposals is in the bottom quartile among the sample DAOs versus those whose average Gini coefficient is in the top quartile, respectively. Columns (7) and (8) present the estimates for trades made by proposal managers in DAOs whose average fraction of voting power held by top decile voters is in the bottom quartile among the sample DAOs versus those whose average fraction is in the top quartile, respectively. The regressions control for admin-DAO-year-quarter fixed effects. The standard errors are clustered by the administrator. P-values are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

| | Has Forum | | DAO Size | | Gini | | Top Voters% | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | No | Yes | Low | High | Low | High | Low | High |
| **Variable of interest:** | | | | | | | | |
| Day[−30,−1] | 0.158*** | 0.036*** | 0.185*** | 0.002 | −0.005 | 0.159*** | −0.004 | 0.171*** |
| | (0.000) | (0.000) | (0.000) | (0.832) | (0.713) | (0.000) | (0.765) | (0.000) |
| **Controls:** | | | | | | | | |
| Size | −0.080*** | −0.050 | −0.085*** | 0.003 | −0.002 | −0.079*** | −0.002 | −0.083*** |
| | (0.000) | (0.271) | (0.000) | (0.415) | (0.902) | (0.000) | (0.919) | (0.000) |
| Return Volatility | −0.096 | −0.006 | −0.204*** | −0.725 | −0.006 | −0.013** | 0.001 | −0.169 |
| | (0.516) | (0.131) | (0.000) | (0.185) | (0.958) | (0.013) | (0.994) | (0.118) |
| AbReturn | −0.627*** | −0.077*** | −0.661*** | −0.035 | −0.009 | −0.659*** | −0.014 | −0.648*** |
| | (0.000) | (0.000) | (0.000) | (0.363) | (0.705) | (0.000) | (0.392) | (0.000) |
| Trade Size | 0.026 | 0.089*** | 0.159*** | −0.025 | 0.033* | 0.072 | −0.076 | 0.104 |
| | (0.802) | (0.000) | (0.000) | (0.593) | (0.084) | (0.166) | (0.187) | (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 |

**Table 8. Voting Strategies and Insider Trading Profitability.**
The table reports the estimates from OLS regressions of insiders' trades' profitability in different proposal groups. The sample consists of purchases and sales made by proposal managers in sample DAOs between 30 days before the proposal creation and 30 days after the end of voting. The dependent variable is *BHAR15*, the 15-day market-adjusted abnormal buy-and-hold returns (multiplied by -1 for sales) to insider trades. *Day[-30,-1]* is an indicator that takes the value of one if the insider trade occurs during the [30,0) window before the proposal creation and zero otherwise. All the control variables are defined in Appendix A. Columns (1) and (2) present the estimates for trades made by proposal managers around proposals that do not employ delegation strategy versus those that employ delegation strategy, respectively. Columns (3) and (4) present the estimates for trades made by proposal managers around proposals that do not employ quadratic voting strategy versus those that employ quadratic voting strategy, respectively. The regressions control for admin-DAO-year-quarter fixed effects. The standard errors are clustered by the administrator. P-values are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

| | Delegation | | Quadratic Voting | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | No | Yes | No | Yes |
| **Variable of interest:** | | | | |
| Day[−30,−1] | 0.097** | −0.012 | 0.095** | 0.005 |
| | (0.042) | (0.166) | (0.045) | (0.949) |
| **Controls:** | | | | |
| Size | −0.080*** | 0.003 | −0.080*** | 0.003 |
| | (0.000) | (0.762) | (0.000) | (0.777) |
| Return Volatility | −0.016* | −0.072*** | −0.015* | −0.071*** |
| | (0.051) | (0.000) | (0.051) | (0.000) |
| AbReturn | −0.563*** | −0.176*** | −0.562*** | −0.179*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Trade Size | 0.093*** | 0.136*** | 0.092*** | 0.137*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Investor × DAO × 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 |

**Table 9. Effect of Negative Shocks on DAOs' TVL.**

The table reports the estimates from a Difference-in-Difference (DID) model in which the dependent variable is DAOs' daily TVL. The sample consists of days in the [-60, 60] window around two negative market shocks – Luna crash and FTX collapse – for all the DAOs with TVL data on Defillama. DAOs are divided into quartiles based on their average abnormal trading volume one month before proposal creation dates. *Treatment* is an indicator that equals one if a DAO is in the top quartile and zero if a DAO is in the bottom quartile. DAOs in the second or third quartiles are excluded from the sample. *Post* is an indicator that equals one after the Luna crash on 9 May 2022 in column (1), or after the FTX collapse on 8 Nov 2022 in column (2), and zero otherwise. All the control variables are defined in Appendix A. The regressions control for industry-fixed effects. P-values are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

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

# Appendix A. Variable Definitions

| Variable | Definition | Source |
|---|---|---|
| *Abvol* | Ratio of daily trading volume to the average daily trading volume from 90 days to 60 days before the proposal creation minus one. | BigQuery |
| *Buy-sell Imbalance (BSI)* | Insiders' purchase volume minus sales volume divided by insiders' total trading volume on a trading day. | BigQuery |
| *BHAR15* | 15-day market-adjusted abnormal buy-and-hold returns (multiplied by -1 for sales). | CoinMarketCap |
| *Day[-30,-1]* | An indicator that takes the value of one for trading days in the [-30,-1] window before the proposal creation, and zero otherwise. | Snapshot |
| *Voting Period* | An indicator that takes the value of one for trading days in the voting window and zero otherwise. | Snapshot |
| *Day[+1,+30]* | An indicator that takes the value of one for trading days in the [+1,+30] window after the voting end date, and zero otherwise. | Snapshot |
| *Size* | Logarithm of a DAO's market capitalization plus one. | CoinMarketCap |
| *Return Volatility* | Standard deviation of daily token returns during the [-7,-1] window prior to a trading day. | CoinMarketCap |
| *AbReturn* | Market-adjusted buy-and-hold abnormal return over the [-7,-1] window prior to a trading day. | CoinMarketCap |
| *Trade Size* | Number of tokens traded as a percentage of the token circulating supply on a trading day | BigQuery, CoinMarketCap |
| *Total Value Locked (TVL)* | Total value of digital assets locked or staked in a DAO's smart contracts. | Defillama |
| *Treatment* | An indicator that equals one if a DAO's average abnormal trading volume in the one month prior to proposal creation dates is in the top quartile among the sample DAOs, and zero if a DAO's average abnormal trading volume is in the bottom quartile. | BigQuery, Snapshot |
| *Post* | An indicator that equals one after the Luna crash on 9 May 2022 or after the FTX collapse on 8 Nov 2022, and zero otherwise. | CoinDesk |
| *Num of Chains* | Number of blockchains on which a DAO operates. | Defillama |
| *Number of Proposals per DAO* | Number of proposals with votes in the top quartile for a given DAO. | Snapshot |
| *Have Forum* | An indicator that equals one if the DAO has an open discussion forum, and zero otherwise. | Snapshot |
| *Duration* | Length of a proposal's voting window (in days). | Snapshot |
| *Num of Voting Strategies* | Number of voting strategies adopted in a proposal. | Snapshot |
| *Delegation* | An indicator that equals one if a proposal employs delegation strategy, and zero otherwise. | Snapshot |
| *Quadratic Voting* | An indicator that equals one if a proposal employs quadratic voting strategy, and zero otherwise. | Snapshot |
| *Num of Voters* | Number of voters that cast votes on a proposal. | Snapshot |
| *Support Ratio of Winning Option* | Proportion of votes received by the winning option relative to the total votes cast on a proposal. | Snapshot |
| *Gini* | Gini coefficient of the voting power distribution among participants within a proposal. | Snapshot |
| *Top Voters%* | Ratio of total voting power held by voters in the top decile to the total voting power cast on a proposal. | Snapshot |