Blockholders and strategic voting in DAOs' governance

Romain Rossello[1]
HEC Paris

Abstract

Using highly granular voting data, I show that Decentralized Autonomous Organizations, DAOs, and especially DeFi DAOs, can be considered a valid laboratory to study corporate governance. Besides not being decentralized, I show that the voting bases of DeFi DAOs encounter strategic voters. This is the first contribution to highlight that prices of the DAOs' governance tokens incorporate new information about the unanticipated presence of strategic voters in the same way as it would be expected from firms in traditional finance. The first time that a majority voter unilaterally decides the outcome of a proposal against what would have otherwise chosen minority token holders, the **first majority swaying voter**, triggers a drop in weekly cumulative abnormal returns of 11.34% for a given DAO. The first time that a blockholder votes in the last moments of a proposal benefiting from a last mover advantage, the **first sniping blockholder**, triggers a drop in weekly cumulative abnormal returns of 8.83% for a given DAO. Consistent with a new information release mechanism about the strategic nature of its voters, subsequent improvement proposals with strategic voting exhibit no significant negative cumulative abnormal returns. Blockholders' votes implementing value-maximizing outcomes of the DAOs' improvement proposals are associated with positive abnormal returns of 1.4%, in line with the predictions of blockholder theory in corporate governance.

[This Version: May 29, 2024]

Keywords: Decentralized Finance, DAOs, Strategic voting, Corporate Governance, Blockholder theory, Shareholder's voting

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[1]Email address: romain.rossello@hec.edu. I am very grateful to Bruno Biais and Guillaume Vuillemey for their guidance and support. I am also thankful to Augustin Landier, Johan Hombert, Paul Voss, Catherine Casamatta and Vincent Maurin for very helpful discussions.

1. Introduction and Literature Review

In November 2015 the Ethereum blockchain made it possible for users to launch new tokens on its blockchain. Provided those tokens followed certain rules which are known as the ERC-20 token format, users could mint, sell, and trade their tokens using the Ethereum blockchain. While the governance of the Ethereum blockchain was established to try to be decentralized, the new ERC-20 token projects had a choice regarding the governance of their organizations to either be centralized or decentralized. The organizations which chose the latter are called Decentralized Autonomous Organizations (or DAOs, term coined by Jentzsch (2016)). These organizations are designed to have no central authority, no managers and no boards of executives. The purpose of those organizations is to involve their members for every decision that is to be taken in the organization. DAOs' activities range from Decentralized Finance (DeFi), to building other blockchains, to creating NFTs, to even trying to write a new constitution. The voting procedures, the conflicts of interests and discrepancies of voting power between the users of those DAOs take therefore many different shapes depending on what is the purpose of the DAO.

Among all those DAOs, DeFi DAOs are relatively the closest to companies known in traditional finance. These DAOs want to embody a new decentralized form of financial intermediation. Their products are similar to platforms or two-sided markets, their voting power allocation are based on a one-token-one-vote rule similar to the one-share-one-vote voting structure, their governance tokens are similar to shares with potential buybacks and their new investment projects are financed through token emissions similarly to equity financing. The resemblance is even more striking when it comes to their governance. DeFi DAOs' governance repeatedly vote on improvement proposals which inherently have conflicts of interests between large and minority token holders. The topics of the improvement proposals of DeFi DAOs also sound very familiar. Topics such as founders'/developers' compensation, expansions on other blockchain through tokens issuance, more or less decentralization in the internal governance, ability for key members' decisions to bypass votes are analogous to very common topics in corporate governance.

Tunnelling as described in Johnson et al. (2000) where developers or founders vote for their own compensations or put a threshold of token holdings to be able to put forward a proposal is even observed. One difference that can be pointed out between DeFi DAOs governance and traditional finance firms is that "decentralization of governance" at which aim DeFi DAOs is along two different dimensions. The first dimension is that the voting power in the improvement proposals of DeFi DAOs should be decentralized meaning not concentrated. Minority token holders would vote and their votes should be meaningful for the development of the DAO. This paper, in accordance with the literature, will show that the voting power is surprisingly very concentrated in DAOs. The second dimension is more subtle, decentralization of governance in DAOs also means that the scope of decisions which are available to token holders is broader than what would be in traditional finance for shareholders. In traditional finance, minority shareholders have very limited access to decisions of the firm (only being solicited for the CEO's election for example). One of the contributions of this paper is also to bring forward that, even though DeFi DAOs have this extra dimension to governance decentralization, what is observed is still very similar to what would be expected from the governance of firms in traditional finance.

Another key difference between traditional finance firms' governance and DeFi DAOs' governance from which this paper benefits is data availability. The governance data available for DeFi DAOs are highly granular and are high frequency relatively to traditional corporate governance. Votes are called improvement proposals and are voted upon by token holders on a weekly or monthly basis. It is possible to see which Ethereum address voted for which outcome in each proposal with which timing and with which voting power. This is the first contribution studying DeFi DAOs which dives at the vote level and highlights how strategic voting behaviors in improvement proposals signaling potential minority token holders' expropriations trigger negative cumulative abnormal returns the first time that the strategic voting behaviors are observed. Previous contributions have focused on metrics which are at the proposal level. Laturnus (2023) examined how the voting concentration in improvement proposals is correlated with the size of the DAO. Appel and Grennan (2023b) have focused on how topics of improvement proposals are associated with returns following those proposals. It is possible to go beyond observing only the voting power of participants and to link this voting power to other observable data dimensions. I show that agents in DeFi DAOs' governance exploit strategies in accordance with their voting power. I observe two different type of strategic voting in DeFi DAOs' improvement proposals:

- **Swaying majority voters** are voters with the voting power to unilaterally decide the outcome of a proposal and who choose to implement outcomes against what minority token holders would have chosen. Those votes can be isolated by both looking at the "voting power" and the "choice made" dimension of the data.

- **Sniping blockholders** are voters without the voting power to unilaterally decide the outcome of the proposal but who can gain a last mover advantage if they wait until the end of the duration of an undecided improvement proposal to cast their votes. Those votes can be isolated by both looking at the "voting power" and the "timing" dimension of the data.

The new information released the first time that those strategic behaviors happen triggers a **11.34%** drop in weekly CARs for a given DAO following the first swaying majority voter and an **8.83%** drop in weekly CARs for a given DAO following the first sniping blockholder. Theses results are in line with what would be expected from a traditional finance firm which would release new information about an unanticipated high possibility of minority shareholders' expropriation. The fact that DeFi DAOs' token price efficiently incorporate new information about the DAOs' governance is the first evidence that DeFi DAOs are a valid laboratory to study empirical corporate governance.

The second result that points towards DeFi DAOs being a valid laboratory for corporate governance is that the presence of blockholders in improvement proposals is associated with positive **1.4%** CARs relative to proposals without their presence. In traditional corporate governance, blockholders can improve repeatedly the firm value by intervening in the governance of the firm either by voice or by the threat of exit. They can also decrease the firm's value by extracting private benefits if their voting power is large enough[1]. The one-share-one-vote voting structure aligns the voting power of blockholders with value-maximizing incentives at the cost of the possibility to implement self-serving actions expropriating minority shareholders if it has a voting power which is too large. (Shleifer and Vishny (1997), Burkart and Lee (2008), Edmans (2014), Edmans and Holderness (2017)).

Token returns efficiently incorporating new information about the governance of DAOs and in line with what is predicted by the blockholder theory are two results put forward in this paper which validate DeFi DAOs as a laboratory for corporate governance benefiting from more precise and higher frequency data.

This paper contributes to the growing literature on DAOs' governance. The works of Fritsch et al. (2022), Barbereau et al. (2022) study on chain votes for a selected group of DAOs and show that those DAOs are very centralized even though they could naively be thought as decentralized. This is shown for several voting concentration measures. Barbereau et al. (2022) highlights that the minority rule which arises in the sample of DAOs they study comes probably from the fact that the voting rights are tradeable as tokens are tradeable on a secondary market. Sun et al. (2022) and Sun et al. (2022) study the on-chain votes of MakerDAO, one of the most prominent decentralized lending platforms. They find that decisions are controlled by a 5-voter coalition and that a high degree of centralized governance will refrain the protocol growth. Han et al. (2023) model the conflicts of interest between large and small token holders. Their model predicts that the growth rate of a platform will be negatively correlated to the ownership concentration and that the implementation of lock-in mechanisms can mitigate this negative correlation. They confirm those predictions using off-chain voting data also confirming the hypothesis of Barbereau et al. (2022). Linking off-chain data about DAOs' governance to corporate governance, Laturnus (2023) shows that the AUM (assets under management) of DAOs

[1]A voting power high enough to unilaterally decide in the outcome of a vote is referred to as a majority voter in this paper.

increases with the ownership concentration of DAOs and verifies a prediction from the model of Sockin and Xiong (2023). Bakos and Halaburda (2022) model the strong tendency for concentration of control when governance tokens of DAOs' can be traded and how it is therefore challenging to have a decentralized governance. Appel and Grennan (2023a) and Appel and Grennan (2023b) use off-chain voting data to show firstly that a small number of entities control most of the decisions for DAOs and that proposals which aim at centralization are linked to negative abnormal returns while proposals which aims at decentralization are linked with positive abnormal returns.

This paper also more broadly relates to the literature on decentralization in decentralized finance, cryptocurrencies, and distributed networks. Hu et al. (2019) put forward stylized facts about cryptocurrencies and ICOs characteristics. Gan et al. (2023) shows that properly designed ICOs is the better choice for a decentralized governance of a platform. Cong et al. (2021) develop a dynamic asset pricing model which formalizes how network effects and endogenous adoption influences token prices. While Makarov and Schoar (2022) and Harvey et al. (2021) present some of the intrinsic risks to the governance of decentralized finance DAOs, Sockin and Xiong (2023) formalize the possible governance threats which are inherent to the launch of platform which would like to get financing through selling a utility token. Biais et al. (2023) emphasizes that decentralization of DeFi applications must be considered with its economics trade-offs mentioning that optimal structure combines elements both from DeFi and traditional centralized finance. Cong and Zhou (2023) develop a dynamic incentives model in which a Web3 reputation improves efficiency and long-run sustainability of distributed networks. Benhaim et al. (2023) evaluate how the implementation of quadratic voting could help in gathering users inputs in the governance of decentralized organizations highlighting the importance of turnout in the governance proposals. For the Ethereum Blockchain governance, Fracassi et al. (2024) bring forward that a few members of the Ethereum foundation largely contribute to the governance of the Ethereum blockchain. Interestingly, because the nature of governance proposals for the blockchain network resemble much more a common value elections framework, informed voters' participation from the members of Ethereum foundation have a positive impact on the price of the Ethereum token. In the context of a blockchain governance in which the decision power is proportional to the hash rate purchased (like a one-token-one-vote DAO governance) Ferreira et al. (2023) shows that a monopolist can arise that will take decisions for its private benefit even at the expense of a lower outstanding token price.

2. Data

2.1. Description of the data

From a technical point of view, DAOs have two choices regarding how to conduct their votes. DAOs can either choose for votes to be casted "on-chain", this means that every vote will be written on the blockchain. This is very useful to easily link a vote from a given address to its respective voting power (proportional to the amount of token held). It is easy because the wallet of the voter containing the tokens is also "on-chain". However, that vote needs to be written on the blockchain and this would cost gas fees to the voter and gas fees can be expensive on the Ethereum Blockchain. DAOs can also choose for their improvement proposals to be voted "off-chain". These off-chain options are for example a forum or an outside website that is not directly linked to the blockchain, and therefore not directly linked to the wallet of the voter. The voting with this option would be free but this option would require a technological bridge for verification to be sure to attribute the right voting power to the voter's address. The use of the IPFS (InterPlanetary File System) network enables to make the link between a vote off-chain and a token holding (a voting power) on chain without incurring the fees of writing the vote on-chain. I extract and analyze votes from a platform which uses such a technology called Snapshot. I choose the DAOs based on the average number of voters in a DAO and on the number of improvement proposals that are put forward. More importantly, I filtrate DAOs that have a DeFi activity (automated market makers, decentralized lending, etc...) because their improvement proposals are very close to corporate governance decisions. I exclude from the sample DAOs that are not in the DeFi space such as Blockchain DAOs and NFTs DAOs. For Blockchain DAOs improvement proposals are mostly either for improving the code which does not have as clear "corporate governance" conflicts of interest underlying as DeFi DAOs, those proposals are more closely analogous to common value elections where people agree to implement better versions of the technological product developed which benefits every token holder. For NFT DAOs, improvement proposals have no link to corporate governance. I also exclude DeFi DAOs that are extremely small for which the number of voters is always the same four-five addresses. Those are also DAOs with very little market capitalizations and this therefore does not impact the fact that the DeFi DAOs retained give a sensible grasp of the whole DeFi market. For the retained sample, the governance proposals are either made by the users directly or they are discussed before on a forum specific to the DAO and then put forward on Snapshot for the rest of the DAO community to vote. From the API of Snapshot, I gathered improvement proposals from July 2020 (the launch of Snapshot) to September 2022. The final sample contains 5905 proposals across 75 DAOs. This represents 1178326 votes being casted by 275 458 different addresses. Those 75 DAOs constitute a dataset which is representative of the whole DeFi market with one notable exception being MakerDAO (which chose to have its voting on-chain). These improvement proposals are single choice approval voting or weighted voting proposals [2]. I only selected proposals which were finished. The complete list of DAOs of the sample and their activities can be found in Appendix C. A more comprehensive description of what the proposals of DeFi DAOs are about can be found in Appendix E using two examples: The decentralized exchange *Balancer* and the currency/Unit of account *OlympusDAO*.

2.2. Descriptive statistics for a typical DAO

What would a typical DAO in this sample look like?

This typical DAO would have on average (median) 78.7 (25) proposals which would last for an average (median) duration of 4.7 (3.8) days. The average (median) number of different voters (meaning different addresses) participating in the governance of this typical DAO would be 224 (94). **Although aiming (or advertising) decentralization, the voting concentration for this typical DAO would be very high as the Nakamoto**

[2] Some of the DAOs also implement a quorum which can be either a fixed amount of token casted on the proposal or a percentage of the total outstanding token supply of the DAO.

number[3] would be on average (median) 5.3 (2.9). Concerning the timing at which my DAOs members vote I could expect on average (median) a participant to vote with 60% (73%) of the duration of the proposal remaining on the proposal. If that voter casts a vote which has a voting power greater than 10% of the final overall voting power casted for that proposal but less than 50% of the overall voting power, a blockholder casting a vote; this vote would be casted with on average (median) with 65% (80%) of the duration of the proposal remaining. If that voter casts a vote which has a voting power greater than 50% of the final overall voting power casted for that proposal, a majority voter, his voting speed would be on average (median) 63% (72%) of the duration of the proposal left. If that voter casts a vote which has a voting power greater than 50% of the final overall voting power casted for that proposal **AND** decides unilaterally against what would otherwise have been chosen by the minority token holders, **a swaying majority voter**, his voting speed would be on average (median) 61% (68%) of the duration of the proposal left. Histograms of the voting speed of overall voters, majority voters, swaying majority voters and blockholders can be found in Appendix A. As the length of the proposals for the DAOs are not the same, I created a timing measure to observe when the votes are being casted for the cross section of DAOs. This measure takes the difference between the date when the vote is being casted and the date of the beginning of the proposal normalized by the duration of the proposal. I observe that a lot of votes are casted at the beginning of the proposal and that the number of votes casted at a given moment steadily decreases during the duration of a proposal. For blockholders, majority voters, swaying majority voters, I observed a similar decrease in the frequency of votes casted as the proposal is closer to end, yet I also observe that, relatively, more votes are being casted in the last moments of the proposal.

This typical DAO could encounter strategic voting (meaning here swaying majority votes and/or sniping blockholder votes). A DAO would have on average (median) 9 proposals (2) onto which I would observe sniping blockholders and on average (median) 5.2 (2)

[3]The Nakamoto number is a measure of voting concentration in DAOs. It is the number of contributions it takes to reach 50% of the overall voting power casted (the overall number of tokens) on a given improvement proposal.

proposals where I observe swaying majority voters. These strategic voting occurrences would be observed on average (median) on the 10.5 (6)-th proposal that the DAO votes on for the first sniping blockholder and on average (median) the 22.4 (13)-th proposal that the DAO votes on for the first swaying majority voter. What is observed is that first strategic voting occurrences are on average (median) later than first non strategic interactions. The first Blockholder or Majority voter happens almost immediately for a given DAO (i.e. the governance of the DAO is straightaway not decentralized). Voters acting strategically, however, occur later in the life of the DAO, highlighting the fact that opportunistic behaviors may be exploited by the voters only when the private benefit is large enough. Table 1 gives more detailed summary statistics on the DAOs in the sample. Table 2 gives more detailed summary statistics on the proposals and the voters in the sample. Two examples of improvement proposals with a swaying majority voter and a sniping blockholder are given in Section 3.1 and 4.1.

Table 1 – DAOs Summary Statistics

	Obs	Mean	SD	Min	25%	50%	75%	Max
DAOs	75							
Proposals per DAO	75	78.7	269.4	4	14	25	59	2320
Average duration of proposals (days)	75	4.7	3.2	0.87	2.97	3.83	5.33	19.6
Average turnout across proposals	75	224	406	7.8	47	94	214	2535
Average Nakamoto number across proposals	75	5.3	6.1	1.2	1.95	2.9	5.4	34.7
Proposals with majority voters	75	29.8	140	0	1	4	19	1220
Proposals with swaying voters	75	8.3	42.6	0	0.5	2	4	370
Proposals with swaying majority voters	75	5.2	31.8	0	0	1	2	276
Proposals with blockholders	75	51.3	153.3	1	10	18	36	1289
Proposals with sniping voters	75	56.4	157.9	2	10	19	46.5	1316
Proposals with sniping blockholders	75	9	31.3	0	1	2	6.5	261
Number of proposals before the first majority voter	75	9.1	11.4	0	1	7	10	59
Number of proposals before the first swaying voter	75	10.7	12	0	2	8	14	64
Number of proposals before the first swaying majority voter	75	22.4	25.3	0	8	13	26.5	144
Number of proposals before the first blockholders	75	0.95	2.4	0	0	0	1	19
Number of proposals before the first sniping vote	75	0.53	1.32	0	0	0	0	7
Number of proposals before the first sniping blockholder	75	10.5	11.56	0	2.5	6	14.5	58
Market Cap (average sample period, M$)	75	304	923	0.37	13	43	147	7117
Trade volume (average sample period M$)	75	36	91	6e-3	0.6	4	20	477

2.3. Stylized facts: Voting concentration

What is striking when looking at the voting power concentrations of DAOs is that the voting power is extremely concentrated from the beginning. Meaning that despite

Table 2 – Proposals and Voters Summary Statistics

	Obs	Mean	SD	Min	25%	50%	75%	Max
Proposals	5905							
Duration (days)	5905	10.5	25.5	0.007	2	3.125	7	366
Turnout	5905	201	491	4	20	57	163	9056
Nakamoto number	5905	4.2	14.35	1	1	2	3	331
Margin of victory	5905	0.821	0.273	4e-4	0.74	0.978	1	1
Voters	215820							
Average voting power across votes (% of the total voting power)	215820	3.7	29	0	6e-6	1e-3	0.3	1
Number of proposals voted upon	215820	7.5	22.2	1	2	2	5	2195
Average voting speed	215820	0.31	0.24	0	0.11	0.27	0.45	1
Voting speed for majority voters	2236	0.37	0.32	0	0.07	0.28	0.64	1
Voting speed for swaying voters	621	0.4	0.33	0	0.09	0.34	0.69	1
Voting speed for swaying majority voters	387	0.39	0.33	0	0.08	0.32	0.66	1
Voting speed for blockholders	3853	0.35	0.31	0	0.06	0.2	0.6	1

hundreds of voters giving their opinions on what the platform should implement, the number of votes actually deciding the outcome is very low. This is surprising as one could believe that decentralized organizations are, as their name would suggest, decentralized. Both graphs in Appendix B plot the number of voters across time and look at the turnout in governance proposals compared to the number of contributions it actually took to reach 50% of the voting power (the Nakamoto number). I do this for the biggest decentralized lending platform in the sample (AAVE) and show that although the turnout sometimes reaches several thousand voters, the Nakamoto number oscillates between 1 and 2. I also look at Lido DAO, a DAO which enables users to stake Ethereum and become part of Ethereum node[4]. For this DAO, even though the turnout in governance proposals increased over the time of the sample the Nakamoto number stayed between 2 and 4. This stylized fact brings evidence that DAOs are not decentralized. There are

[4] A Ethereum node necessitates 32 ETH to be launched and participate in the Proof of Stake validation of the Ethereum Blockchain. 32 ETH represents ∼65k€ in January 2024. To enable smaller ETH holders to stake their tokens, Lido DAO pools low amounts of tokens from different small token holders and then shares the subsequent rewards between them

large contributors who could act strategically to implement governance outcomes that are not necessarily value-maximizing. Although claimed to be decentralized, DAOs' may resemble more diffused ownership firms where a small number of shareholders decide on the governance of the firm. This is the first clue towards the fact that DeFi DAOs may be a valid laboratory to study corporate governance: the voting power is very concentrated, alike what one can find in the general assembly of shareholders.

2.4. Summary statistics on CARs

The returns calculated in this paper are weekly cumulative abnormal returns for the price of the DAOs' governance tokens. I subtract to the weekly cumulative returns of the token the weekly cumulative abnormal returns of a market portfolio of tokens of the main cryptocurrencies. Average CARs can be found for different types of DAOs and different types of weeks (whether there is a proposal voted upon during that week and the sort of voter which voted in the proposal). Concurring with the traditional view in blockholder theory, the presence of a blockholder who votes for and implements the value-maximizing outcome of a given proposal for a DAO is overall associated with positive cumulative abnormal returns. This is a second clue pointing at the overall similarity between what is expected in the governance in a traditional finance and the governance of DeFi DAOs: CARs following proposals with the repeated presence of blockholders are alike what is predicted by the blockholder theory. Detailed summary statistics about the CARs of the DAOs in the sample can be found following in Table 3.

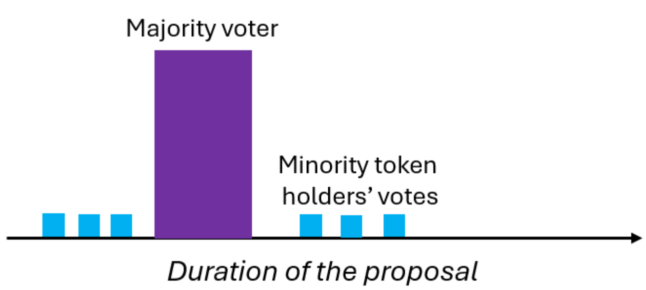
Table 3 – Weekly cumulative abnormal returns Summary Statistics

	All DAOs	Majority DAOs	Small DAOs	Older proposals	Newer proposals	High Trade volume	Low Trade Volume
CAR overall	0.8%	0.4%	1.2%	0.9%	0.7%	0.5%	1.2%
CAR when there is no proposal	1%	0.6%	1.5%	0.9%	1.2%	0.6%	1.5%
CAR when there is a proposal	0.4%	0.8%	-0.08%	1%	-0.04%	-0.02%	0.9%
CAR when there is a proposal with majority voter	0.05%	1%	-1.3%	1.2%	-3.3%	-0.1%	0.4%
CAR when there is a proposal with blockholder	1%	1%	1%	1.6%	0.4%	0.4%	1.7%

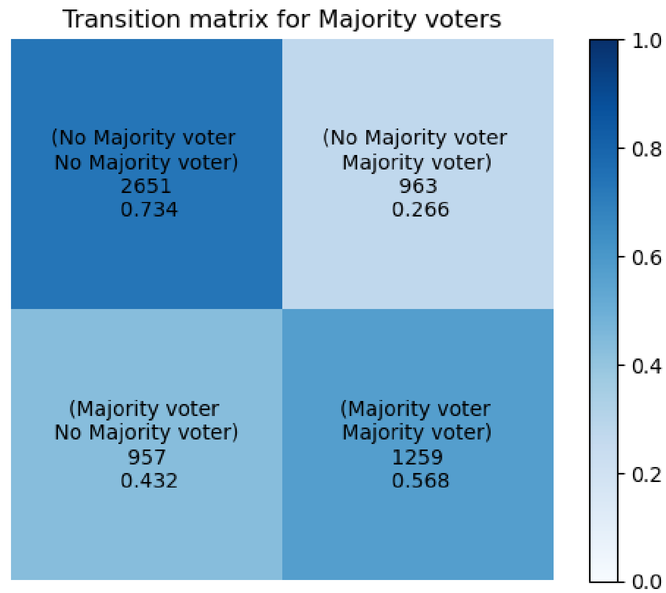
2.5. Information releases and transition matrices

This section aims at explaining what events I focus on in the following sections of the paper and why can we consider the strategic voting occurrence as a shock to the information set of the voters of DAOs. One thing that is to be noted is that at the time of which the sample was gathered, a typical proposal would be up for votes during a given number of days. During this time, people could vote with the amount of governance tokens that they had in the given block of the blockchain before the proposal was launched (they cannot buy more token during the proposal). They could, however, observe which addresses voted and for which outcome during the entire time of the proposal. Votes already casted were observable by the entire voting base. Schemes as well as transition matrices that are shown for each kind of the four voting patterns that I examine in the data.

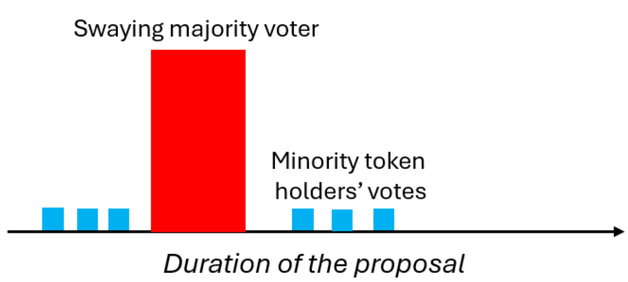
The first voting pattern I look for are majority votes casted on a proposal. This means that a single contribution is the median voter and decides on the outcome of the proposal. This vote can be casted whenever during the duration of the proposal. This vote decided the final outcome unilaterally.



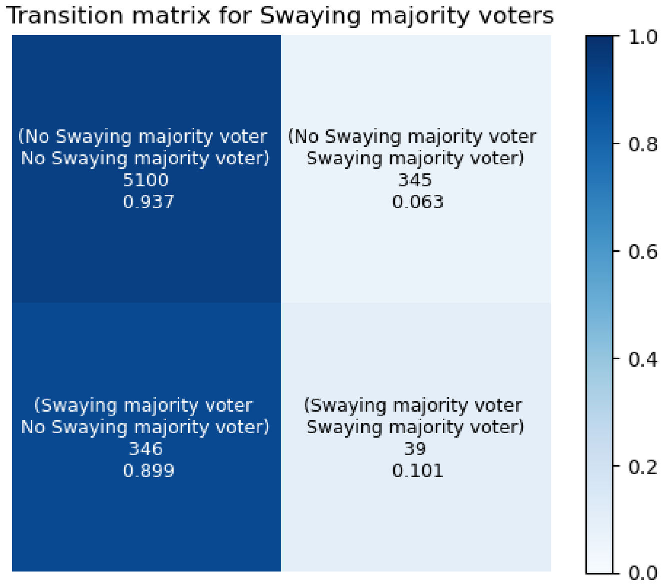
The transition matrix below shows how frequent are majority voters and the transition between having a majority vote casted and not having majority votes casted onto proposal for the whole sample of DAOs. It is more probable than not to be in a "regime" where there are no majority voters, but there is still a chance of more than a quarter (26.6%) that a majority vote will be casted. Once a majority voter has casted a vote on a proposal, for the next proposal it is almost a 50/50 percent chance that there will be again the presence of a majority voter. This shows how common are majority voters and that their presence should be anticipated by the participants in the governance of the DAOs.



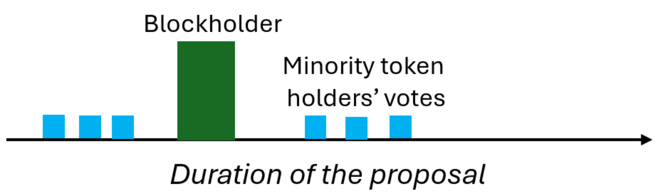
Now, I take into account the "choice made" dimension of the data and search whether the majority voter has gone against what the minority token holders would have had chosen. This is what I call a "**Swaying majority voter**".



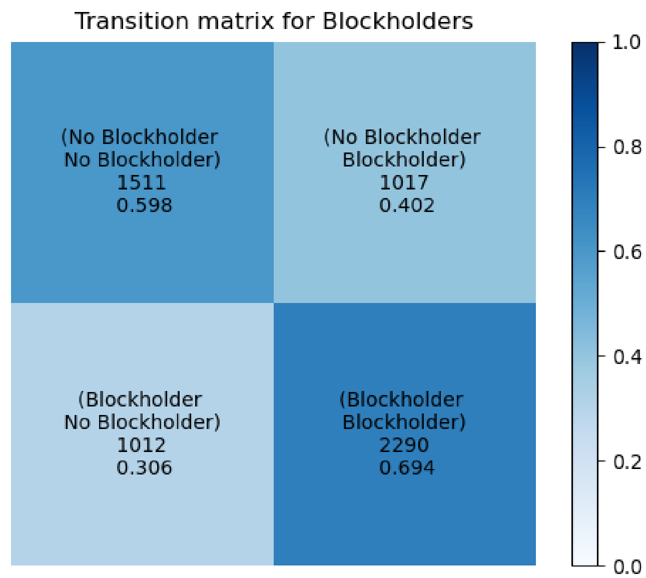
The transition matrix below show that this strategic voting pattern is a lot less frequent, there are very few cases of swaying majority voters. When there was no swaying majority voters there is a 6.3% chance to have one in the following proposal. More importantly, once there is a swaying majority vote, there is almost never a second one in the following proposal, there is a 90% to revert to proposals without swaying majority voters. This is one evidence that shows that strategic voting in DAOs are rare events, and this is why the first of these events is definitely not anticipated by the voting bases of the DAOs.



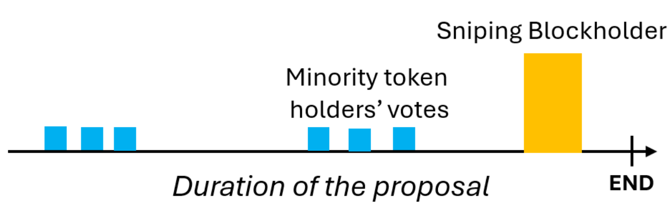
The second category of votes which are highlighted in this paper are Blockholders' votes in proposal. Voters which have a voting power large enough to bear the cost of information acquisition about the value-maximizing outcome of a given improvement proposal, yet a voting power not large enough to be the median voter for the given proposal. They have incentives aligned with the value maximization of the DAO.



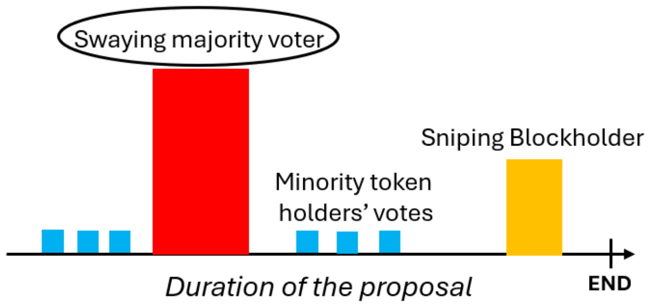
From the transition matrix below, blockholders are omnipresent in the governance of DAOs, there is a 60/40% chance that the next proposal will have a blockholder casting a vote if the there was not a blockholder on a given proposal. There is a 70% chance that if a blockholder voted on a given proposal there will be a blockholder vote again in the next proposal.



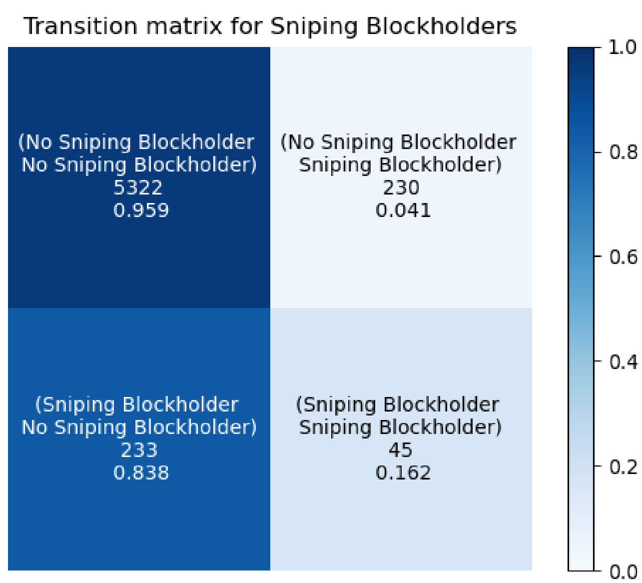
A blockholder has a substantial voting power but not enough to be the median voter. In line with Blockholder theory from corporate governance or the Swing voter's curse from Feddersen and Pesendorfer (1996), a blockholder which aims at maximizing the value of the DAO would vote early in the proposal to influence the minority token holders which haven't paid the information acquisition cost. Having observed this vote, minority token holders could vote as the blockholder or, optimally, abstain from voting. However if there is a small margin of victory between the two choices, a strategic blockholder could wait until the end of a proposal to influence the vote in its favor, this is what I call a "**Sniping blockholder**". They exploit another dimension of the voting data, the timing dimension of the data exploiting a last mover advantage.



In case in which there is a swaying majority voter, a median voter who votes strategically against all other voters, the outcome is decided by this swaying majority voter and therefore blockholders play no role in this simplified context. If there is occurrence of both a swaying majority voter and sniping blockholder, the strategic voting interaction accounted for in this sample is the swaying majority voter's as this voter is the median voter and has unilaterally decided on the outcome of the proposal.



For these new strategic interactions in the improvement proposals of the DAOs, I observe a similar pattern, there is almost never sniping blockholders. There is only a 4% chance that for a given proposal onto which there is no sniping blockholder vote, the following proposal will have a sniping blockholder vote. Once a vote has been casted, there is 84% chance that the pattern will revert to sniping blockholder vote. This is a very similar pattern the swaying majority voters presented before and therefore those occurrences are also not anticipated by the voting base of the DAOs.



The section's aim is twofold. The first is to show that proposals are not decentralized as one would except, a result which is in accordance with the literature on DAOs' governance. There is an omnipresence of either majority voters or blockholders in the proposals which have a substantial voting power relative to the minority token holders. For a given proposal, majority voters and blockholders should be expected, if the proposal does not have the vote from the first, it will most likely have the vote from the latter. The second aim is to show that the strategic voting occurrences are much less common and therefore are difficult to anticipate for the voters of DAOs. The first occurrence of such strategic voting behaviors can reasonably be considered as new information release about the voting base of the DAOs.

3. Majority Voters and Swaying

3.1. Economic Mechanism and Example

In traditional finance, giving a shareholder a large voting power also gives this shareholder incentive to acquire information about what would be the value-maximizing outcome for the organization. When the outcomes are alike common value elections à la Feddersen and Pesendorfer (1996), that is, either a good or bad option, the outcome implemented influences every shareholder in the same way. It would then be optimal to give informed voters a very high voting power. DAOs that develop technological products like Blockchains or Roll-ups have governance improvement proposals which resemble those common value elections. It is in fact found in Fracassi et al. (2024) that votes from known and trusted members of the Ethereum foundation are associated with positive returns for the ETH token. In diffused ownership firms however, the economic mechanism is very different. Even though one outcome may be value destroying for the minority shareholders, a large voter may have incentive to implement such a bad outcome if he can extract a private benefit which outweighs the value-destruction of his shares. Therefore, a majority voter may hurt the firm. DeFi DAOs have improvement proposals with inherent conflicts of interest between large and small token holders which resemble more traditional finance diffused ownership than other DAOs.

A majority voter present in the voting base of a DAO may be hurtful to the DAO but if those voters are omnipresent, as shown in Section 2.5, the information of their presence should be incorporated in the price of the token. Majority voters' omnipresence should be reflected in another dimension of the DAO. For example, a lower market capitalization because this majority voter has repeatedly hurt the growth of the DAO. Without controlling for the actual choice of the majority voter, maybe the majority voter implemented the value-maximizing outcome in agreement with minority token holders, and it could be positive for growth after all. This is why, taking advantage of the granularity of the governance voting data of DeFi DAOs, I look further for **Swaying majority voters**. Those are median voters with more than 50% of the voting power for a given proposal who actively voted against what minority token holders would have otherwise chosen. As shown in Section 2.5, those strategic voting interactions are very scarce. If DeFi DAOs are a good laboratory for corporate governance, then unanticipated information release should have an impact on returns, as it would for a firm in traditional finance. Here it should have a negative impact as this new information would signal that there is a higher chance of minority token holders' expropriation. The economic mechanism of new information incorporated efficiently in the price of the tokens predicts that only the first vote should trigger negative CARs. It is very important to keep in mind that while only the first swaying majority voter will impact the DAO's governance price it will not only be the first interaction which hurts the DAO. Every non value-maximization unilaterally decided by swaying majority voters against minority token holders will hurt the DAO, but only the first swaying majority voter occurrence will hurt the DAO's governance token price. After this first interaction, the information about the presence of a swaying majority voter in the DAO's voting base will be incorporated in the governance token's price.

A concrete example of such an information release is a proposal from the decentralized exchange Balancer. In December 2021, a token holder put up a proposal which had the purpose to stake "FEI, TRIBE and MTA Tokens". This means that Balancer had invested in assets FEI, TRIBE and MTA tokens [5] and the vote was whether Balancer should transfer those assets onto another platform. This strategy had the risk that the platform receiving those assets could be taking very high risks to create those attractive yields. It was taking extra-risk on top of holding already risky assets (in this case, badly operated algorithmic stablecoins). 2102 voters participated in that improvement proposal. Minority token holders voted for "No" refusing to take this risk. However, one address voted with 51.3% of the overall voting power casted onto the proposal and decided to implement the risky strategy anyway. This swaying majority voter may have had private benefit incentive for Balancer to invest a large amount onto this platform or to move and buy large amounts of another asset. This was completely different from what the minority token holders wanted and not value-maximizing for Balancer. This new information of the possibility of swaying majority voters in Balancer was followed by 5.5% drop in weekly cumulative abnormal returns of the Balancer governance token.

3.2. Identification Strategy

The identification strategy is to use a triple difference-in-difference in the cross-sections of weekly cumulative abnormal returns following improvement proposals. I first run a simple regression that compares proposals onto which a majority voter unilaterally decided the outcome versus proposals where there was no majority vote. The indicators in the regressions that follow correspond to whether the vote with the maximum voting power for a given proposal is a majority voter/swaying majority voter/first swaying majority voter.

$$CAR_{i,d,t} = \alpha_0 + \alpha_1 \cdot Majority\ voter_{i,d,t} + \beta \cdot \mathbf{X}_{i,d,t} + \gamma_d + \delta_t + \epsilon_{i,d,t} \quad (1)$$

In a second regression, I differentiate between proposals with Swaying majority voters and proposals without swaying majority voters, controlling for lower-level interactions. Here lower-level interactions are majority voters which voted for an outcome in-line with

[5] FEI and TRIBE are two tokens from a DAO which launched an algorithmic stablecoin, FEI, which later went on to crash. MTA is the token from a BoostedFi which promises large yields when staking token on their platform.

what minority token holders had voted for and swaying voters which had a small voting power and changed the outcome of a vote in a very contested vote. The regression for that second regression is the following.

$$CAR_{i,d,t} = \alpha_0 + \alpha_1 \cdot Majority\ voter_{i,d,t} + \alpha_2 \cdot Swaying\ voter_{i,d,t}$$
$$+ \alpha_3 \cdot Majority\ voter \times Swaying\ voter_{i,d,t} + \beta{\cdot}\mathbf{X}_{i,d,t} + \gamma_d + \delta_t + \epsilon_{i,d,t} \ (2)$$

Finally, in line with the economic mechanism described above, I then run a third regression, which isolates proposals during which there was the First swaying majority voter for a given DAO. I also control for lower-level interactions in that regression. Added are indicators which account for the influence of having a majority voter and a swaying majority voter in subsequent proposals and whether what drives this result is the first occurrence of a majority voter or the first occurrence of a small swaying voter.

$$CAR_{i,d,t} = \alpha_0 + \alpha_1 \cdot Majority\ voter_{i,d,t} + \alpha_2 \cdot 1st\ Majority\ voter_{i,d,t}$$
$$+ \alpha_3 \cdot Swaying\ voter_{i,d,t} + \alpha_4 \cdot 1st\ Swaying\ voter_{i,d,t}$$
$$+ \alpha_5 \cdot Swaying\ Majority\ voter_{i,d,t} + \alpha_6 \cdot 1st\ Swaying\ Majority\ voter_{i,d,t}$$
$$+ \beta{\cdot}\mathbf{X}_{i,d,t} + \gamma_d + \delta_t + \epsilon_{i,d,t} \ (3)$$

All regressions have DAO level controls, namely market capitalization, the trading volume as well as the age of the DAO at which the proposals are put forward. I also add quarter-of-the-year and industry/DAO fixed effects. The dependant variable is the cumulative abnormal returns following proposal i of DAO d at time t.

3.3. Results

In Table 4 below, I only control for the presence of majority voters. The absence of statistically significant results is in line with the economic mechanism described in Section 3.1. The information about the potential presence of majority voters in improvement proposals is incorporated in the price of the governance tokens as their occurrence is frequent.

In Table 5 below, I control for the dimension of the data "Choice made" of the voters. This differentiates proposals with Swaying majority voters from other proposals. The presence of Swaying majority voters is associated with negative CARs of 4.2% (column 4) relative to proposals where they are absent. This is not a causal statement as the distributions of voters (and therefore majority voters) for DAOs are endogenous. However, this is not in line with the economic mechanism as this would be a repeated effect. Somehow, voters would repeatedly be unaware of the presence of strategic participants in the voting base of the DAO and each Swaying majority voter's presence in an improvement proposal would be associated with negative returns.

In traditional finance, if prices are efficient incorporating information, only new unanticipated information releases would affect the returns of the share's price. Table 6 below gives two results in line with the economic mechanism tested. The first result is that new information about a high possibility of minority token holders' expropriation, the indicator for the first swaying majority voter, is strongly negatively significant. The first occurrence of a swaying majority voter in a governance proposal for a given DAO triggers a **11.34%** drop in the DAO's governance token price (column 4). This statement can be considered causal as, arguably, the presence of such strategic voters is not anticipated as it should be by the token holders of the DAO. The second result is that no other coefficient for lower-level interactions is statistically significant. In figure 1 of Appendix E, I plot the CARs of proposals with the presence of the first swaying majority voter versus the control of proposals where a blockholder voted. Although both groups have similar CARs for the week before the end of the proposals, they differ after the end of the proposal as the proposals with the first swaying majority voters drop significantly. Appendix E also shows graphs for CARs following proposals with majority voters versus CARs following proposals with blockholders in the first figure, CARs following proposals with swaying majority voters versus CARs following proposals with blockholders in the second figure and CARs following proposals with first swaying majority voters versus CARs following proposals with blockholders in the third figure.

Table 4 –

Dependent variable: Cumulative Abnormal Returns for given token one week following a proposal.
***,**,* indicate significance at the 1%, 5% and 10% levels.
Standard errors are heteroskedasticity robust.

	CAR (1)	CAR (2)	CAR (3)	CAR (4)
Majority voter (>50%)	$5e^{-}4$	−0.001	−0.011	−0.0115*
	(0.077)	(−0.183)	(−1.636)	(−1.841)
log(Market Cap)	−0.0826***	−0.0852***	−0.13***	−0.23***
	(−5.633)	(−5.251)	(−5.893)	(−8.835)
log(Trade Volume)	0.0575***	0.0564***	0.116***	0.104***
	(5.601)	(5.325)	(6.285)	(5.668)
Age	$-1.6e^{-}5$***	$-2.5e^{-}5$***	$-3e^{-}5$	$-7e^{-}4$***
	(−2.838)	(−3.514)	(−1.204)	(−4.841)
Quarter FE	Y	Y	N	Y
Industry FE	N	Y	N	N
DAO FE	N	N	Y	Y
Observations	5905	5905	5905	5905
R-squared	0.08	0.082	0.09	0.165
Adj. R-squared	0.079	0.08	0.078	0.153

Table 5 –

Dependent variable: Cumulative Abnormal Returns for given token one week following a proposal.
***,**,* indicate significance at the 1%, 5% and 10% levels.
Standard errors are heteroskedasticity robust.

	CAR (1)	CAR (2)	CAR (3)	CAR (4)
Swaying majority voter	-0.037^{*}	-0.039^{*}	-0.035^{*}	-0.042^{**}
	(-1.815)	(-1.926)	(-1.684)	(-2.121)
Swaying voter	0.0185	0.0182	0.016	0.022
	(1.083)	(1.071)	(0.921)	(1.32)
Majority voter (>50%)	0.0048	0.0035	-0.006	-0.006
	(0.718)	(0.53)	(-0.889)	(-0.951)
log(Market Cap)	-0.0826^{***}	-0.0853^{***}	-0.13^{***}	-0.23^{***}
	(-5.635)	(-5.265)	(-5.913)	(-8.859)
log(Trade Volume)	0.0576^{***}	0.057^{***}	0.116^{***}	0.104^{***}
	(5.615)	(5.346)	(6.308)	(5.69)
Age	$-1.6e^{-}5^{***}$	$-2.6e^{-}5^{***}$	$-3e^{-}5$	$-7e^{-}4^{***}$
	(-2.857)	(-3.549)	(-1.19)	(-4.828)
Quarter FE	Y	Y	N	Y
Industry FE	N	Y	N	N
DAO FE	N	N	Y	Y
Observations	5905	5905	5905	5905
R-squared	0.08	0.082	0.09	0.165
Adj. R-squared	0.079	0.08	0.078	0.153

Table 6 –

Dependent variable: Cumulative Abnormal Returns for given token one week following a proposal.
***,**,* indicate significance at the 1%, 5% and 10% levels.
Standard errors are heteroskedasticity robust.

	CAR (1)	CAR (2)	CAR (3)	CAR (4)
First swaying majority voter	−0.112***	−0.1087***	−0.0976***	−0.1134***
	(−3.23)	(−3.078)	(−2.647)	(−3.271)
Swaying majority voter	−0.023	−0.025	−0.023	−0.029
	(−1.235)	(−1.356)	(−1.184)	(−1.592)
First swaying voter	0.03	0.0328	0.037	0.029
	(0.653)	(0.7)	(0.727)	(0.584)
Swaying voter	0.0144	0.0138	0.0113	0.018
	(0.951)	(0.912)	(0.73)	(1.266)
First majority voter	0.0246	0.0264	0.023	0.0253
	(0.691)	(0.741)	(0.548)	(0.623)
Majority voter	0.0046	0.0033	−0.007	−0.007
(>50%)	(0.690)	(0.493)	(−0.939)	(−1.014)
log(Market Cap)	−0.0828***	−0.0854***	−0.13***	−0.231***
	(−5.596)	(−5.227)	(−5.921)	(−8.887)
log(Trade Volume)	0.057***	0.056***	0.116***	0.104***
	(5.568)	(5.285)	(6.296)	(5.685)
Age	$-1.5e^{-}5$***	$-2.5e^{-}5$***	$-2.9e^{-}5$	$-7e^{-}4$***
	(−2.671)	(−3.397)	(−1.14)	(−4.864)
Quarter FE	Y	Y	N	Y
Industry FE	N	Y	N	N
DAO FE	N	N	Y	Y
Observations	5905	5905	5905	5905
R-squared	0.082	0.083	0.091	0.167
Adj. R-squared	0.08	0.081	0.078	0.154

4. Blockholders and Sniping Blockholders

4.1. Economic Mechanism and Example

A large shareholder which has enough voting power to decide solely the outcome of an improvement proposal may not have incentive to implement value-maximizing outcomes. In traditional finance, blockholders are shareholders which have their incentive aligned with the value-maximization of the firms. They are informed shareholders which do not implement private benefiting outcomes. Their voting power is large enough to ensure that they pay the information acquisition cost about what is the value-maximizing outcome, yet not large enough that it creates possibilities of opportunistic behaviors. In the corporate governance literature, the voting power threshold to be considered a blockholder ranges from 5% to 10% (Edmans and Holderness (2017)). In this paper I will consider that a blockholder casted a vote in a governance proposal if it voted with more than 10% of the total voting power casted on that proposal. In the case of majority voters, participants acknowledged that there were these voters that could unilaterally choose outcomes, and their choices may or may not have be in line with the value-maximizing option. In the case of blockholders however, because their incentives are aligned with the DAO, they can implement options which will, each time, positively impact the DAO and every of its token holders (a repeated positive impact on the growth of the DAOs for example). As seen in Section 2.5, for every proposal the DAOs more or less flip a coin between having the outcome decided by an incentive-aligned blockholder or by a possibly private benefiting majority voter. If DeFi DAOs were to be a valid laboratory for traditional corporate governance, it should be observed that, relative to proposal with the presence of majority voters, proposals with the presence of a blockholders are associated with positive CARs[6]. Also, to be truly beneficial, proposals with blockholders should also have relatively higher CARs than proposals with no voter that has incentive to implement to acquire the information about the value maximizing outcomes (the few extremely decentralized proposals).

[6] Or, positive CARs relatively to the presence of majority voters and vice-versa.

Blockholders have substantial voting power. Yes, they do not have the voting power to decide unilaterally the final outcome of a proposal, but, if the proposal is highly debated (the margin of victory for the winning outcome is small), they may become the median voter. All the votes are observable during the duration of the proposal, so the optimal strategy for a strategic blockholder is to wait until the last moment to vote to extract a last mover advantage. In that case the whole positive influence of blockholders is gone because this last mover advantage may not be value-maximizing for the DAO. A blockholder which takes advantage of voting late is referred to as a **Sniping Blockholder**. Sniping blockholders are strategic voters which take advantage of another dimension of the data available, the timing dimension. As presented in Section 2.5, theses strategic voting occurrences are also very scarce and therefore the first of those occurrences follow a new unanticipated information intuition very similar to first swaying majority voters in Section 3. This information release should trigger negative CARs as again there is a higher possibility of minority token holders' expropriation. It should be observed only the first time that a sniping blockholder votes in the governance of a given DAO.

One example of a first sniping blockholder happened in December 2020 for the DAO Rari Capital. This is a DAO that provides liquidity pools and staking of cryptoassets. A proposal was put forward "[RIP-3] New Fee structure" which encompassed two modifications for the DAO. The first modification was to increase the fees on the liquidity pools of the DAOs and delete a withdrawal fee. This meant that liquidity providers of the DAO would earn more. The second modification was the allocation of those earnings. Whereas as it used to be 50% buybacks 50% for the Rari foundation, it was to become 45% for something alike buybacks, 15% for something alike the Rari foundation but 33% (and an additional optional 6%) for the compensation of developers. The first modification is a textbook application of why it is positive to have blockholders in the governance of the DeFi DAOs. Low trading fees mean that a lot of traders will join the platform but few liquidity providers will join (because they earn the low trading fees). And few liquidity providers in the first place can decrease the amount there is to trade, therefore the number of traders on the platform in the first place. High trading fees will have the opposite mechanism. A high number of liquidity providers will join the platform but only a few traders, which could result maybe in fewer liquidity providers in the first place. Is there a better option? A value-maximizing option for Rari Capital DAO? Yes, according to Hasbrouck et al. (2022) the second option is the optimal one. A blockholder has incentive to search for that information (the cost of this search being the time of the search for example) and vote for the value-maximizing outcome which benefits every token holder as it boosts the growth of the platform. However, the proposal does not end there, and a second part is put forward. This part has large conflicts of interest between token holders. It benefits greatly developers of the DAO as they now earn a larger part of those increased fees as their compensation. Minority token holders get lower earnings as their buybacks are decreased. Minority token holders voted against the implementation of the proposal. Even though the fee structure is more optimal for the growth of the DAO, the earnings structure generated by those fees are tailored to their disfavor. This proposal should not have been implemented. Although debated the result was clearly in favor of not implementing the fee structure. However, a blockholder with 37% of the voted in the last 10% of the duration of the proposal (the last 9.6 hours) and voted for the first outcome benefiting the compensation of the developers and therefore benefited from a last mover advantage. This strategic interaction was not anticipated by the voting base of Rari Capital DAO. This triggered a drop of 63.6% in the weekly CARs of the DAO's governance token price in the following week.

4.2. Identification strategy

I reconstitute the chronology of the votes for every proposal and then identify strategic voting in those votes. In line with what is described in Section 2.4 if both a sniping blockholder and a swaying majority voter vote on a proposal, the indicator will be attributed to the median voter, the swaying majority voter. I run three very similar regressions to the regressions in Section 3. The first is simply with an indicator for whether a blockholder's vote was casted during proposal. The second is controlling for the rarer occurrences of sniping blockholders as well as lower-level interactions. The final regression is the triple difference-in-difference regression between first sniping blockholders and all lower-level interactions. I run those regressions with two different control groups. The first control group is the same as in part 3: the rest of the cross section of proposals. The second control group excludes proposals with swaying majority voters to be able to compare these strategic interactions to a control group of both proposals with no strategic interactions and subsequent strategic interactions of the same type. In Appendix F I run robustness checks which shows that the results from Section 3 hold with this reconstituted vote chronology dataset.

$$CAR_{i,d,t} = \alpha_0 + \alpha_1 \cdot Blockholder_{i,d,t} + \beta \cdot \mathbf{X}_{i,d,t} + \gamma_d + \delta_t + \epsilon_{i,d,t} \quad (4)$$

$$CAR_{i,d,t} = \alpha_0 + \alpha_1 \cdot Blockholder_{i,d,t} + \alpha_2 \cdot Sniping_{i,d,t} + \alpha_3 \cdot Sniping\ Blockholder_{i,d,t} + \beta \cdot \mathbf{X}_{i,d,t} + \gamma_d + \delta_t + \epsilon_{i,d,t} \quad (5)$$

$$CAR_{i,d,t} = \alpha_0 + \alpha_1 \cdot Blockholder_{i,d,t} + \alpha_2 \cdot First\ Blockholder_{i,d,t} + \alpha_3 \cdot Sniping_{i,d,t} + \alpha_4 \cdot First\ Sniping_{i,d,t} + \alpha_5 \cdot Sniping\ Blockholder_{i,d,t} + \alpha_6 \cdot First\ Sniping\ Blockholder_{i,d,t} + \beta \cdot \mathbf{X}_{i,d,t} + \gamma_d + \delta_t + \epsilon_{i,d,t} \quad (6)$$

4.3. Results

Table 7 below provides support the economic mechanism described in Section 4.1. First, the indicator for the presence of blockholders in the improvement proposals is strongly statistically significant and positive. This means that relative to proposals on which there is the vote of a majority voter that may not be value-maximizing or a proposal with no voter that has incentive to acquire information about what is best for the DAO, the presence of blockholders is positive as predicted in traditional corporate governance. Proposals during which there was the vote of a blockholder are associated with positive abnormal returns of 1.72% in this specification. Column 6 of the table is evidence in favor of the mechanism of new unanticipated information which is then incorporated in the governance token price. The first sniping blockholder triggers a 8.29% drop in CARs for a given DAO the week following the end of the proposal on which that vote has been casted[7]. The indicator for "First sniping voter" is also significant. This is explained by the fact that for some DAOs the first sniping blockholder vote happens

[7]This result is when the first sniping blockholder does not manifest in the same proposal as the first sniping voter for a given DAO, which is most likely, as explained in Section 2.2

during the proposal that is also the first proposal onto which there is sniping (which also happens to be the first proposal of the DAO, ever). The effect one the returns of the first sniping blockholder seems in those cases to would be nullified. In those particular cases, a lot may be happening right after the first ever proposal of a given DAO and it is difficult to link returns with this strategic voting behavior. This effect would strengthen the identification as I observe those negative returns only when there is a real update of an "established" prior about the DAO's voting base. This result is however only significant to the 10% level and not robust across all specifications (Appendix F).

The second specification excludes proposals with swaying majority voters from the control group and yields the results presented in Table 8. Both coefficients for the presence of blockholders and the first presence of a sniping blockholder are strongly statistically significant. In this specification the coefficient linked to the presence of the first sniping voter is no longer statistically significant. Proposals during which there was the vote of a blockholder are associated with positive abnormal returns of 1.4% (column 4). The first sniping blockholder triggers an 8.83% drop in CARs for a given DAO the week following the end of that proposal (column 6). Appendix E shows graphs for CARs following proposals with sniping blockholders versus CARs following proposals with blockholders in the fourth figure and CARs following proposals with first sniping blockholders versus CARs following proposals with blockholders in the fifth figure.

This section, alike Section 3 on majority voters and swaying, shows that participants in DeFi DAOs governance exploit the strategic possibilities that are left to them by the data and that those agents have the same behavior as what would be anticipated from an agent in traditional finance. Even more so, they implement strategies that are optimal given their level of voting power. Majority voters unilaterally decide on swaying final outcomes when private benefits are high enough. Sniping blockholders gain from last mover advantages when margins of victories are small. Other robustness checks for both Section 3 and Section 4 can be found in Appendix F.

Table 7 –

Dependent variable: Cumulative Abnormal Returns for given token one week following a proposal.
***,**,* indicate significance at the 1%, 5% and 10% levels.
Standard errors are heteroskedasticity robust.

	CAR (1)	CAR (2)	CAR (3)	CAR (4)	CAR (5)	CAR (6)
First Sniping Blockholder			-0.108^{***}			-0.0997^{***}
			(-3.439)			(-3.074)
First Sniping voter			0.113^{**}			0.103^{*}
			(2.017)			(1.737)
First Blockholder			-0.052			-0.05
			(-0.949)			(-0.893)
Sniping Blockholder		0.007	0.016^{*}		0.006	0.014
		(0.741)	(1.672)		(0.659)	(1.545)
Sniping voter		-0.006	-0.007		0.003	0.001
		(-0.75)	(-1.014)		(0.446)	(0.185)
Blockholder (10-50%)	0.0169^{***}	0.016^{**}	0.017^{***}	0.0172^{***}	0.016^{**}	0.0168^{***}
	(2.698)	(2.46)	(2.595)	(2.79)	(2.448)	(2.617)
log(Market Cap)	-0.084^{***}	-0.084^{***}	-0.084^{***}	-0.23^{***}	-0.23^{***}	-0.23^{***}
	(-5.168)	(-5.215)	(-5.125)	(-8.829)	(-8.843)	(-8.717)
log(Trade Volume)	0.055^{***}	0.056^{***}	0.056^{***}	0.104^{***}	0.105^{***}	0.104^{***}
	(5.257)	(5.296)	(5.203)	(5.697)	(5.695)	(5.565)
Age	$-2.7e^{-}5^{***}$	$-2.6e^{-}5^{***}$	$-2.7e^{-}5^{***}$	$-7e^{-}4^{***}$	$-7e^{-}4^{***}$	$-7e^{-}4^{***}$
	(-3.748)	(-3.49)	(-3.6)	(-4.841)	(-4.847)	(-4.898)
Quarter FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	N	N	N
DAO FE	N	N	N	Y	Y	Y
Observations	5905	5905	5905	5905	5905	5905
R-squared	0.083	0.83	0.086	0.165	0.165	0.168
Adj. R-squared	0.081	0.08	0.083	0.153	0.153	0.155

Table 8 –

Dependent variable: Cumulative Abnormal Returns for given token one week following a proposal.
***,**,* indicate significance at the 1%, 5% and 10% levels.
Standard errors are heteroskedasticity robust.

	CAR (1)	CAR (2)	CAR (3)	CAR (4)	CAR (5)	CAR (6)
First Sniping Blockholder			-0.112^{***}			-0.102^{***}
			(−3.517)			(−3.115)
First Sniping voter			0.102^{*}			0.093
			(1.776)			(1.51)
First Blockholder			−0.048			−0.05
			(−0.86)			(−0.839)
Sniping Blockholder		0.007	0.016^{*}		0.006	0.014
		(0.712)	(1.698)		(0.643)	(1.572)
Sniping voter		−0.004	−0.006		0.005	0.003
		(−0.49)	(−0.724)		(0.645)	(0.407)
Blockholder	0.0153^{**}	0.015^{**}	0.015^{**}	0.014^{**}	0.0126^{*}	0.0137^{**}
(10-50%)	(2.286)	(2.065)	(2.206)	(2.103)	(1.816)	(1.992)
log(Market Cap)	-0.084^{***}	-0.084^{***}	-0.084^{***}	-0.23^{***}	-0.23^{***}	-0.23^{***}
	(−4.975)	(−5.017)	(−4.938)	(−8.574)	(−8.59)	(−8.479)
log(Trade Volume)	0.055^{***}	0.055^{***}	0.054^{***}	0.11^{***}	0.109^{***}	0.108^{***}
	(5.006)	(5.04)	(4.951)	(5.66)	(5.695)	(5.543)
Age	$-2.8e^{-}5^{***}$	$-2.8e^{-}5^{***}$	$-2.9e^{-}5^{***}$	$-7e^{-}4^{***}$	$-7e^{-}4^{***}$	$-7e^{-}4^{***}$
	(−3.813)	(−3.592)	(−3.702)	(−4.759)	(−4.767)	(−4.813)
Quarter FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	N	N	N
DAO FE	N	N	N	Y	Y	Y
Observations	5518	5518	5518	5518	5518	5518
R-squared	0.08	0.8	0.086	0.164	0.164	0.166
Adj. R-squared	0.078	0.078	0.083	0.151	0.153	0.155

5. Conclusion

This paper studies the governance of DeFi DAOs and the occurrences of strategic voting in those governance. This is the first contribution which takes the analysis of the governance of the DeFi DAOs to the vote level. The data available for the governance of DAOs are granular and high frequency which enables to examine which voter voted for which outcome at what time during the proposal and with which voting power. I find first stylized facts that are concordant with the literature on the governance of DeFi DAOs. Surprisingly, DAOs are not as decentralized as one might expect. This lack of decentralization comes also as the first evidence towards the fact that DeFi DAOs maybe resemble more diffused ownership firms than decentralized cooperatives. The abundance of data and the similarity with traditional corporate governance begs the question whether DeFi DAOs could be a good laboratory to study corporate governance. This would bridge some of the difficulties that empirical research encounters in corporate governance (the lack of transparency in the voting data and the yearly frequency of the general assemblies of firms). This paper then shows that governance token prices of the DeFi DAOs behave as what would be expected in traditional corporate governance. The two economic mechanisms tested in this paper are whether prices of tokens react to unanticipated news incorporating this additional information in their prices and whether the presence of value-maximizing incentive-aligned blockholders are associated with positive returns. I find support for both of those mechanisms. When the first evidence of a strategic voting behavior unanticipated by the voting base of the DAO happens, first swaying majority voters or first sniping blockholders, **prices react with a sharp 8-10% drop in weekly CARs the following week**. The information is then incorporated in the price as subsequent strategic voting occurrences do not trigger those negative abnormal returns. Majority voters and Blockholders are omnipresent in the governance of DAOs. Alike what is predicted by the blockholder theory, whereas the presence majority voters have no effect on returns as it is unclear that they voted for the value-maximizing outcome or extracted private benefit from being the median voters, Blockholders' votes, on the other hand, are associated with a relatively positive impact on the returns of tokens. This paper's contribution is to validate DeFi DAOs as a valid laboratory to study empirically corporate governance. A future research avenue following the insight of this paper could be to take advantage of the availability of voting data to test theoretical predictions from corporate governance for which the traditional finance data availability used to render identification difficult.

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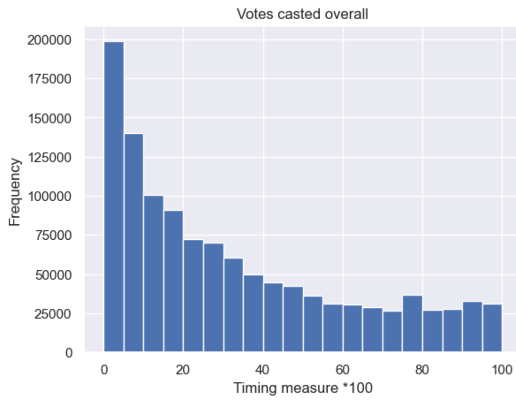
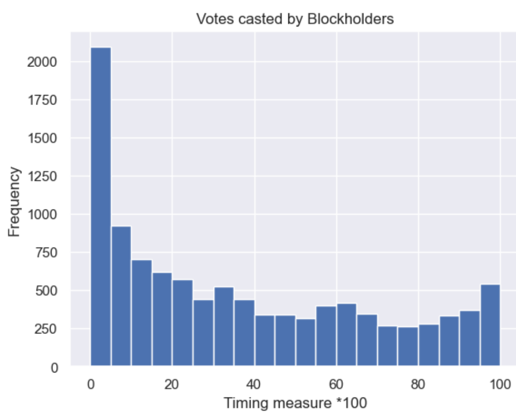
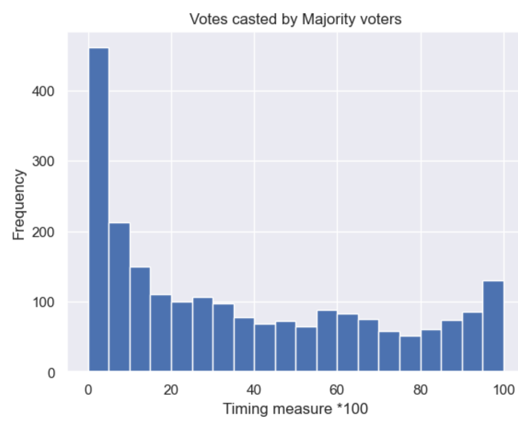
Appendix A: Histograms of the timing measure of votes

The timing measure is : $Timing = \frac{Vote\ casted - Beginning\ proposal}{End\ proposal - Beginning\ proposal}$. In the histogram the x-coordinate are the timing measures multiplied by a 100.

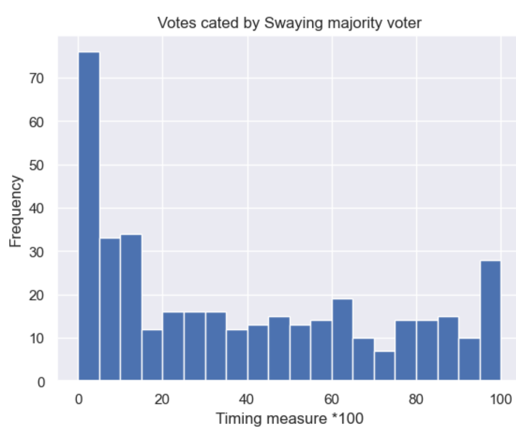


Histogram of the timing measure for all voters



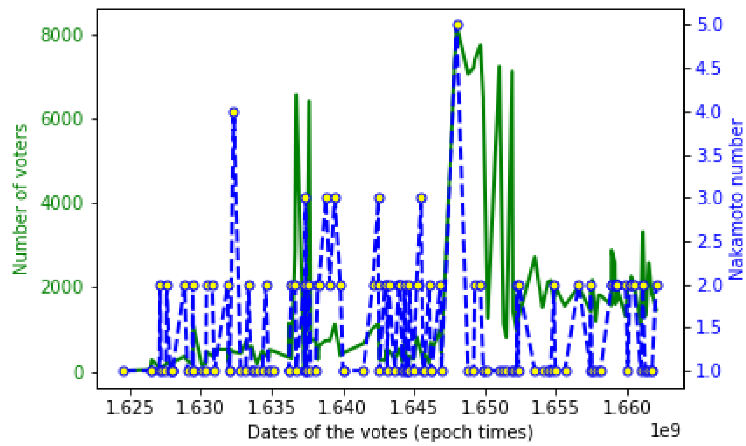


Histograms of the timing measure for Blockholders (left) and Majority voters (right)

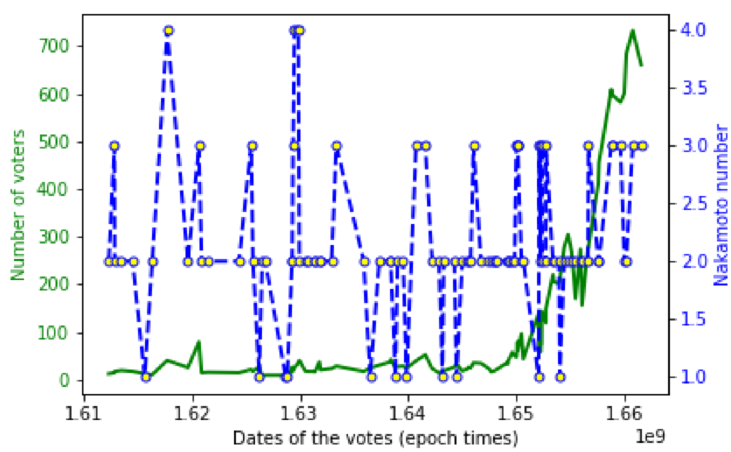


Histogram of the timing measure for Swaying majority voters

Appendix B: Voting concentration across time



Aave number of voters in proposals (in green) and the Nakamoto number of proposals (in blue) across time



Lido number of voters in proposals (in green) and the Nakamoto number of proposals (in blue) across time

Appendix C: List of DAOs and activities

- **Decentralized lending**: Aave, Alchemix, Bankless DAO, Gearbox, unFederal Reserve, PoolTogether, Cream finance, Abachi, TrueFi, Inverse finance
- **Decentralized exchanges (DEXs)**: Uniswap, PancakeSwap, Sushiswap, Julswap, Airswap, Bao Finance, Beethoven X, Biswap, Balancer, Rhino.fi, DODO, dYdX, Paraswap, Linear Finance, Hydranet DAO, Saddle Finance, BoringDAO, DFX Finance, Tokenlon, YFDAI Finance, SpritSwap, QuickSwap, Spookyswap, MacaronSwap, Perpetual protocol, Tacoswap, Opium Protocol, Bancor
- **BoostedFi and staking**: Lido, Alchemist, Alpaca Finance, BadgerDAO, BTCST, Pancake Bunny, BarnBridge, Stake DAO, Yearn Finance, ShareStake, Vesper Finance, Merit Circle, Gro DAO, Idle, Ribbon, Paladin, APWine, PieDAO, AladdinDAO, StakeWise, Threshold Network, RomeDAO, Pickle finance, Yam finance, Rari capital, Stargate DAO, Beefy finance, Crystl finance
- **Currency/Unit of account/Stablecoin**: OlympusDAO, Magic Internet Money, TribeDAO, Fortress DAO, Ampleforth, Phonon DAO, Angle protocol, Ripae, Frax, Digital Reserve currency
- **DeFi ecosystems (all of the above)**: Hector Network, OpenDAO, ApeSwap, Mantra DAO, Curve Finance, Revault

Appendix D: Detailed description of the proposals

The improvement proposals put up for votes for DAOs have very different aims and address different improvements depending on the category of the DAO. After giving a general sense of what those improvement proposals address, this appendix will give two detailed examples of what are those improvement proposals for a decentralized exchange and for a DAO that aims to be a reserve currency.

What are the governance proposals about?

Improvement proposals can be categorized in 5 different categories. The first one could be called 'common good upgrades', these are updates which benefit everybody in the DAO no matter the amount of token, they are generally adopted with more than 99% of the voters voting for the same option (the extreme majority of those votes all of the voters agree on implementing those upgrades). These common good upgrades can be a smart contract audits by an outside legal team, the implementation of bug bounties, or any upgrade which would benefit the DAO technically. Those proposals can also be viewed as a mean to give objective credibility to the DAO, as DAOs which would refuse to hire a legal team to audit the smart contracts could hardly be trusted. The second category of proposals could be called "expansion proposals". Those proposals are about establishing strategic partnerships with other DAOs through the exchange of token with other DAOs (this can also be viewed as a way to diversify the DAO's treasury). In this category, proposals such as grants, the funding for events, advertising, incentivising network externalities, rewards, expansion on sidechains [8]. These expansion proposals are financed almost exclusively by the treasury of the DAO, theses treasuries

[8] The Ethereum blockchain is built in way that sidechains of the mainnet blockchain operate in parallel of Ethereum, they have their own way to validate blocks and their own apps, DAOs present on the mainnet blockchain of Ethereum often look to expand their user bases by launching their services on sidechains of Ethereum which isn't costly in term of effort as it is purposely very easy to go from one side chain to another to the mainnet blockchain for the Ethereum blockchain. The common sidechains on which the DAOs expand are Optimism, Arbitrum or Fantom. When the Ethereum mainnet blockchain used to have a proof-of-work validation protocol, transaction fees (gas fees) would get relatively high, expanding on sidechains already using proof-of-stake which had no gas fees could be a good alternative for some DAOs and some DAOs' users.

have some liquidities and reserves either stablecoin or in “blue chip tokens” [9], however the main element which constitutes DAO treasuries are minted yet unissued tokens which are held by the DAO. Those proposals fund projects via token issuance which is very much like equity financing. Expansion proposals are therefore synonymous with token issuance and new native utility tokens being possibly traded on the secondary market, an increase in the supply of outstanding native tokens. The third category would be “contraction of the supply” proposals. The economic intuition of those proposals is to have means to counteract the supply increase of the “expansion proposals” and therefore implement proposals which either reduce the supply (implementing burning mechanisms through buybacks or an increase in transaction fees of liquidity pools of DEXs) or which de-incentivise selling the tokens (increasing the rewards for the staking the token through by using BoostedFi DAOs, increasing the liquidity providers’ reward, bonding on DAOs such as OlympusDAO). Another way to contract the traded supply of tokens is to implement lock-in mechanisms which give rewards at the end of the lock-in period and voting power benefits during the lock-in period. This was pioneered by CurveDAO, the amount of voting power is no longer directly proportional to the native token held, staking the native token during a given amount of time will give the user a pre-determined amount of voting native tokens (veTOKEN). The longer the tokens are staked, the greater the voting power in veTOKEN. The curve of how much veTOKENs is given for which lock-in period is determined via proposals. This is one way control how much users sell their token as they can no longer sell them for a given period once staked, it also de-incentivise strategic malicious voting as the malicious large token holder will be stuck with a staked token for which the price has depreciated as a consequence of his actions.

The last two categories of proposals have a direct impact on the centralization of the DAOs. These are “centralization proposals” and “decentralization proposals”. The proposals which aims at centralizing the DAO are proposals which enforce a high quorum which can be met only if certain blockholders vote, implementing a minimal token holding requirement to either take parts in the votes or be able to put forward a proposal, forming committees of insiders which can bypass the community approval process if they want to implement a change which cost below a determined cost or reward via airdrops

[9] Are considered blue chip tokens big cryptocurrencies which aren’t linked to any company and that have a large marketcap such as Bitcoin (wBTC on the Ethereum blockchain), ETH (or wETH), Litecoin etc...

early/large token holders or founding members to give them even power in the decision process. The decentralization proposal on the other hand are improvement proposals which aim to implement equal rewards between the members of the DAO, allowing more users to join the governance votes (making it possible to vote with the utility token used on a sidechain[10]. Proposals that go in the exact opposite direction of some centralization proposals such as lowering the quorum or the requirements to vote/put forward a proposal fall also naturally under the decentralization category.

Something that is very common to see in improvement proposals for DAOs are proposals which decide on how much to bribe users of BoostedFi DAOs so that they vote to boost the staking curve of said DAOs. Some DAOs, BoostedFi DAOs, are designed in such a way that they have a lot of liquidity pools. In liquidity pools (used to trade any two tokens), liquidity providers get a reward for providing liquidity at the cost of incurring impermanent loss[11]. The reward rates of the liquidity pools of BoostedFi DAOs are chosen by the users of such DAOs through proposals. The tokens traded in theses liquidity pools are pairs of native tokens coming from other DAOs, hereinafter referred to as non-BoostedFi DAOs, and those non-BoostedFi DAOs bribe users of BoostedFi DAOs to vote to boost the reward rates of liquidity pools which have their native tokens. A lot of improvement proposals in non-BoostedFi DAOs are to decide on an amount to bribe BoostedFi DAOs users to vote for their non-BoostedFi DAO liquidity pools.

Finally, a majority of the improvement proposals are synonymous with spending resources from treasury or minting new tokens, those spending have to be executed by an entity following the implementation or not of the improvement proposal. This is done through a "Multisig Gnosis wallet" which is a wallet for which there needs to be several approbations for the spending to go through (multiple signatures). The treasury of a given DAO is therefore a wallet on the sidechain Gnosis. Spendings need to be signed by designated members and the nomination of those members are themselves improvement proposals voted on by the community. These are the proposals which would resemble

[10]Some DAOs have several utility tokens, either because the rewards from different products are different utility tokens, either because they have a specific token for each chain/sidechain, enabling those tokens to become governance tokens expands the voter base and therefore boosts decentralization

[11]The article of Park (2022) gives a theoretical description of what impermanent loss in Decentralized exchanges are

the most elections, yet the voting power for those nominations is also proportional to the token holdings. More generally, every spending done by a wallet of the DAOs is agreed upon by a community vote, and the members ensuring that the transaction go through are nominated members of the DAO. Every DAO differs in the ways those members stay or not as signatories of the Multisig Gnosis wallet and the duration for which they stay signatories. Some known addresses in the DAO space are signatories in several Multisig wallets at the same time (Llama, OxMaki, etc..).

An example for a decentralized exchange: Balancer

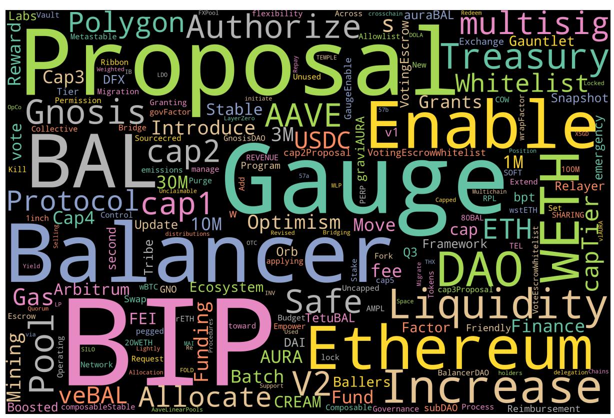
Balancer is a DAO which is a decentralized exchange (DEX), the code of balancer has been cloned for a lot of the DEXs present in the DeFi space. It enables liquidity pools which are blends of several tokens, contrary to the traditional ways of DEXs which have liquidity pools for only a given pair of tokens (Uniswap V2 or Sushiswap). Balancer has a staking offer; user can stake the token to earn rewards at the end of the staking period. To be able to participate in the governance of the DAO, Balancer has put in place lock-in mechanisms similar to the Curve Finance lock-in mechanism. The longer the tokens of the user are staked the higher proportion of voting power token (veBAL as opposed to the BAL utility token) this user will be able to use, veBAL having no secondary market.

In the beginning Balancer focused on improvement proposals which decided where to attribute rewards and was therefore focusing on boosting network externalities and increase the adoption of the platform. For example, 7500 BAL token were emitted every week to reimburse gas fees to users[12]. This strategy worked, we can see in the data that the number of people engaging with governance that there is a jump from voters from around 250 to over 1500. The budget for gas fees reimbursement was therefore quickly exhausted and several proposals were put forward to implement new budgets of reimbursement. Balancer engaged as well in strategic partnerships and expansion policies such as creating a fork on the Terra blockchain called Hexagon and using 6% (60M$ in March 2022 when it was implemented) of the total supply of tokens to do so. They also expanded on the Gnosis sidechain creating a friendly fork call Symetric with 100k USDC and voted to allocate 31k BAL tokens as incentives (network externalities) on Optimism (another Ethereum sidechain). A strategic partnership which can be cited is the one with

[12]The overall coded possible supply of token for balancer is 96M

AAVE as they did a 200k BAL token swap to diversify each DAO's treasury and hired ex- AAVE staff (they did the same token swap with Gnosis DAO). Balancer whitelisted some DAOs to have a say in the governance of Balancer (Gnosis, Olympus, Tracer DAO).

Centralization improvement proposals were also implemented such as the creation of the Balancer Foundation which is centralized with a CEO and some decentralization proposals were put forward such as enabling the holders of the vlAURA token to take part in governance of the DAO (raising the quorum for proposals). Finally, improvement proposals implementing investments in BoostedFi and nominations of signatories of the Multisig treasury wallets were also enacted. There are also proposals which are specific to DEXs such as deciding on the liquidity providers reward, the pools that the protocol want to create (with risky assets or blue chip tokens), the amount of liquidity invested in the new liquidity pools (Balancer initiated a AAVE/wETH pool with 12.5k tokens allocated as future LP rewards for that pool). Votes on liquidity pools could be as examples the launch of the BADGER/wBTC pool or enabling a veBAL gauge (token earned as a liquidity provider) for the HAUS/wETH pool.



Word cloud for the titles of improvement proposals of Balancer

An example for a Currency/Unit of account: OlympusDAO

OlympusDAO is a DAO which aims at creating a reserve currency protocol for digital assets and to become the unit of account of the DeFi space. The OHM tokens are backed by assets in the treasury (like DAI or wETH). The DAO treasury allows any user to buy bonds of the OHM token at a discounted price but the user must pay with ETH and wait 5 days to receive the OHM token[13]. 1 OHM is backed by 1 DAI (so 1 dollar as DAI is

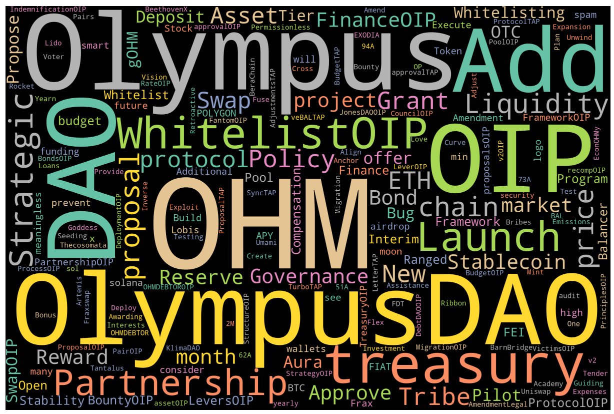
[13] It is also possible to do this with LP tokens

a stablecoin pegged to the dollar developed by MakerDAO) theoretically, so if the price of OHM is above 1 dollar, it is profit for the treasury. Since the user bought 1 OHM at more than 1 dollar, the protocol mints extra OHM tokens which they give back to the stakers of the protocol. The value of the OHM token is not dramatically affected by the creation of new OHM because the user is staking the token (so not selling) and the DAO holds almost all of its treasury, enabling it to proceed to buybacks when needed. This is the good equilibrium of the DAO, the bad equilibrium being that every user sells, and the OHM token falls to it's floor price of 1$.

Improvement proposals which were put up for votes for OlympusDAO at the beginning were mainly to expand the protocol and to enter strategic partnerships. Early on OlympusDAO entered a strategic partnership with FRAX (algorithmic stablecoin), opened a liquidity pool on Uniswap and entered in a strategic partnership with AAVE for an amount of token corresponding to 1M$. The DAO continued to enter strategic partnerships throughout the sample with DAOs such as Umami Finance or Yearn finance and expanded on sidechains such as Phantom. They also chose to add blue chips tokens to their treasury with OIP-15 and OIP-16[14] by adding ETH and BTC to their treasury; OIP-36 adds wBTC and OIP-24 adds LUSD. On the list of proposals which add tokens to the treasury of the DAO we also find OIP-52 which adds UST to the treasury (which later on went on to crash in 2022) and OIP-92 which whitelists FEI as a treasury reserve (an algorithmic stablecoins which also went on to crash). OIP-17 and OIP-23 are examples of common good proposals in which they implement a bug bounty program or pay for an audit of critical smart contracts. Examples of centralization proposals include OIP-56 which puts forward that the technical side of the development of the DAO will no longer require votes but will be left to the coding team; OIP-73 which implements that only key treasury decisions will be put up for votes not operational decision; OIP-75 is put forward to decide on the compensation of the members of the DAO, an implicated DAO member will be paid 500$ monthly while a lead developer of the DAO will have a 30k$ monthly salary; OIP-104 states that the bonding department of the DAO will now operate as a subsidiary of the DAO (therefore by passing votes and being centralized). OIP-39 funds with OHM tokens from treasury a BoostedFi liquidity pool (OIP-48 depends this partnership with 3M$ of token on the BoostedFi liquidity pool).

[14] OIP being "Olympus improvement proposal"

Some of the proposals are also very specific to reserve currencies DAOs such as Olympus: OIP-43 allows the launch of Curve Finance bonds with Olympus, OIP-37 implements the creation of OHM-ETH bonds, OIP-76 implements inverse bonds which give blue chip tokens at the end of the staking period rather than mint new OHM tokens to try to reduce to growth of the supply of tokens. OIP-18 or OIP-63 adjust the reward rates of staking (they adjusted it down to control for the supply of the token)[15] and OIP-80 decides on acquiring the forks of Olympus[16].



Word cloud for the titles of the OIPs of OlympusDAO

[15]From the beginning of Olympus to September 2022 the APY rate for stakers dropped from 8000% to 266%

[16]Other protocols which cloned the code of Olympus and created their own bonding DAO

Appendix E: Visualization of returns

Majority voters, Swaying majority voters and First swaying majority voters

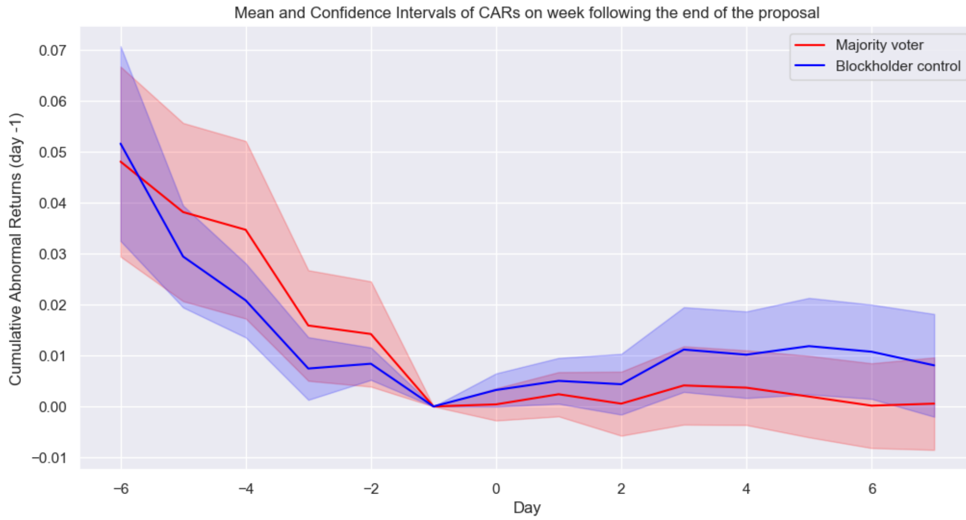


Figure 1: CARs following proposals with the presence of Majority voters versus proposals with the presence of blockholders

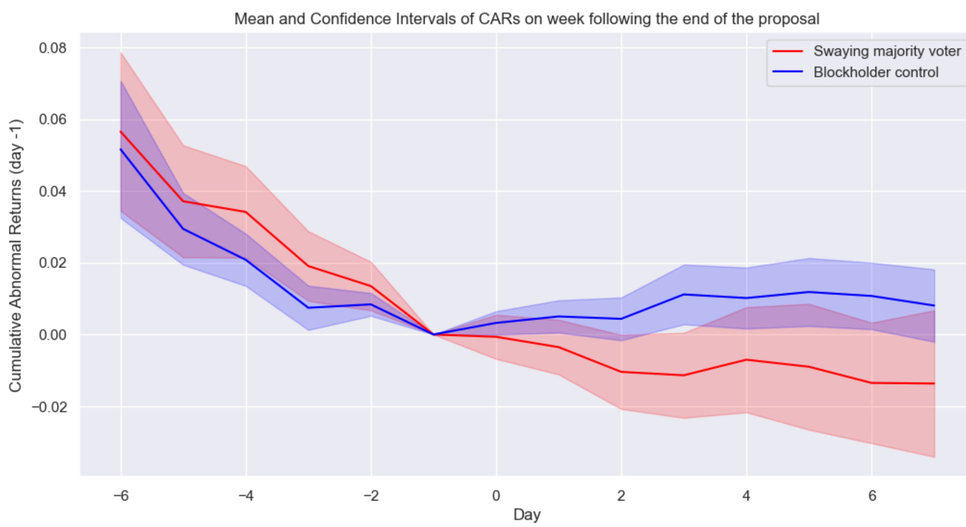


Figure 2: CARs following proposals with the presence of Swaying majority voters versus proposals with the presence of blockholders

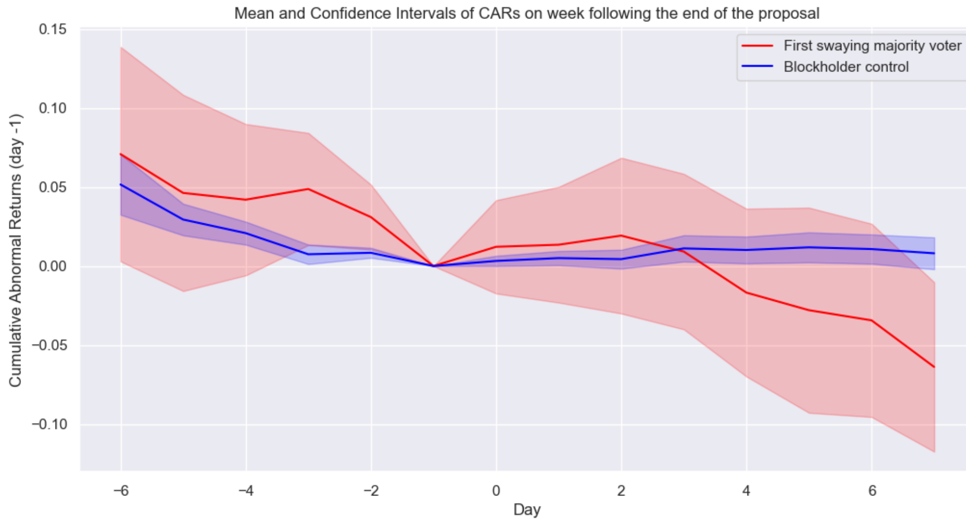


Figure 3: CARs following proposals with the first presence of swaying majority voters versus proposals with the presence of blockholders

Sniping blockholders and First sniping blockholders

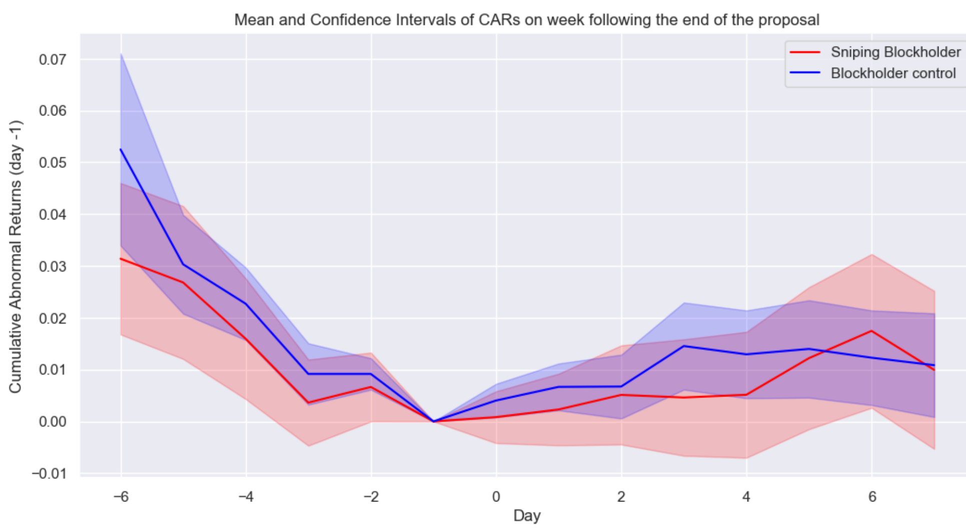


Figure 4: CARs following proposals with the presence of sniping blockholders versus proposals with the presence of blockholders

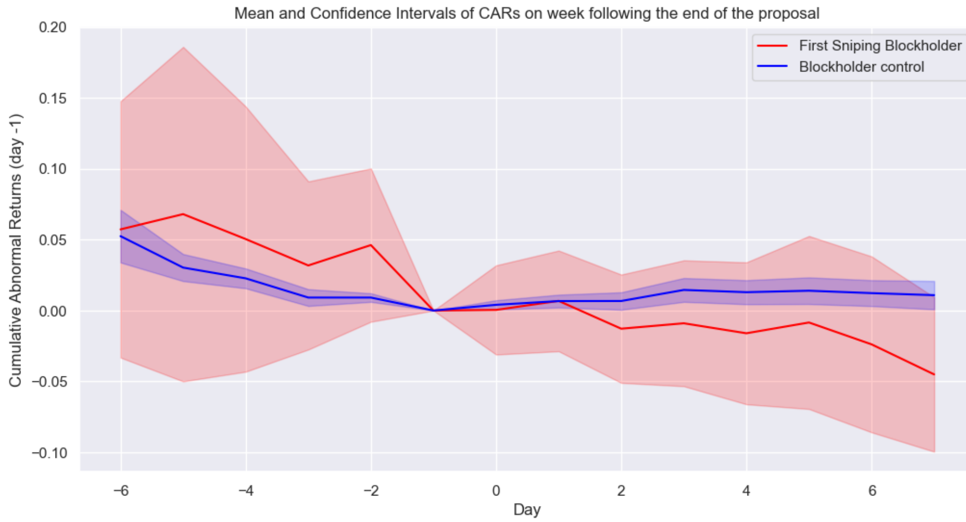


Figure 5: CARs following proposals with the first presence of sniping blockholders versus proposals with the presence of blockholders

Appendix F: Robustness checks

Swaying majority voters: clustered Standard Errors

Table 9 –

Dependent variable: Cumulative Abnormal Returns for given token one week following a proposal.
***,**,* indicate significance at the 1%, 5% and 10% levels.
Standard errors are clustered at the industry/dao level.

	CAR (1)	CAR (2)	CAR (3)	CAR (4)	CAR (5)	CAR (6)
First Swaying majority voter			-0.0995 (-1.858)			-0.108^{**} (-2.366)
First Swaying voter			0.0011 (0.437)			0.013 (0.229)
First majority voter			0.037 (1.893)			0.031 (0.645)
Swaying majority voter		-0.04^{***} (-7.653)	-0.03^{**} (-4.084)		-0.043^{**} (-2.205)	-0.031^{**} (-2.34)
Swaying voter		0.0165^{*} (2.643)	0.015 (1.711)		0.02 (1.253)	0.018 (1.518)
Majority voter (>50%)	-0.0015 (-0.229)	0.0037 (0.693)	0.003 (0.594)	-0.007 (-0.942)	-0.002 (-0.24)	-0.003 (-0.328)
log(Market Cap)	-0.0735 (-2.015)	-0.074 (-2.007)	-0.074 (-1.959)	-0.195^{***} (-3.472)	-0.195^{***} (-3.483)	-0.197^{***} (-3.524)
log(Trade Volume)	0.058^{*} (2.646)	0.058^{*} (2.65)	0.058^{*} (2.607)	0.096^{**} (2.579)	0.097^{**} (2.588)	0.097^{**} (2.61)
Age	$-2.6e^{-}5^{***}$ (-3.264)	$-2.6e^{-}5^{**}$ (-3.414)	$-2.6e^{-}5^{**}$ (-3.307)	$-5.2e^{-}4^{*}$ (-1.973)	$-5.1e^{-}4^{*}$ (-1.952)	$-5.2e^{-}4^{*}$ (-1.953)
Quarter FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	N	N	N
DAO FE	N	N	N	Y	Y	Y
Observations	5905	5905	5905	5905	5905	5905
Adj. R-squared	0.114	0.114	0.115	0.164	0.164	0.165

Swaying majority voters: sample without the DAOs with the most votes (PancakeSwap)

Table 10 –

Dependent variable: Cumulative Abnormal Returns for given token one week following a proposal.
***,**,* indicate significance at the 1%, 5% and 10% levels.
Standard errors are heteroskedasticity robust.

	CAR (1)	CAR (2)	CAR (3)	CAR (4)	CAR (5)	CAR (6)
First Swaying majority voter			−0.0979***			−0.11***
			(−2.671)			(−3.126)
First Swaying voter			0.06			0.036
			(1.284)			(0.725)
First majority voter			0.049			0.035
			(1.308)			(0.86)
Swaying majority voter		−0.061**	−0.028		−0.06*	−0.023
		(−1.999)	(−0.956)		(−1.878)	(−0.785)
Swaying voter		0.019	0.005		0.029	0.02
		(0.754)	(0.216)		(1.12)	(0.925)
Majority voter	−0.0011	0.005	0.002	−0.006	−0.0006	−0.003
(>50%)	(−0.117)	(0.484)	(0.236)	(−0.609)	(−0.056)	(−0.241)
log(Market Cap)	−0.071***	−0.071***	−0.07***	−0.206***	−0.207***	−0.207***
	(−3.688)	(−3.708)	(−3.625)	(−4.931)	(−4.952)	(−4.946)
log(Trade Volume)	0.045***	0.045***	0.045***	0.101***	0.101***	0.1***
	(3.551)	(3.571)	(3.493)	(3.794)	(3.808)	(3.803)
Age	$-2.02e^{-}6$	$1.8e^{-}6$	$3e^{-}6$	$-9e^{-}4$***	$-9e^{-}4$***	$-9e^{-}4$***
	(0.189)	(0.163)	(0.282)	(−4.782)	(−4.798)	(−4.797)
Quarter FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	N	N	N
DAO FE	N	N	N	Y	Y	Y
Observations	3585	3585	3585	3585	3585	3585
R-squared	0.069	0.07	0.072	0.151	0.152	0.153
Adj. R-squared	0.066	0.066	0.067	0.131	0.131	0.132

Swaying majority voters: first method (max voting power) with a control group without sniping blockholders

Table 11 –

Dependent variable: Cumulative Abnormal Returns for given token one week following a proposal.
***,**,* indicate significance at the 1%, 5% and 10% levels.
Standard errors are heteroskedasticity robust.

	CAR (1)	CAR (2)	CAR (3)	CAR (4)	CAR (5)	CAR (6)
First Swaying majority voter			-0.117^{***} (−3.303)			-0.124^{***} (−3.59)
First Swaying voter			0.047 (1.015)			0.047 (0.968)
First majority voter			0.023 (0.636)			0.022 (0.548)
Swaying majority voter		−0.03 (−1.401)	−0.014 (−0.701)		−0.032 (−1.486)	−0.015 (−0.774)
Swaying voter		0.01 (0.517)	0.002 (0.137)		0.012 (0.634)	0.005 (0.279)
Majority voter (>50%)	0.0006 (0.093)	0.005 (0.681)	0.005 (0.666)	-0.011^{*} (−1.717)	−0.007 (−0.983)	−0.007 (−1.034)
log(Market Cap)	-0.089^{***} (−5.245)	-0.089^{***} (−5.255)	-0.089^{***} (−5.209)	-0.236^{***} (−8.828)	-0.236^{***} (−8.846)	-0.237^{***} (−8.879)
log(Trade Volume)	0.057^{***} (5.16)	0.057^{***} (5.18)	0.056^{***} (5.108)	0.105^{***} (5.606)	0.106^{***} (5.626)	0.105^{***} (5.611)
Age	$-2.6e^{-}5^{***}$ (−3.447)	$-2.6e^{-}5^{***}$ (−3.499)	$-2.5e^{-}5^{***}$ (−3.313)	$-6e^{-}4^{***}$ (−4.543)	$-6e^{-}4^{***}$ (−4.522)	$-6e^{-}4^{***}$ (−4.555)
Quarter FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	N	N	N
DAO FE	N	N	N	Y	Y	Y
Observations	5625	5625	5625	5625	5625	5625
R-squared	0.085	0.085	0.087	0.172	0.173	0.174
Adj. R-squared	0.083	0.083	0.084	0.16	0.16	0.161

Swaying majority voters: second method (timing reconstitution method) with all proposals

Table 12 –

Dependent variable: Cumulative Abnormal Returns for given token one week following a proposal.
***,**,* indicate significance at the 1%, 5% and 10% levels.
Standard errors are heteroskedasticity robust.

	CAR (1)	CAR (2)	CAR (3)	CAR (4)	CAR (5)	CAR (6)
First Swaying majority voter			-0.0937^{***}			-0.103^{***}
			(-2.796)			(-3.107)
First Swaying voter			0.024			0.028
			(0.511)			(0.548)
First majority voter			0.002			0.0025
			(0.081)			(0.072)
Swaying majority voter		-0.017	-0.006		-0.019	-0.007
		(-0.997)	(-0.38)		(-1.133)	(-0.452)
Swaying voter		0.004	0.001		0.007	0.004
		(0.29)	(0.099)		(0.522)	(0.322)
Majority voter (>50%)	-0.011^{*}	-0.008	-0.008	-0.02^{***}	-0.017^{**}	-0.017^{**}
	(-1.783)	(-1.141)	(-1.084)	(-3.26)	(-2.441)	(-2.408)
log(Market Cap)	-0.084^{***}	-0.084^{***}	-0.089^{***}	-0.23^{***}	-0.23^{***}	-0.23^{***}
	(-5.182)	(-5.184)	(-5.209)	(-8.838)	(-8.84)	(-8.864)
log(Trade Volume)	0.056^{***}	0.056^{***}	0.056^{***}	0.104^{***}	0.104^{***}	0.104^{***}
	(5.296)	(5.304)	(5.108)	(5.677)	(5.683)	(5.675)
Age	$-2.7e^{-}5^{***}$	$-2.7e^{-}5^{***}$	$-2.5e^{-}5^{***}$	$-7e^{-}4^{***}$	$-7e^{-}4^{***}$	$-7e^{-}4^{***}$
	(-3.730)	(-3.782)	(-3.313)	(-4.859)	(-4.855)	(-4.877)
Quarter FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	N	N	N
DAO FE	N	N	N	Y	Y	Y
Observations	5905	5905	5905	5905	5905	5905
R-squared	0.082	0.082	0.083	0.165	0.166	0.167
Adj. R-squared	0.08	0.08	0.08	0.154	0.153	0.154

Swaying majority voters: second method (timing reconstitution method) with all proposals - clustered standard errors

Table 13 –

Dependent variable: Cumulative Abnormal Returns for given token one week following a proposal.
***,**,* indicate significance at the 1%, 5% and 10% levels.
Standard errors are clustered at the industry/dao level.

	CAR (1)	CAR (2)	CAR (3)	CAR (4)	CAR (5)	CAR (6)
First Swaying majority voter			−0.088 (−1.57)			−0.098** (−2.327)
First Swaying voter			0.015 (0.487)			0.018 (0.313)
First majority voter			$-8e^{-}4$ (0.1)			−0.002 (−0.046)
Swaying majority voter		−0.015 (−1.582)	−0.006 (−0.57)		−0.018 (−1.296)	−0.007 (−0.585)
Swaying voter		$-7e^{-}4$ (−0.072)	−0.002 (−0.155)		0.003 (0.291)	0.002 (0.166)
Majority voter (>50%)	−0.0125 (−1.928)	−0.009 (−1.765)	−0.008 (−1.727)	−0.018*** (−3.017)	−0.014** (−2.218)	−0.014** (−2.247)
log(Market Cap)	−0.072 (−1.998)	−0.072 (−1.99)	−0.073 (−1.934)	−0.195*** (−3.478)	−0.195*** (−3.477)	−0.196*** (−3.506)
log(Trade Volume)	0.058* (2.623)	0.058* (2.624)	0.058* (2.581)	0.097** (2.584)	0.097** (2.584)	0.097** (2.588)
Age	$-2.7e^{-}5^{**}$ (−3.434)	$-2.7e^{-}5^{**}$ (−3.307)	$-2.6e^{-}5^{**}$ (−3.138)	$-5e^{-}4^{**}$ (−1.995)	$-5e^{-}4^{*}$ (−1.991)	$-5e^{-}4^{*}$ (−1.989)
Quarter FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	N	N	N
DAO FE	N	N	N	Y	Y	Y
Observations	5905	5905	5905	5905	5905	5905
Adj. R-squared	0.114	0.114	0.115	0.165	0.165	0.166

Swaying majority voters: second method (timing reconstitution method) : sample without the DAOs with the most votes (PancakeSwap) - clustered standard errors

Table 14 –

Dependent variable: Cumulative Abnormal Returns for given token one week following a proposal.
***,**,* indicate significance at the 1%, 5% and 10% levels.
Standard errors are clustered at the industry/dao level.

	CAR (1)	CAR (2)	CAR (3)	CAR (4)	CAR (5)	CAR (6)
First Swaying majority voter			−0.092			−0.101**
			(−1.528)			(−2.311)
First Swaying voter			0.0431*			0.023
			(2.137)			(0.365)
First majority voter			0.016			0.003
			(1.575)			(0.082)
Swaying majority voter		−0.02	0.0103		−0.02	0.014
		(−0.668)	(0.536)		(−0.702)	(0.586)
Swaying voter		−0.009	−0.016		−0.003	−0.008
		(−0.92)	(−1.09)		(−0.183)	(−0.469)
Majority voter	−0.009	0.006	−0.006	−0.012	−0.009	−0.008
(>50%)	(−0.891)	(−0.807)	(−0.857)	(−1.462)	(−0.998)	(−0.979)
log(Market Cap)	−0.062	−0.062	−0.062	−0.191**	−0.191**	−0.193**
	(−1.706)	(1.707)	(−1.684)	(−2.267)	(−2.266)	(−2.275)
log(Trade Volume)	0.047**	0.047**	0.047**	0.098*	0.098*	0.098*
	(2.8)	(2.805)	(2.785)	(1.871)	(1.871)	(1.872)
Age	$-1.2e^{-}5$	$-1.1e^{-}5$	$-9.5e^{-}6$	$-7.3e^{-}4$**	$-7.3e^{-}4$**	$-.4e^{-}4$**
	(−1.24)	(−1.193)	(−1.05)	(−2.0)	(−2.01)	(−1.993)
Quarter FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	N	N	N
DAO FE	N	N	N	Y	Y	Y
Observations	3585	3585	3585	3585	3585	3585
Adj. R-squared	0.091	0.091	0.091	0.146	0.146	0.146

Sniping blockholders: clustered standard errors

Table 15 –

Dependent variable: Cumulative Abnormal Returns for given token one week following a proposal.
***,**,* indicate significance at the 1%, 5% and 10% levels.
Standard errors are clustered at the industry/dao level.

	CAR (1)	CAR (2)	CAR (3)	CAR (4)	CAR (5)	CAR (6)
First Sniping Blockholder			-0.0949^{**}			-0.0936^{***}
			(-3.016)			(-2.679)
First Sniping voter			0.112^{*}			0.103^{**}
			(2.318)			(2.253)
First Blockholder			-0.06			-0.056
			(-2.036)			(-1.286)
Sniping Blockholder		0.004	0.011		0.007	0.015^{*}
		(0.517)	(1.005)		(0.892)	(1.842)
Sniping voter		-0.008^{**}	-0.01^{**}		-0.002	-0.004
		(-3.658)	(-3.278)		(-0.244)	(-0.422)
Blockholder	0.015^{*}	0.015	0.016^{*}	0.015^{*}	0.014^{*}	0.015^{**}
(10-50%)	(2.344)	(2.114)	(2.305)	(1.992)	(1.849)	(2.14)
log(Market Cap)	-0.072	-0.072	-0.072	-0.195^{***}	-0.195^{***}	-0.194^{***}
	(-1.989)	(-1.99)	(-1.967)	(-3.474)	(-3.475)	(-3.451)
log(Trade Volume)	0.057^{*}	0.0577^{*}	0.057^{*}	0.097^{**}	0.097^{**}	0.096^{**}
	(2.613)	(2.617)	(2.577)	(2.592)	(2.588)	(2.557)
Age	$-2.7e^{-}5^{**}$	$-2.6e^{-}5^{**}$	$-2.7e^{-}5^{**}$	$-5e^{-}4^{*}$	$-5e^{-}4^{**}$	$-5e^{-}4^{**}$
	(-3.666)	(-3.447)	(-3.7)	(-1.981)	(-1.997)	(-2.013)
Quarter FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	N	N	N
DAO FE	N	N	N	Y	Y	Y
Observations	5905	5905	5905	5905	5905	5905
Adj. R-squared	0.115	0.115	0.116	0.164	0.164	0.166

Sniping blockholders: clustered standard errors - No Swaying majority voters in the control group

Table 16 –

Dependent variable: Cumulative Abnormal Returns for given token one week following a proposal.
***,**,* indicate significance at the 1%, 5% and 10% levels.
Standard errors are clustered at the industry/dao level.

	CAR (1)	CAR (2)	CAR (3)	CAR (4)	CAR (5)	CAR (6)
First Sniping Blockholder			-0.0984^{**}			-0.0962^{***}
			(-3.204)			(-2.735)
First Sniping voter			0.103			0.093^{**}
			(2.023)			(2.0)
First Blockholder			0.058			-0.055
			(-1.771)			(-1.242)
Sniping Blockholder		0.004	0.012		0.007	0.015^{*}
		(0.512)	(1.02)		(0.884)	(1.87)
Sniping voter		-0.006^{**}	-0.009^{*}		-0.001	-0.002
		(-2.877)	(-2.539)		(-0.077)	(-0.246)
Blockholder (10-50%)	0.012^{*}	0.012	0.013^{*}	0.012	0.01	0.0114
	(2.31)	(2.0)	(2.2)	(1.427)	(1.302)	(1.538)
log(Market Cap)	-0.072	-0.072	-0.072	-0.2^{***}	-0.2^{***}	-0.2^{***}
	(-1.949)	(-1.951)	(-1.932)	(-3.512)	(-3.519)	(-3.502)
log(Trade Volume)	0.055^{*}	0.055^{*}	0.055^{*}	0.102^{**}	0.101^{**}	0.101^{**}
	(2.533)	(2.537)	(2.497)	(2.624)	(2.62)	(2.593)
Age	$-2.8e^{-}5^{**}$	$-2.7e^{-}5^{**}$	$-2.8e^{-}5^{**}$	$-5e^{-}4^{*}$	$-5.2e^{-}4^{*}$	$-5.3e^{-}4^{*}$
	(-4.04)	(-3.839)	(-4.165)	(-1.855)	(-1.869)	(-1.889)
Quarter FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	N	N	N
DAO FE	N	N	N	Y	Y	Y
Observations	5518	5518	5518	5518	5518	5518
Adj. R-squared	0.111	0.111	0.113	0.162	0.162	0.164

Sniping blockholders: clustered standard errors - No majority voters in the control group

Table 17 –

Dependent variable: Cumulative Abnormal Returns for given token one week following a proposal.
***,**,* indicate significance at the 1%, 5% and 10% levels.
Standard errors are clustered at the industry/dao level.

	CAR (1)	CAR (2)	CAR (3)	CAR (4)	CAR (5)	CAR (6)
First Sniping Blockholder			-0.075^{*}			-0.062^{*}
			(-2.413)			(-1.72)
First Sniping voter			0.032			0.02
			(0.386)			(0.399)
First Blockholder			-0.019			-0.009
			(-0.399)			(-0.163)
Sniping Blockholder		0.003	0.011		0.004	0.01
		(0.312)	(0.776)		(0.536)	(1.306)
Sniping voter		0.003	0.002		0.0147	0.014
		(0.408)	(0.396)		(1.306)	(1.253)
Blockholder	0.0177	0.0173	0.0189	-0.009	-0.011	-0.009
(10-50%)	(2.024)	(1.865)	(1.59)	(-0.441)	(-0.534)	(-0.47)
log(Market Cap)	-0.073	-0.073	-0.073	-0.213^{***}	-0.215^{***}	-0.215^{***}
	(-1.589)	(-1.597)	(-1.588)	(-2.879)	(-2.91)	(-2.899)
log(Trade Volume)	0.055	0.055	0.055	0.103^{*}	0.104^{*}	0.104^{*}
	(1.953)	(1.936)	(1.903)	(1.949)	(1.956)	(1.94)
Age	$-3.1e^{-}5^{***}$	$-3.1e^{-}5^{***}$	$-3.2e^{-}5^{***}$	$-5.5e^{-}4$	$-5.5e^{-}4^{**}$	$-5.5e^{-}4$
	(-6.145)	(-6.529)	(-7.293)	(-1.489)	(-1.519)	(-1.521)
Quarter FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	N	N	N
DAO FE	N	N	N	Y	Y	Y
Observations	3676	3676	3676	3676	3676	3676
Adj. R-squared	0.101	0.102	0.103	0.169	0.169	0.169

Sniping blockholders: clustered standard errors sample without the DAOs with the most votes (PancakeSwap)

Table 18 –

Dependent variable: Cumulative Abnormal Returns for given token one week following a proposal.
***,**,* indicate significance at the 1%, 5% and 10% levels.
Standard errors are clustered at the industry/dao level.

	CAR (1)	CAR (2)	CAR (3)	CAR (4)	CAR (5)	CAR (6)
First Sniping Blockholder			-0.0799 (-1.682)			-0.082^{**} (-2.205)
First Sniping voter			0.127^{**} (2.820)			0.11^{**} (2.357)
First Blockholder			0.052 (-1.463)			-0.06 (-1.327)
Sniping Blockholder		-0.002 (-0.088)	0.007 (0.327)		0.002 (0.188)	0.012 (0.89)
Sniping voter		-0.012^{**} (-3.539)	-0.016^{**} (-4.005)		-0.01 (-0.569)	-0.014 (-0.731)
Blockholder (10-50%)	0.012 (1.225)	0.013 (1.134)	0.015 (1.272)	0.006 (0.636)	0.006 (0.61)	0.008 (0.875)
log(Market Cap)	-0.062 (-1.703)	0.062 (-1.704)	0.06 (-1.688)	-0.192^{**} (-2.265)	-0.191^{**} (-2.258)	-0.189^{**} (-2.207)
log(Trade Volume)	0.047^{**} (2.799)	0.047^{**} (2.833)	0.047^{*} (2.776)	0.098^{*} (1.874)	0.098^{*} (1.876)	0.097^{*} (1.837)
Age	$-1.1e^{-}5$ (-1.252)	$-1.1e^{-}5$ (-1.254)	$-1.2e^{-}5$ (-1.365)	$-7.3e^{-}4^{**}$ (-2.008)	$-7.3e^{-}4^{**}$ (-1.992)	$-7.3e^{-}4^{**}$ (-1.994)
Quarter FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	N	N	N
DAO FE	N	N	N	Y	Y	Y
Observations	3585	3585	3585	3585	3585	3585
Adj. R-squared	0.091	0.091	0.094	0.146	0.145	0.148