Is There Wisdom Among the DAO Crowd? Evidence from Vote Delegation*

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Abstract

Nearly half of decentralized autonomous organizations (DAOs) allow vote delegation to facilitate user participation in governance and decision making. Yet, how well this mechanism works is largely unknown. We evaluate the efficacy of the vote delegation scheme by examining token holders' vote delegation decisions and delegates' voting behavior in MakerDAO, a pioneering and foundational DAO protocol. We find that token holders are able to discern delegates' actions and reward delegates acting in their best interest with more delegated votes. Delegates vary in their incentives and expertise, which influence how they vote on proposals. Delegates whose interests are more aligned with token holders and who possess more expertise related to the proposals are more likely to vote correctly, whereas those with potential conflicts of interest tend to vote against token holders' interest. Finally, we find that how well the vote delegation scheme works is positively related to future performance of the governance tokens. Overall, our evidence suggests that vote delegation can contribute to the performance and growth of DAOs so long as delegates have the requisite incentives and expertise.

Keywords: Decentralized Autonomous Organizations; Vote Delegation; Incentive Alignment; Conflicts of Interest

JEL classification: G34, O3, G32

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1.INTRODUCTION

Decentralized Autonomous Organization (DAO) is an innovative approach to exercising corporate governance on the blockchain. It allows stakeholders who hold governance tokens to directly participate in proposal voting, influencing the organization's operations. DAO differs from traditional centralized governance in two fundamental aspects. First, in centralized governance, shareholders elect board members who then appoint a CEO. In contrast, the term "Decentralized" indicates that nearly all decisions, from operational to financial, are directly made by active token holders. Secondly, the term "Autonomous" indicates that the governance process is enforced without external forces such as regulations or third-party monitoring. Instead, the process is programmed and executed via smart contracts, enhancing information transparency.[1] This setup ensures that voting choices are immutable and publicly visible, eliminating vote manipulation and enhancing monitoring.

Despite its advantages, decentralized autonomous governance suffers from inefficiency as small and unsophisticated voters may lack the time and knowledge to cast informed votes that benefit the company (Ferreira and Li, 2024). Additionally, there exists a risk of free riding among token holders. Consequently, many DAOs have established a vote delegation scheme that allows token holders to delegate their voting power to other members, known as delegates, enabling them to participate in governance without directly voting on every proposal.

The vote delegation scheme bears some similarity to mutual fund investors delegating the voting rights of their shares in companies to the fund managers. However, unlike the latter case,

[1] A smart contract is an automated, self-executing contract with terms directly written into code, executing, and enforcing the agreement upon pre-defined conditions on a blockchain network. The blockchain's decentralized ledger ensures transparency by allowing all participants to view contract and transaction details. Also, its cryptographic security renders the contract immutable, preventing alterations once deployed.

where asset managers are bound by fiduciary duty to act in the best interest of their investors, in DAOs there are no regulatory restrictions or penalties for delegates who may be either negligent, or worse, have conflicts of interest through holdings of other crypto-assets that compete with the delegated tokens. In addition, while the transparency inherent in blockchain ensures that delegates' asset holdings are publicly visible, enabling investor oversight, blockchain's pseudo-anonymity allows delegates to easily create multiple accounts, providing opportunities for them to conceal their associated interests.[2]

According to Appel and Grennan (2024), 45% of the DAOs in their sample allow some form of vote delegation. However, despite its prevalence, how well the vote delegation scheme works is largely unknown. In this paper, we provide the first evidence on the efficacy of the vote delegation scheme by examining the delegation decisions of token holders and the voting decisions of delegates. Specifically, we focus on three important questions about vote delegation in decentralized governance. First, do token holders reward delegates who cast 'correct votes' by increasing delegated shares, and conversely, penalize those who cast 'wrong votes' by withdrawing shares? Second, how do incentives and expertise affect delegates' voting decisions? Third, does the efficacy of the vote delegation scheme affect the growth and performance of DAOs? Ex ante, the answers to these questions are unclear, as the very reasons that prompt the introduction of the vote delegation scheme – namely, the lack of sophistication by many token holders and the absence of regulatory and monitoring forces – could also hinder the scheme's functioning.

We examine these questions using a sample of proposal voting in MakerDAO over a two-

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[2] Pseudo-anonymity in blockchain refers to the partial concealment of user identities, where participants are identified by unique alphanumeric addresses rather than personal information. Real-world identities are not directly linked to blockchain activities. However, the transaction history and wallet addresses are publicly visible on the blockchain, providing traceability while maintaining user anonymity.

year period from October 25, 2021 to October 25, 2023.[3] MakerDAO is a foundational DeFi platform built on the Ethereum blockchain that operates as a crypto bank. It has introduced two cryptocurrencies: DAI, its stablecoin product pegged to the U.S. dollar, and MKR, which can be considered its governance token or 'stock'.[4] MKR holders can vote on proposals covering topics such as new product design, budgeting, and staffing. Like a traditional bank that lends out fiat currency, MakerDAO issues loans in DAI and generates revenue through the interest charged on these loans.

In our first analysis, we examine changes in the number of MKR tokens delegated to a delegate in the month after voting on a proposal (or proposals). We find that a delegate casting a higher percentage of correct votes on the proposals experience a higher growth of delegated shares, where a vote is defined as correct if it is for (or against) a proposal that significantly increases (decreases) the value of MKR tokens. All else being equal, a one standard deviation increase in the correctness of a vote is associated with a 1.5 percentage-point increase in delegated shares growth, or a 75% increase from the mean. For the average delegate in our sample, this improvement in vote correctness over a given month translates into an annual increase in compensation of approximately $2,832. These results indicate that through their delegation decisions, token holders are able to instill incentives in delegates to act in token holders' best interest in proposal voting.

Next, we explore the determinants of delegates' proposal voting decisions, with a focus on the delegates' incentive (mis)alignment with MKR holders and their level of expertise on the underlying issues of each proposal. We find that delegates with larger MKR holdings in their own

[3] We start the sample period from October 25, 2023, which is the beginning of the compensated delegation scheme.

[4] Stablecoins are a category of cryptocurrencies that aim to offer price stability and are typically pegged to a stable reserve asset, like the US Dollar. DAI is an algorithmic stablecoin, which relies on on-chain algorithms and smart contracts to manage its supply according to market conditions.

investment portfolios are more likely to cast correct votes on proposals. We also examine delegate holdings of other tokens and differentiate among them based on whether their interests are aligned or in conflict with MKR. We find that delegates with more holdings of MKR-conflicted tokens are more likely to cast incorrect votes on proposals. We note that our analysis likely underestimates the extent of conflicts of interest arising from delegate holdings of MKR-conflicted tokens, as delegates may conceal some of these positions by using other addresses. These results highlight the role of incentive alignment in driving delegates' voting decisions and the importance of accounting for delegates' ownership in not only MKR but also other related tokens.

Regarding delegate expertise, our analysis shows that delegates are more likely to vote correctly on a proposal if they have previously invested in a higher percentage of the tokens mentioned in the proposal's discussion forum, or held larger positions of these mentioned tokens. We obtain similar results when we measure delegate expertise by the frequency of their previous participation in proposals with the same topics at the current proposal. Additionally, we find that delegates with expertise are generally inclined to vote earlier, rather than free ride the choices of others.

In our final set of tests, we assess whether the functioning of the vote delegation scheme affects the growth of MakerDAO. We find that the percentage of correct votes casted by all delegates in each week is significantly and positively related to the abnormal returns of MKR tokens in the following week. To the extent that higher abnormal returns of MKR tokens can attract more users to the MakerDAO protocol, our evidence suggests that a well-functioning vote delegation scheme where delegates make better decisions on half of MKR token holders can contribute to platform growth.

Our paper makes several key contributions to the growing literature on the governance of DAO. To the best of our knowledge, we are the first to conduct a comprehensive empirical analysis of DAO delegation systems. While many papers provide descriptive analysis of DAO characteristics and classifications (Appel and Grennan, 2024; Ding et al., 2023; Puschmann and Huang-Sui, 2023), exactly how specific governance mechanisms like vote delegation function and whether they affect DAO outcomes is not well understood. Appel and Grennan (2024) document a positive relationship between the possibility of vote delegation and returns of governance tokens during a proposal's voting period. They consider vote delegation as an inclusive governance feature of DAOs that encourages token holder participation in decision making. However, this interpretation hinges on the assumption that the delegates act in the best interest of DAOs on behalf of token holders. We provide direct evidence on this assumption by showing that even in a prominent decentralized organization like MakerDAO, there are important variations across delegates in their expertise and incentive alignment with token holders and these variations influence the delegates' voting decisions. Furthermore, we find that the extent to which the delegates act in the best interest of token holders is positively associated with the token's future performance. Overall, our study expands the understanding of a crucial design feature of decentralized governance.

A significant body of research examines ownership concentration in DAOs. For instance, Ferreira and Li (2024) develop a model highlighting the trilemma between efficiency, autonomy, and decentralization. Han, Lee and Li (2023) construct a theoretical framework to analyze the conflicts of interest between large token holders and small participants, showing that ownership concentration can hinder platform growth. In contrast, our paper shifts the focus to the efficacy of decentralized delegation systems in DAOs. We empirically demonstrate that a well-functioning decentralized delegation system can substitute for centralized governance structures, positively impacting platform growth. Additionally, we provide evidence on conflicts of interest between voting delegates and token holders, informing the current discourse on DAO governance.

Our study also contributes to the literature on blockchain-based governance. Previous research has extensively discussed consensus algorithms in public blockchains, such as Proof of Work and Proof of Stake (Cong, He, and Tang, 2022; Saleh, 2021). Other studies examine blockchain technology's applications in industries such as supply chain management, showing how blockchain reshapes collaboration and coordination between parties (Cong and He, 2019; Lee et al., 2024; Chen et al., 2023; Lumineau, Wang, and Schilke, 2021). Additionally, several theoretical studies explore how token-based governance impacts platform financing, data generation, and growth (Bena and Zhang, 2023; Cong, Li, and Wang, 2022; Jermann and Xiang, 2024; Cong, Li, and Wang, 2021). Our paper complements this literature by offering empirical insights into how the delegation system in DAO governance influences overall platform efficacy.

Finally, our paper also relates to a recent trend in the asset management industry, where asset managers offer investors the option to reclaim their voting rights through programs like "voting choice". Under these programs, investors can either vote directly or delegate their votes to fund managers. While this practice aims to democratize voting, it presents challenges such as inefficient delegation and coordination failures, as highlighted by Malenko and Malenko (2023). Our paper sheds light on this practice by leveraging the transparency of blockchain-based governance in DAOs, which allows us to gather granular data on both investors' and delegates' choices – data typically difficult to obtain in traditional mutual fund settings. Our findings suggest that vote delegation can be an effective governance mechanism when delegates have the right incentives and expertise to vote in the best interest of token holders.

2.INSTITUTIONAL BACKGROUND

2.1 MakerDAO Business Model

MakerDAO is a DeFi company operating on the Ethereum blockchain that generates profits by issuing crypto loans. As one of the most promising DeFi project, its market capitalization reached USD 1 billion in July 2023. MakerDAO has introduced two cryptocurrencies: DAI, a stablecoin pegged to the U.S. dollar by a one-to-one ratio, and MKR, which serves as its governance token or ‘stock’.

Similar to a traditional bank that lends out fiat currency, MakerDAO issues loans in DAI and generates revenue through the interest charged on these loans. To borrow DAI, borrowers are required to lock collateral, typically Ethereum (ETH), in a smart contract. To mitigate market volatility and potential depreciation of the collateral, MakerDAO often enforces overcollateralization. For instance, a loan of 1 DAI might be backed by ETH valued at 1.5 DAI. The interest charged on these loans, referred to as the “stability fee”, is also paid using DAI.

Borrowers can either save DAI or trade it on public exchanges. Investors who choose to save DAI can lock it into a smart contract to earn interest at a rate known as the Dai Savings Rate (DSR). The DSR plays a crucial role in maintaining DAI’s price stability by balancing market demand and supply. For instance, if DAI’s market price exceeds 1 USD, MKR holders can vote to lower the DSR, which reduces the demand for saving and increases market supply, thereby driving the price back to 1 USD.

Secondary market trading also contributes to maintaining DAI’s price stability. For example, if DAI’s price rises above 1 USD, more investors are incentivized to borrow DAI from MakerDAO and sell it on the market, increasing the circulating supply and pushing the price back towards parity with the USD. Figure 1 provides an overview of the participants in the primary and secondary markets of DAI and how their activities help stabilize its price.

MKR serves three distinct roles within the MakerDAO ecosystem. First, it represents voting rights; each MKR token equals one vote in MakerDAO's governance system, allowing holders to participate in decision-making process related to platform operations and policies. Second, it represents a claim on cash flow; MKR holders share the profits generated from interest accrued on DAI loans. Lastly, it serves as a financial backstop; in the event of a sudden drop in collateral prices, MKR acts as a last-resort mechanism for recapitalizing the system. If solvency is threatened, additional MKR tokens can be minted and sold to cover outstanding debt, diluting existing holdings but ensuring the integrity of the DAI peg. This devaluation acts as a punitive measure for MKR holders, reflecting a governance failure in maintaining DAI's stability. Figure B1 in Appendix B illustrates how MakerDAO addresses insolvency crises during sudden market downturns.

2.2 MakerDAO Governance Scheme

Diverging from traditional corporate governance models centered around a CEO and a board of directors, MakerDAO adopts a more democratic approach. All MKR holders are invited to participate in the governance process. As illustrated in Figure 2, this process begins with an open forum discussion, where any individual holding MKR tokens or having a vested interest in the MakerDAO ecosystem can submit and discuss proposals. These proposals cover a range of topics, from new collateral inclusion to budgetary considerations. This open forum allows MakerDAO decision-makers to incorporate insights from both internal and external sources by engaging a wide user base.

After being thoroughly discussed and refined in the forum, proposals that generate significant interest and debate proceed to the formal poll voting stage, which takes place weekly on the governance portal. Voting on new proposals starts at 4 PM UTC every Monday, with most votes concluding within three days, although particularly important proposals could last for seven or fourteen days. All relevant materials and discussions about each proposal are carefully organized on the website, ensuring that voters can easily access and understand the information. The voting interface on the official website also includes a voting button for convenience. To help voters prioritize their attention and efforts, proposals are typically labeled as high, medium, or low impact. Additionally, each proposal is tagged with several topic labels.

The final phase, known as executive votes, determines the definitive execution and detailed implementation of the proposals. Participation in poll voting and executive votes is exclusively restricted to MKR holders and delegates who have been entrusted with voting rights by ordinary holders. Figure 3 illustrates an example of the MakerDAO governance process as displayed on the web interface. Figure 4 presents voting participation across the major topic tags for our sample proposals, showing that proposals with the highest vote participation often concern risk parameters, such as changes to the stability fee.

2.3 The Delegation Framework

Acknowledging that not all MKR holder have the time or expertise to actively participate in every vote, MakerDAO has instituted a delegation system. As shown in Figure 5, the process begins with the prospective delegate establishing a delegation contract using a standardized smart contract format designed by MakerDAO. Upon successful execution of this contract, the delegate's agreement is displayed on the official MakerDAO voting website. The term for a delegation contract is one year. At the expiration of the delegation contract, if the delegate wishes to continue, she must create a new delegation contract and attract token holders to delegate their shares under the new contract.

MKR holders who wish to delegate their voting power can lock their MKR tokens with a chosen delegate, who then votes on their behalf in both proposal polls and executive votes. This arrangement offers flexibility; if MKR holders lose confidence in their delegate at any point during the contract's duration, they can terminate the delegation by unlocking their MKR tokens from the contract. The delegation process, including the creation of contracts and interactions between delegates and MKR holders, is fully transparent and publicly recorded on the blockchain.[5] Any individual or institution can become a delegate within the DAO. On MakerDAO, there are typically 38 active delegates at any given time. The flexibility to switch delegation, combined with the competition among delegates to earn MKR holders' trust, incentivizes delegates to build expertise and dedicate significant effort to decision-making.

There are two types of delegates within MakerDAO: recognized delegates and shadow delegates. Recognized delegates are mandated to disclose their identity, including any potential conflicts of interest, social media profiles, and introductory videos. Additionally, recognized delegates are eligible for compensation from MakerDAO's system reserves. The amount of compensation is determined by two factors: the number of MKR shares they manage and their level of participation in voting and forum discussions. Equation (1) presents the formula for calculating monthly compensation.

$$Recognized\ Delegate\ Compensation = \left[C * \min\left(1, \frac{MKR^q}{T^q}\right)\right] * M \qquad (1)$$

[5] A delegate's history remains publicly accessible even after the delegation contract has expired.

where *C* represents the maximum monthly compensation, capped at $12,000. *MKR* is the number of MKR tokens managed by the delegate at the end of the month; *T* is a threshold set at 10,000 MKR, and *q* is an exponential factor set at 0.5. Therefore, compensation increases with the number of MKR tokens managed by the delegate. The factors *T* and *q* are specifically designed to skew compensation in favor of smaller delegates, thereby incentivizing the recruitment of new participants into the system.

M is an adjustment factor determined by a performance modifier, *P*, which measures the delegate's voting participation and communication. Specifically, *P* = min (*participation, communication),* where *participation* is the percentage of polls in the previous 120 days in which the delegate participated.[6] *Communication* measures how much the delegate discloses their voting decisions and provides reasoning for those decisions over the previous 120 days. For example, *communication* of 100% would indicate the delegate disclosed all of their voting decisions *and* provided reasons for each decision over the previous 120 days. On the other hand, *communication* of 50% would indicate the delegate disclosed all their voting decisions but did not provide any reasoning for those decisions. If *P* is less than 75%, then *M* equals zero, meaning that the delegate receives no compensation. For *P* exceeding 75%, *M* gradually increases from 40% to 100% as *P* reaches 90%. Once P exceeds 90%, *M* equals 100%.

Unlike recognized delegates, shadow delegates remain anonymous and do not receive monetary compensation. Despite the absence of financial incentives, shadow delegates are motivated to attract MKR delegations to gain significant voting power and influence proposal outcomes that align with their interests. This delegation structure allows for a diverse range of participation, accommodating different preferences and strategies from groups with different

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[6] For a new delegate with less than 120 days of history, the evaluation period begins from the start of their delegation.

priorities and goals.

3. DATA AND VARIABLE CONSTRUCTIONS

3.1 Data and Sample

We obtain data on proposal voting in MakerDAO over a two-year period from October 25, 2021, which marks the introduction of the compensated delegation scheme, to October 25, 2023. The data is sourced from MakerDAO's official websites and includes on-chain information on proposals, voting records, delegation history, and forum discussions. Proposal information includes titles, descriptions, voting durations, and outcomes. For this study, we focus exclusively on binary-choice proposals (i.e., 'Yes' or 'No'), excluding ranked-choice polls where voters rank options rather than selecting one. Voting records capture voter addresses (either the account addresses of ordinary MKR voters or delegation contract addresses of delegates), voting timestamps, poll identifiers, and vote choices. We focus on definitive votes and we exclude 'Abstain' votes, which account for 7% of the total votes. Additionally, we require proposals to be classifiable as either value-enhancing or value-destroying using our classification approach described in Section 3.2, which drops about 20% of the proposals. Our final sample consists of 280 proposals, comprising 9,827 voting participation records. These votes were cast by 790 ordinary MKR holders and 179 delegates.[7]

The data on delegation history includes delegation contract addresses, delegate account addresses (which deploy these contracts), MKR holder addresses granting voting power to the delegates, and details of delegation record changes, such as timestamp and the number of delegated shares. Since the inception of the delegation scheme, 263 delegation contracts have been

[7] About 40% of these delegates are recognized delegates, and the remainder are shadow delegates.

established - 188 by shadow delegates and 75 by recognized delegates (not all participate in proposal voting). We exclude cases where delegates grant their own MKR shares to themselves, which are identified if the deploying account address matches the delegating MKR holder's address. This leaves us with 1,153 records of delegation activities: 666 new delegations (i.e., MKR holders join a delegate or add more shares to an existing delegate) and 483 withdrawals (i.e., MKR holders leave a delegate or transfer some of their shares away from an existing delegate). Recognized delegates account for 581 (87.2%) of the new share delegations, while shadow delegates account for 85 (12.8%) of the new share delegations.

The forum discussion dataset includes the proposal title, detailed descriptions, and discussants' posts within each thread. For each post, we record the discussant's nickname, the number of likes received, and any cited or referenced content. Since MakerDAO provides information on delegates' interactions within the forum, we are able to link forum discussant nicknames to their corresponding delegates.

To examine delegates' expertise in specific tokens and potential conflicts of interest, we obtain data on the token holdings of MakerDAO delegates from Etherscan. Etherscan is a blockchain explorer and analytics platform that provides detailed records of transactions, balances, and smart contract executions within the Ethereum network, covering activities and token holdings both within and outside the MakerDAO platform. We focus on token holdings in the account addresses used by delegates to deploy their delegation contracts, as well as other public accounts linked to their ENS (Ethereum Name Service) names.[8] It is important to note that tracking token holdings in concealed accounts that delegates choose not to disclose, as well as their holdings on

[8] ENS is a naming system built on the Ethereum blockchain. It is designed to map human-readable names like 'monetsupply.eth' to Ethereum addresses. This system allows us to identify other accounts linked to a delegate because a single ENS name can be mapped to multiple Ethereum addresses, one of which is typically the delegate' address disclosed on MakerDAO.

other blockchains like Bitcoin, remains a significant challenge.

To assess market reactions for MKR and other tokens, we obtain daily token prices from CoinMarketCap, a leading platform for cryptocurrency price information. To calculate the abnormal returns of each token, we adopt the cryptocurrency factor model proposed by Liu and Tsyvinski (2021). The Crypto-CAPM model involves constructing a daily cryptocurrency market return index (CMKT) by value-weighting the returns of all tokens with a market capitalization exceeding USD 1 million. Using the CMKT factor, we calculate the daily abnormal return of each token, enabling us to evaluate its price response to each proposal.

3.2 Classifications of 'Correct' Votes

For our analysis, it is crucial to determine if a delegate has voted correctly on a proposal, i.e., voting in favor of a value-enhancing proposal or against a value-destroying proposal. We take two steps to classify votes as correct. First, we categorize each proposal as either value-enhancing or value-destroying based on the market response to MKR on the pivotal voting date. Second, we examine whether the delegate's vote aligns with this classification.

To determine whether a proposal is value enhancing or value destroying, we examine market response to the voting results on the *pivotal vote date*. The pivotal vote date for a proposal is defined as the day when: 1) The MKR shares voted for a decision ('Yes' or 'No') reach 50% of the expected total votes, where the expected total votes are calculated as the average MKR shares involved in proposals from the previous month; 2) The MKR shares voted for that decision on the date exceed 10% of the expected total votes. These two conditions are designed to identify significant voting events that determine the outcome of a proposal. We focus on market responses on the pivotal vote date rather than the voting's closing date for two reasons. First, the voting result is publicly visible and often determined before the final voting date, meaning the market reaction may occur prior to the conclusion of voting. Second, multiple proposals often conclude simultaneously within the same week, making market reactions on the closing date reflect aggregate outcomes rather than the impact of individual proposals. Note that a pivotal vote date may be unavailable for some proposals if neither side exceeds 50% of expected total votes or if incremental votes on that date fail to meet Condition (2).[9]

To illustrate the definition of pivotal vote date, let's consider Poll 665, which takes place from November 1 to November 4, 2021, with a total of 54,365 MKR shares participating. By the end of the poll, 34,315 MKR shares (63%) vote in favor, while 20,050 MKR shares (37%) oppose the proposal. The average participation in proposal voting during the previous one month is 67,043 MKR shares (expected votes). To meet the 50% threshold specified in Condition (1), one side must accumulate at least 33,521.5 MKR shares. Figure 6 plots the cumulative voting shares across voting period, showing that the threshold is achieved by the "Yes" votes on November 3, 2021. Additionally, on the same day, the incremental MKR shares voted for the "Yes" decision amount to 15.5% of the expected votes, satisfying Condition (2), which requires that the MKR shares voted for that decision on the pivotal vote date exceed 10% of the expected total votes. Therefore, November 3, 2021 is identified as the pivotal vote date for Poll 665.

Next, we examine the abnormal return of MKR on the proposal's pivotal vote date. The daily abnormal return is estimated based on the Crypto-CAPM model:

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_i CMKT_t + \epsilon_{i,t} \tag{2}$$

where *CMKT* is the value-weighted average return of cryptocurrencies listed on CoinMarketCap with market capital over $100 million (Liu, Tsyvinski, and Wu, 2021). We use the 180-day estimation window up to day -1 relative to the pivotal vote data. If the abnormal return aligns with

[9] Sixty-two proposals do not meet these two conditions and therefore are not included in our sample.

the vote direction, i.e., a positive return when 'Yes' votes reach 50% of the expected votes, or a negative return when 'No' votes reach 50% of the expected votes, then we classify the proposal as value-enhancing. On the contrary, if the abnormal return contradicts the voting direction, i.e., a positive return when 'No' votes reach 50% of the expected votes, or a negative return when 'Yes' votes reach 50% of the expected votes, then we classify the proposal as value-destroying.

In the case of Poll 655, Figure 6 plots the cumulative abnormal returns of MKR during the voting period. On the pivotal vote date, the 'Yes' side prevails and the abnormal return for MKR is positive 13.6%. Therefore, we classify the proposal as value enhancing for MKR.

Next, we define a delegate's vote on a proposal as *correct* if the delegate votes 'Yes' on a value-enhancing proposal or 'No' on a value-destroying proposal. Conversely, a vote is classified as *incorrect* if otherwise. Table 1 presents hypothetical examples to illustrate this classification. Given that a delegate may vote on multiple proposals on a single vote date, we construct an aggregate measure, *Correct Vote*, for each delegate on a given vote date.[10] This measure is defined as the proportion of correct votes cast by the delegate out of all the proposals they participate in on that vote date.

The classification of value-enhancing vs. value destroying proposals in our paper is novel. To bolster the confidence in our approach, we use both a case study and a text-based sentiment analysis as validity check. For a case study, we revisit Poll 665 and find that subsequent developments support our classification of Poll 665 as value-enhancing. For the sentiment analysis, we utilize the Gemini-pro-latest API to label posts in the discussion forum for each proposal as positive, neutral, or negative (assigning sentiment scores of 1, 0.5, or 0, respectively), and then summarize at the proposal level. For example, the average sentiment score for Poll 665 is 0.64,

[10] The average number of polls per delegate per vote date is 2.73.

indicating that it is generally viewed favorably by the discussants as a value-enhancing proposal. We find a 30% overall correlation between the proposal discussion sentiment and our classification (where value-enhancing proposals are coded as 1 and value-destroying proposals as 0). This indicates that the opinions of discussants tend to align with our classification approach. Details of these validity checks are provided in Appendix C.

3.3 Variable Constructions and Summary Statistics

Our analysis uses a vector of delegate characteristics, including an indicator variable for recognized vs. shadow delegates and some time-varying variables. Recognized delegates, whose identities are disclosed and prominently displayed on MakerDAO's official website, tend to attract more delegation shares than shadow delegates. Since recognized delegates are more closely monitored by MKR holders and face reputational costs, they are expected to align more closely with the interests of MakerDAO. Panel A of Table 2 summarizes the delegate-vote date level variables, where the sample is restricted to the days on which a delegate cast a vote. The results reveal that 80% of the observations are associated with recognized delegates, while the remaining 20% correspond to shadow delegates.

Panel A also provide additional insights into delegate behavior and characteristics. The average vote correctness (*Correct Vote*) for delegates during our sample period is 44%.[11] The mean and median voting power held by delegates are 5% and 1.1% of the total cast votes in a poll, respectively, indicating significant variation in voting power, with some delegates controlling a substantial proportion. The maximum voting power held by a single delegate is 48.9% of the total cast votes, which suggests that even the largest delegate cannot unilaterally determine the voting

[11] On average, delegates vote "Yes" 82% of the time. In contrast, out of the 280 proposals in our sample, 127 are classified as value-enhancing while the remaining 153 are classified as value-destroying.

outcome.[12]

On average, delegates receive voting power from approximately four MKR holders. The remaining duration for delegation contracts is 120 days on average. Delegates approaching the end of their delegation contracts may have lower incentives to vote correctly, as MKR holders are less likely to delegate their voting power to contracts that are close to expiration due to the potential costs of switching delegates.

Panels B and C of Table 2 provide summary statistics for the delegate-poll-level and weekly-level variables, respectively. These variables will be discussed in detail later in the paper when describing the corresponding analyses. Additional information on the variable constructions is provided in Appendix A.

4.EMPIRICAL ANALYSIS

4.1 Do MKR Holders Reward (Punish) Delegates for Correct (Incorrect) Votes?

In this subsection, we investigate whether MKR holders reward delegates for casting 'correct' votes by increasing their delegated shares, and conversely, penalize delegates for casting 'incorrect' votes by withdrawing their shares. We first conduct baseline regression analysis, followed by a series of robustness tests.

4.1.1 Baseline Regression Analysis

We estimate the following delegate-vote date level regression of future delegation changes on delegates' vote correctness.

$$Delegation\ Change_{d,t+30} = \alpha + \beta\ Correct\ Vote_{d,t} + \gamma' X_{d,t} + \eta_d + \theta_t + \epsilon_{d,t} \quad (3)$$

[12] Larger delegates may attract more attention and trust from MKR holders; however, since the marginal increase in compensation diminishes with the size of the delegate, their incentive to vote correctly may be lower compared to smaller delegates.

where the sample includes observations where delegate *d* casts a vote on date *t*. The dependent variable is the change in delegation for delegate *d* within a 30-day window following their vote on date *t*.[13] We construct three measures to capture the responses of MKR holders. The first measure, *MKR Increase*, is a dummy variable that equals one if the net change in delegated MKR is positive, and zero otherwise. The second measure, *Delegator Increase*, is the count of MKR holders who grant new delegations to the delegate, minus the count of those who withdraw their delegations. The third measure, *Delegate Growth*, is the growth rate of delegated MKR shares, calculated as the net gain in the number of MKR shares in 30 days following the vote date, divided by the number of MKR shares delegated by the delegate on the vote date.[14] The main independent variable, *Correct Vote*, is the correctness of delegate *d*'s vote on date *t*, defined as the proportion of correct votes cast by delegate *d* across all proposals voted on that date. $X_{d,t}$ represents a vector of control variables, which include the delegate and proposal characteristics discussed in the previous section and the delegation growth over the prior 30-day period. To control for unobserved heterogeneity across delegates and time, we include delegate fixed effects (η_d) and year-month fixed effects (θ_t) in the regressions. The standard errors are clustered at the delegate level.

Table 3 presents the regression results. The coefficients on *Correct Vote* are significantly positive in five out of the six models, indicating that MKR holders reward delegates for making correct votes by increasing delegated shares, or conversely, punish delegates for making incorrect votes by withdrawing delegated shares. The effect is also economic significant. A one standard deviation increase in *Correct Vote* for a delegate is associated with a 1.5 percentage-point increase

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[13] The selection of the 30-day window is based on the monthly evaluation cycle of delegates. Additionally, recognized delegates are obligated to disclose the reasons for their votes within 7 days following a vote. MKR holders may need additional time to understand and react to their delegates' voting decisions.
[14] We winsorize Delegate Growth at the 90th percentile to avoid outliers.

in the delegation shares growth rate over the next 30 days, representing a 75% increase from the mean. Given that the average number of MKR shares managed per delegate is 4,598, this increase translates to an additional 66 MKR shares delegation, leading to an additional $58 in monthly compensation. A delegate on average participates in four votes per month, meaning this delegation increase in the current month would lead to a total of additional $236 in additional compensation in the following month.

4.1.2 Robustness Tests

We conduct various robustness tests. First, we use an alternative approach to measure vote correctness by using abnormal MKR returns based on the cryptocurrency two-factor and three-factor models (Liu, Tsyvinski, and Wu, 2021), rathe rather than the Crypto-CAPM model in the baseline analysis.[15] Second, we expand the return window for measuring vote correctness to include both the pivotal vote date and the following day, rather than only using the pivotal vote date. As shown in Table B3 in Appendix B, the results are consistent with our baseline analysis in Table 3 under both alternative approaches.

Third, we measure vote correctness using the delegate's number of correct votes on a given date, rather than the proportion of correct votes. As shown in Table B4 in Appendix B, our results remain consistent with this alternative specification. Fourth, in April 2023, MakerDAO experiences significant governance changes as part of its "Endgame Plan", which aims to further decentralize governance, improve efficiency, increase resilience, boost voter participation, and ensure long-term sustainability. This reform, as discussed in detail in Appendix D, brings several key changes to delegate incentives and raises questions about the continued effectiveness of MKR

[15] Cryptocurrency 2-factor models include crypto-market factor (CMKT) and crypto-size factor (CSMB). Cryptocurrency 3-factor model adds crypt-momentum factor (CMOM). When construction for CMOM, we use 3-day momentum strategy.

holder monitoring of delegate voting. In Table B5 of Appendix B, we present a subperiod analysis covering the post-reform period from April 2023 to October 2023. The results show even stronger effects compared to the full sample period. For example, a one standard deviation increase in *Correct Vote* is associated with a 4.2 percentage-point increase in delegate growth, nearly three times the baseline effect.

4.2 Delegates Incentives and Voting Behavior

Our results in the previous section show that MKR holders can create incentives for delegates to vote correctly on proposals through an ex-post settling-up mechanism of delegation adjustments. In this section, we examine ex-ante incentives for delegates, specifically those arising from their crypto holdings, and how these incentives affect their voting decisions.

4.2.1 Incentive alignment from MKR token holdings

We begin by examining the influence of delegates' MKR holdings on their voting decisions. When delegates have more MKR holdings in their investment portfolios, we expect stronger interest alignment between them and their principals (MKR holders), increasing the likelihood that delegates vote correctly. To test this hypothesis, we estimate the following delegate-poll level regression:

$$Correct_{d,p} = \alpha + \beta_1 \ln(1 + MKR\ holdings_{d,p}) + \gamma' X_{d,p} + \eta_d + \theta_t + \epsilon_{d,p} \tag{4}$$

where the dependent variable, *Correct*, is a dummy variable that equals one if delegate *d* casts a correct vote for proposal *p* and zero otherwise. The key independent variable is the natural logarithm of one plus the dollar value of MKR holdings in delegate *d*'s accounts at the time of voting on proposal *p*. As shown in Panel B of Table 2, the majority of delegates have no MKR holdings in their public related accounts. Among those with a positive MKR position, the average dollar value of holdings is $5,530. The regression also controls for a vector of delegate and proposal characteristics, as well as delegate fixed effects and year-month fixed effects. The standard errors are adjusted for delegate-level clustering.

Table 4 presents the regression results. The coefficient estimate for MKR holdings is positive and significant (*p*-value < 1%) across both specifications. Economically, all else being equal, a one standard deviation increase in *ln(1+ MKR holdings)* is associated with a 2.5% increase in the likelihood of voting correctly on a proposal. This finding suggests that delegates' MKR holdings help align their incentives with those of MKR holders.

4.2.2 Conflicts of interest from other token holdings

In addition to MKR, delegates often hold other tokens in their portfolios. While delegates' MKR holdings can strengthen the alignment of interest between delegates and MKR holders, their holdings of other tokens may have the potential to create conflicts of interest, raising concerns among DAO participants. Figure 7 illustrate such a scenario, where the delegate 'Monet-Supply' discloses its holding tokens of Aave and COMP, competitors of MakerDAO. This disclosure prompted skepticism from an MKR holder, who voiced concerns about conflicting incentives: "*We should need to trust you to act against your incentive. This is something I wouldn't trust anyone to do, as I believe incentives always win*."

We investigate the potential conflicts of interest arising from delegates' token holdings. For example, in the scenario depicted in Figure 7, suppose a proposal is introduced to lower the interest rate of DAI, which could attract more users to MakerDAO but potentially divert users away from competitors like Aave. Could the delegate in question vote 'No' to protect the value of their Aave holdings, even if this proposal is value-enhancing for MakerDAO? To examine potential agency conflicts like this, we investigate whether delegates who own tokens with interests misaligned with MakerDAO are more likely to vote incorrectly.

We construct a poll-token level measure, *Conflicted*, to capture the contradicting effects of a proposal p on MKR and a token i.[16] The idea is that if a proposal has diverging effects on MKR and token i, the voting outcome – whether passing or rejection – would cause opposite price changes in MKR and token i. Therefore, we define *Conflicted* as a dummy variable equal to 1 if, on the pivotal vote date, the abnormal returns of token i and MKR are in opposite extreme (top or bottom) deciles of their respective distributions, and zero otherwise.

Similarly, we create a dummy variable, *Aligned*, to capture scenarios where the interests of MKR and token i are aligned with respect to a proposal. Specifically, *Aligned* equals 1 if the abnormal returns of MKR and token i on the pivotal vote date are either both in the top decile or both in the bottom decile of their respective distributions, and zero otherwise. Table B6 of Appendix B illustrates various scenarios, providing examples of the construction of *Conflicted* and *Aligned*.

We examine how the incentives derived from delegates' related token holdings affect their voting behavior by estimating the following delegate-proposal level regression.

$$Correct_{d,p} = \alpha + \beta_1 Conflict_{d,p} + \beta_2 Align_{d,p} + \gamma' X_{d,p} + \eta_d + \theta_t + \epsilon_{d,p} \tag{5}$$

where the dependent variable, *Correct*, is as defined in equation (4). The key independent variables include measures of conflicts or alignment of interests for delegate d with respect to proposal p. Specifically, we use three measures of conflicts of interest. *Conflicted Dummy* is a dummy variable that equals 1 if the delegate holds any tokens with *Conflicted* equal to 1 on the vote date, and zero otherwise. *Conflicted Number* is the number of tokens with *Conflicted* equal to 1 in the delegate's holdings on the vote date. *Conflicted Ratio* is calculated as *Conflicted Number* divided by the total

[16] We exclude tokens of Ethereum, DAI and MKR. Additionally, we exclude other stablecoins because stablecoins are known for its stable price around the peg.

number of tokens held by the delegate on the vote date. We also construct three interest alignment measures similarly based on *Aligned.* We control for delegate and proposal characteristics, as well as delegate and year-month fixed effects. All standard errors are adjusted for delegate-level clustering.

Table 5 presents the regression results. The coefficient estimates are significantly negative for all three *Conflicted* measures, indicating that delegates holding more tokens with interests misaligned with MKR are significantly less likely to cast a correct vote. These results are also economically significant. For example, the coefficient in Model (2) suggests that a one standard deviation increase in *Conflicted Dummy* reduces the likelihood of voting correctly by 4%. Model (6) shows that one standard deviation increase in *Conflicted Ratio* decreases the probability of voting correctly by 2.8%. It is worth noting that this result likely represents a conservative estimate, as delegates may potentially hide related token holdings in other accounts that are not publicly visible to the MakerDAO community, which could further exacerbate the agency problem.

For robustness, we also construct alternative measures of conflicts and alignment of interest by using the logarithm of the dollar value of the conflicted (aligned) token holdings. The results are consistent with our baseline analysis (Table B7 of Appendix B). Overall, our analyses demonstrate that conflicts of interest arising from delegates' token holdings can significantly impact their voting behavior.

4.3 Delegate Expertise

4.3.1 Delegate Expertise and Vote Correctness

In this section, we examine whether delegates are more likely to vote correctly on a proposal if they have related expertise about the proposal. We estimate a delegate-proposal level regression as below.

$$Correct_{d,p} = \alpha + \beta\ Expertise_{d,p} + \gamma' X_{d,p} + \eta_d + \theta_t + \epsilon_{d,t} \qquad (6)$$

where the dependent variable, *Correct*, is a dummy variable equal to 1 if delegate d casts a correct vote on proposal p, and 0 otherwise. The key independent variable is the expertise level of delegate d with respect to proposal p at the time of voting. As in Equation (4) and (5), we control for delegate and proposal characteristics as well as delegate and year-month fixed effects, and adjust the standard errors for delegate-level clustering.

We measure a delegate's expertise on a proposal by evaluating their experience holding the tokens mentioned in the forum discussions about the proposal. This approach assumes that delegates with prior holdings of these tokens are more familiar with the proposal's subject matter and are therefore better equipped to make informed voting decisions. To construct this measure, we begin by identifying tokens mentioned in the proposal discussions by searching token names in the forum discussions associated with each proposal.[17] We exclude the three fundamental tokens of MKR, DAI, and ETH as they are relevant to virtually all proposals and do not provide additional insight into a delegate's expertise on specific topics. Table B8 of Appendix B provides the list of tokens mentioned in proposal discussions.

Next, we classify a delegate as having experience with a particular token if they have a history of holding that token. We focus on tokens that the delegate previously owned but no longer holds at the time of voting to avoid potential confounding effects from the current token holdings. Delegates with no history of holding any tokens are excluded from the analysis. We construct the expertise measure, *Token Experience*, as the ratio of the number of unique tokens mentioned in the proposal discussion and had been held by the delegate (henceforth "expertise token"), to the total

[17] If the name of a token is a single word such as Tether or two words, we require the entire token name to be present in the discussion. If a token's name contains three words such as Rocket Pool ETH, we require at least two words in the name to matched to the text of discussion (e.g., Rocket Pool).

number of unique tokens in the delegate's portfolio prior to the time of voting (excluding those currently held by the delegate). As shown in Table 2, *Token Experience* has an average of 3% in our sample.

We also construct two alternative expertise measures that incorporate the dollar values of token holdings, because a delegate who invested more heavily in a token may have more expertise about the token. The first alternative measure is the natural logarithm of one plus the average dollar value of the expertise tokens. The dollar holding value for an expertise token is calculated as the average dollar value of holdings during the delegate's holding period. The second measure, *Portfolio Weight*, is the average portfolio weight of the expertise tokens. The portfolio weight for an expertise token is the average daily portfolio weight allocated to the expertise token during the delegate's holding period. The average dollar value of expertise tokens held by the delegates is $1,458, which accounts for 5% of their total portfolios.

Table 6 presents the regression results. We find that the coefficient estimate of *Token Experience* is positive and significant in both Models (1) and (2). This result is also economically significant, as a one standard deviation increase in *Token Experience* increases the likelihood of voting correctly by 3%. The coefficient estimate for the other two expertise measures are also statistically and economically significant in Models (3) to (6). For example, the coefficient estimate for *Portfolio Weight* indicate that a one standard deviation increase in *Portfolio Weight* increases the likelihood to vote correctly by 2.2%.

For robustness, we adopt an alternative approach to measure delegate expertise using the delegate's voting experience on proposals with similar topics. Specifically, delegates may learn from their previous voting experience on similar proposals, accumulating knowledge that aids them in future voting. Therefore, we first measure topic experience at the delegate-proposal-tag level as the count of participations by delegate *d* in previous proposals with an identical tag as proposal *p*, where a tag represents a key topic associated with the proposal. We then define *Topic Experience* as the average of this count variable across tags at the delegate-proposal level if proposal *p* has multiple tags. For each delegate, the average number of historical participations on the same topics is 7.7, with a maximum of 60.5.

Table 7 presents the regressions of vote correctness on the natural logarithm of one plus *Topic Experience*. The coefficient estimate for topic experience is positive and significant in both models, supporting our prediction that delegates with greater expertise on a proposal are more likely to cast correct votes. In terms of economic significance, a one standard deviation increase in *ln(1+Topic Experience)* leads to 4.9% increase in the probability of voting correctly.

Our results are robust across various model specifications for calculating adjusted returns on the pivotal vote date, as well as using an expanded 2-day window to capture market reactions. Tables B9 and B10 in Appendix B present the robustness tests. Overall, the results in this subsection demonstrates that delegates' expertise significantly increases the likelihood of voting correctly.

4.3.2 Delegate Expertise and Timing of Votes

In addition to correctness, the timing of delegates' votes is another variable of interest. Since votes are visible during the voting period, voters face a tradeoff: early voters can influence later voters and potentially affect the outcome, while late voters can utilize information from earlier votes to make more informed decisions. This tradeoff is reflected in the significantly negative coefficient for *Vote Early* reported in Table 7, where *Vote Early* is defined as the duration between a delegate's vote and the end of the voting period, divided by the total duration of the voting period.

We predict that delegates with greater expertise are more likely to vote early, as they rely less on learning from others. To test this prediction, we examine the relation between delegate expertise and the timing of their votes. Specifically, we regress *Vote Early* on our measures of delegate expertise and present the results in Table 8. The coefficient on the delegate expertise measure is positive across all regressions and statistically significant in half of them. For example, the coefficient for *Topic Experience* in Model (1) is positive and significant at the 0.01 level (t-statistic 4.72). Economically, this coefficient indicates that a one standard deviation increase in *Topic Experience* corresponds to a 20% increase in the standard deviation of *Vote Early*. These findings suggest that delegates with greater expertise are inclined to vote earlier.

4.4 The Efficacy of Vote Delegation and MakerDAO Performance

As a key component of the MakerDAO governance framework, the efficacy of the delegation scheme can potentially have a significant impact on the performance and growth of the MakerDAO protocol. To shed light on this issue, we assess how delegates' voting correctness affect MKR prices. Given that most proposal voting on MakerDAO occurs within a week, we regress weekly abnormal returns of MKR on the lagged weekly weighted average of delegates' voting correctness. The regression model is specified as follows:

$$Abnormal\ Ret_{i,t+1} = \alpha + \beta Delegate\ Voting\ Correctness_{i,t} + \gamma' X_{i,t} + Year\ FE + \epsilon_{i,t} \quad (7)$$

where the dependent variable is weekly abnormal returns of MKR. We follow the methodology of Liu, Tsyvinski, and Wu (2021) to create weekly price factors CMKT, CSMB, and CMOM, allowing us to obtain residuals from the crypto-market model, the two-factor model, or the three-factor model. The key independent variable is *Delegate Vote Correctness*, which is the voting power-weighted average of delegates' voting correctness over the past week. We control for several weekly measures related to proposal voting, including the number of proposals under voting, the total count of voting participations, and the number of proposals tagged as "High

Impact" under voting. Additionally, we construct a measure of *Ordinary Voters' Correctness*, defined as the voting power-weighted average of non-delegate MKR holders' voting correctness, using the same methodology as *Delegate Voting Correctness.*

During our two-year sample period, there are 87 weeks with participation from both delegates and ordinary MKR voters. As shown in Panel C of Table 2, the average weekly crypto-market adjusted return for MKR during our sample period is 1%. Additionally, the average voting power-weighted correctness for delegates across weeks is 46%, which is higher than the 42% for ordinary MKR voters.

Table 9 presents the regression results. The coefficient estimate for *Delegate Vote Correctness* is positive and significant across all models. Specifically, a one standard deviation increase in delegate vote correctness in a given week is associted with a 4.14% higher monthly returns. To assess how well the delegation system needs to function for it to be cost-effective for MKR holders, we can perform a simple cost-benefit analysise. Taking December 2022 as an example, the total monthly compensation paid to delegates is \$108,690, while the average number of MKR shares locked in delegation contracts is 129,183 shares. This implies that the monthly cost of delegation per MKR share is about \$0.84 (calculated as \$108,690/129,183). With the MKR price in December 2022 being approximately \$580, the monthly cost of delegation as a precentage of MKR price is roughly 0.14%, less than 1/25th of the 4.14% increase in MKR monthly returns associated with a one-standard-deviation increase in weekly delegate vote correctness. This comparison indicates that even a small improvement in delegate vote correnctness can be value increasing for MKR holders.

In addition to reducing the collective cost of governance and enhancing efficiency, the voting delegation system on MakerDAO is designed to increase MKR holder participation and reduce the influence of large shareholders.[18] To assess whether the delegation scheme has achieved these objectives, we examine voter participation and concentration since 2019 (prior to the launch of delegation). Figure 8 illustrates the weekly time series of the ratio of total MKR shares participating in voting relative to the circulating supply (blue line). Before the introduction of the delegation scheme in October 2021, the average voting participation rate is 4.5%. Following its launch, voting participation increases immediately, with the average rising to 10%. This finding suggest that the delegation scheme has been effective in increasing broader MKR holder participation in governance.

The orange dotted line in Figure 8 tracks the voting power of the largest voter over time. Following the introduction of the delegation scheme, the voting power held by the largest voter decreased significantly, from an average of 48% to 26%. Similarly, the average voting power controlled by the top 3 voters dropped from 80% before October 2021 to 57% afterward. These changes mark a meaningful step toward decentralization for MakerDAO without significantly compromising governance efficiency.

5. CONCLUSION

Governance on the blockchain has garnered significant attention in recent years, with Decentralized Autonomous Organizations (DAOs) emerging as a novel structure for managing decentralized communities. Unlike traditional governance models, DAOs operate without a central authority, allowing every token holder to participate in voting in decision-making processes that span from staffing to business strategy. However, this ideal of perfect decentralization can lead to inefficiencies, as not all token holders possess the time or expertise to make informed decisions

[18] See https://forum.sky.money/t/delegation-and-makerdao/9429.

that benefit the community's growth. To address this challenge, DAOs have introduced vote delegation schemes.

In this paper, we set out to investigate the efficacy of vote delegation in DAOs, using data from MakerDAO. First, we demonstrate that token holders do reward delegates who cast "correct" votes, as evidenced by increased delegation of voting power to these delegates. Such increase in delegation shares can translate into tangible financial compensation for the delegates.

Second, we find that delegates' incentives and expertise play a crucial role in shaping their voting behavior. Delegates with greater expertise - measured by their prior involvement in similar proposals or their holdings of tokens relevant to the proposals - are more likely to vote correctly. Moreover, delegates with higher MKR holdings are more likely to cast votes that are value-enhancing to the DAO. However, our analysis also reveals that when delegates hold tokens that conflict with the interests of MakerDAO, they are more likely to vote incorrectly.

Finally, we show that the efficacy of the vote delegation scheme has a significant impact on the performance of MakerDAO. Specifically, a higher percentage of correct votes by delegates correlates with higher future abnormal returns for MKR tokens, suggesting that well-functioning governance contributes to the platform's growth. Furthermore, we find that the delegation scheme increases voter participation and reduces centralization, fulfilling its foundational objective of facilitating relatively decentralized governance.

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Figure 1
Participants in the DAI Markets

This figure illustrates the activities of participants in the primary and second DAI markets. When the price of DAI falls below 1 USD, secondary market investors are incentivized to buy DAI and save it to earn interest at the Dai Saving Rate (DSR). This reduces the circulating supply of DAI and drives its price upward. Concurrently, MKR holders may vote to increase the DSR, further boosting demand for DAI in the secondary market as investors buy DAI to save it, thereby pushing the price closer to parity with the USD. Conversely, when the price of DAI rises above 1 USD, investors are more likely to borrow DAI from MakerDAO and sell it at a higher price on the secondary market, increasing the circulating supply and reducing the price. In the meantime, MKR holders may reduce the DSR, which dampens demand in the secondary market and helps stabilize the price of DAI.

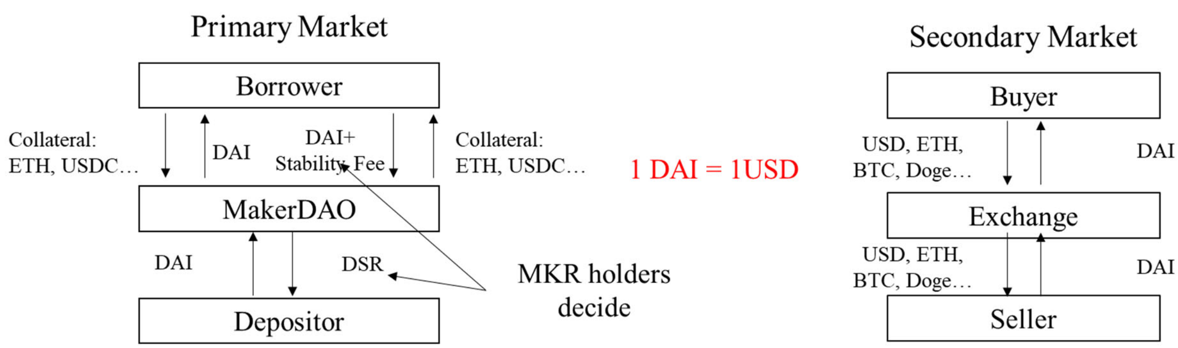


Figure 2
MakerDAO Governance Process

This figure outlines the governance process on MakerDAO. The process starts with a proposal, which can be submitted by anyone through a discussion forum. Participants on the forum provide their opinions and preferences, fostering an open and transparent dialogue. After a proposal has undergone thorough discussion, facilitators consolidate it into a poll and present it on the governance portal each Monday. At this stage, both MKR holders and delegates are able to vote on the proposal. Proposals that pass the poll voting phase advance progress to the executive votes stage, where the finer details are reviewed, and final approval of execution is granted, completing the governance cycle.

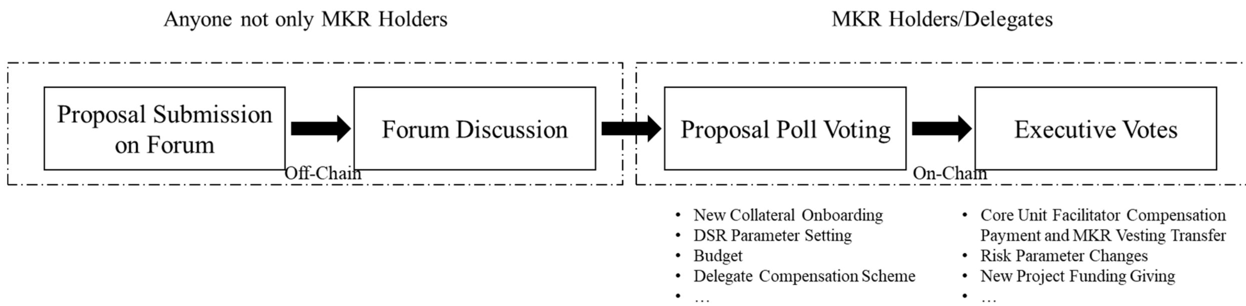


Figure 3

MakerDAO Governance Process: An Example

This figure illustrates an example of the MakerDAO governance process as displayed on the web interface. The process begins with Proposal Submission, where PhoenixLabs submits a proposal to adjust parameters in a smart contract named SparkLend. The second step involves Forum Discussion, where various members provide questions and comments regarding the proposal. In the third step, the proposal progresses to Poll Voting, receiving 100% support from 70 participants, with a total of 80,181.461 MKR votes cast. The fourth step is Executive Voting, where the approval proposal undergoes final approval, including detailed plans for implementation. In the final step, Specific Implementation of the proposal is carried out.

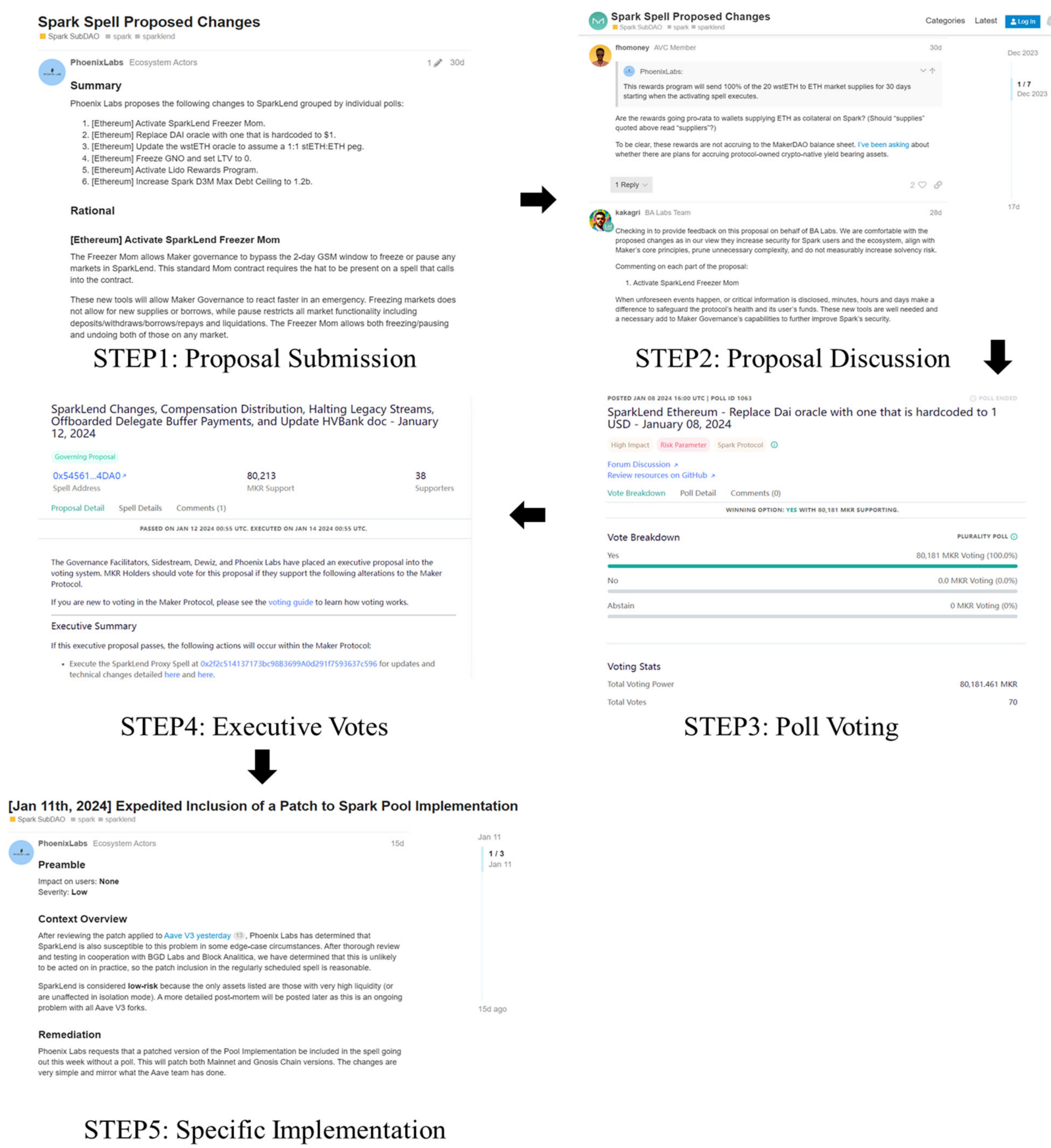


Figure 4
Voting Participation across Proposal Topics

This figure illustrates voting participation, measured by the number of voters participating in the process, across proposals categorized by various topic tags. Proposals tagged as "Risk Parameter" exhibit the highest participation from MKR holders. The next four most popular tags are "MIP" (Maker Improvement Proposals), "Ratification Poll" (finalized MIP approval), "Real World Asset" (using real-word assets as collateral), and "Endgame" (a restructuring initiative aimed at decentralizing governance and fostering innovation).

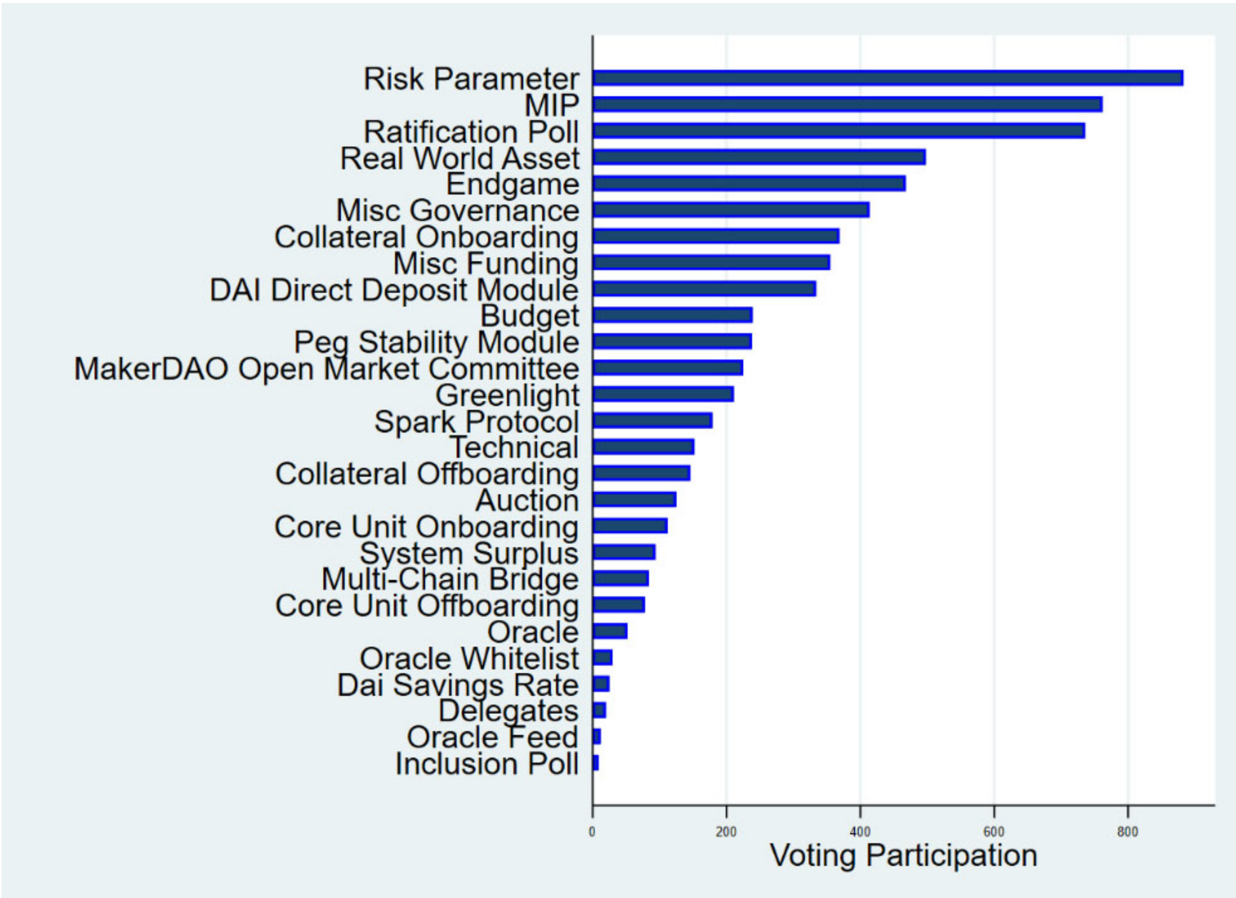


Figure 5
Delegation Process within MakerDAO

This figure illustrates the delegation process within MakerDAO. The process begins with an institution or individual establishing a delegation contract, thereby assuming the role of a delegate (Step 1). Once the contract is successfully created, the delegate's profile and contract address are displayed on the official MakerDAO website. MKR holders who wish to delegate their voting rights can then select a trusted delegate and lock their MKR tokens into the contract (Step 2). This action authorizes the delegate to cast votes on behalf of the MKR holders in both poll and executive voting (Step 3). Should an MKR holder decide to terminate the delegation arrangement, she can withdraw her MKR tokens from the delegate (Step 4). This withdrawal enables the MKR holder to either select a new delegate or opt out of delegation entirely.

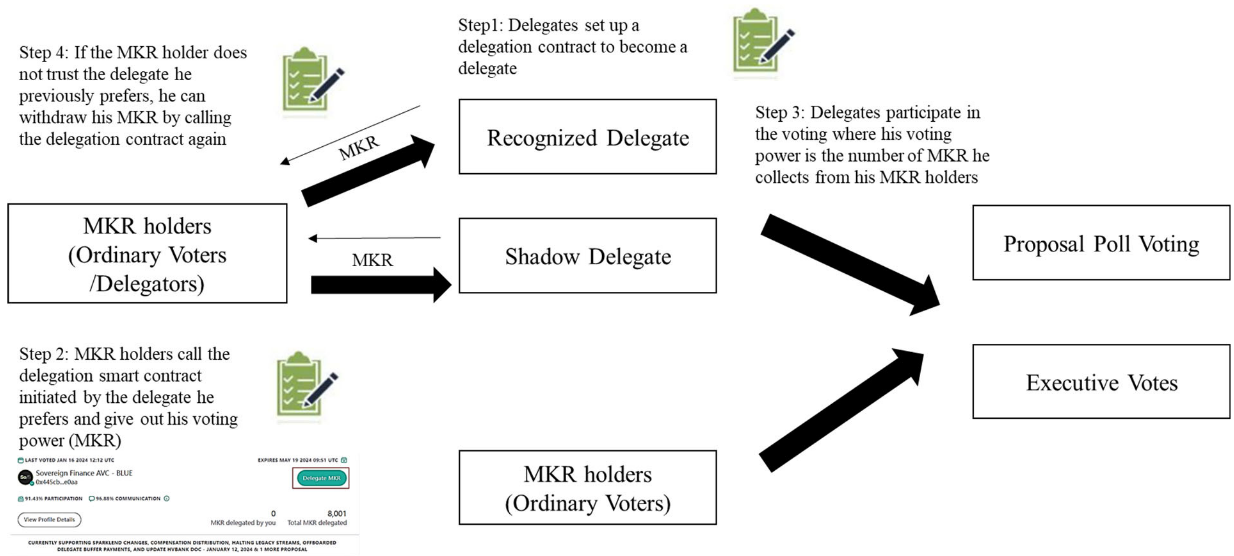


Figure 6

Classification of Value-Enhancing vs. Value-Destroying Votes: An Example

The figure illustrates the classification of value-enhancing vs. value-destroying votes using Poll 665 as an example. The poll is about removing swap fees, and the figure plots the cumulative voting shares and MKR abnormal returns over the voting period. The average participation in proposal voting during the previous one month is 67,043 MKR shares (expected votes). To meet the 50% threshold, one side must accumulate at least 33,521.5 MKR shares. This threshold is achieved by the "Yes" votes on November 3, 2021. Additionally, on the same day, the incremental MKR shares voted for the "Yes" decision amount to 15.5% of the expected votes, satisfying the second condition, which requires that the MKR shares voted for that decision on the pivotal vote date exceed 10% of the expected total votes. Therefore, November 3, 2021 is identified as the pivotal vote date for Poll 665. Next, we calculate daily abnormal return of MKR using the Crypto-CAPM model, and plot the cumulative abnormal return during the voting period. On the pivotal vote date of November 3, the abnormal return for MKR is a positive of 13.6%, and the "Yes" side prevails. Therefore, it is classified as victory of the "Yes" side on this date indicate that "Yes" is a proper choice for this proposal, as the market views it as a value-enhancing proposal for MKR.

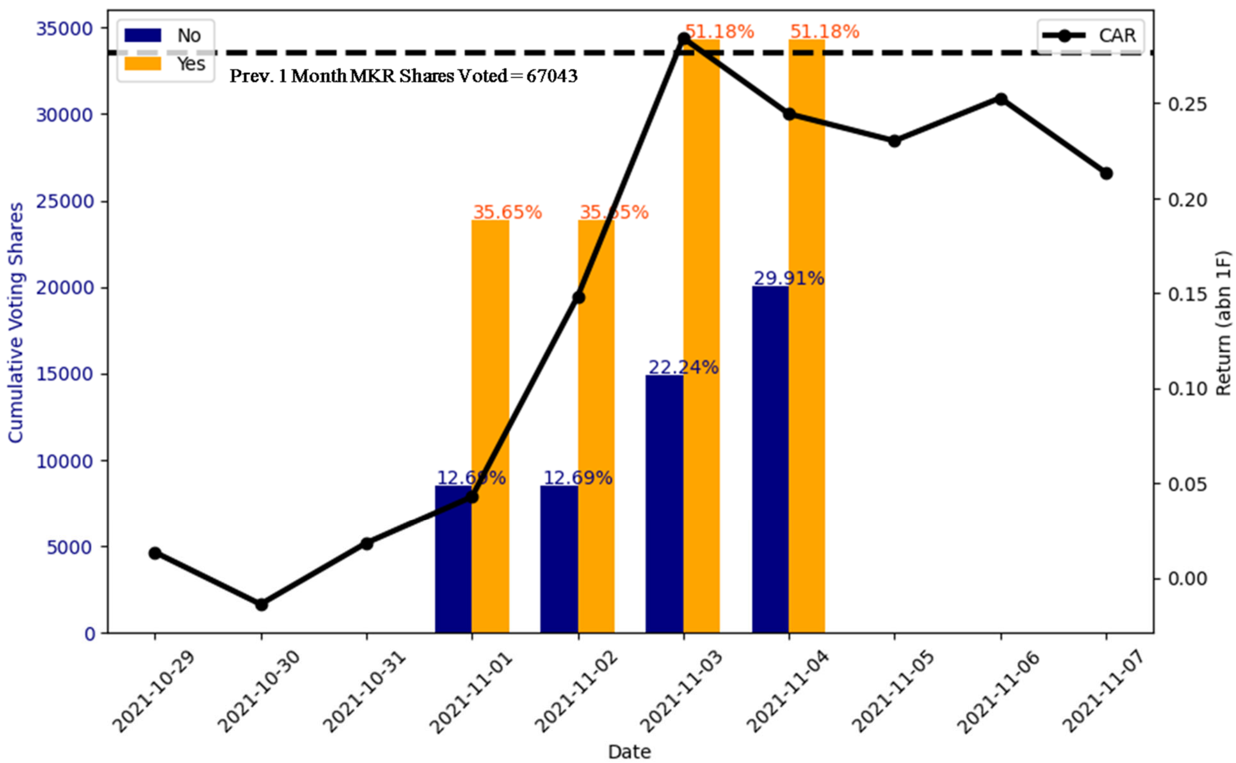
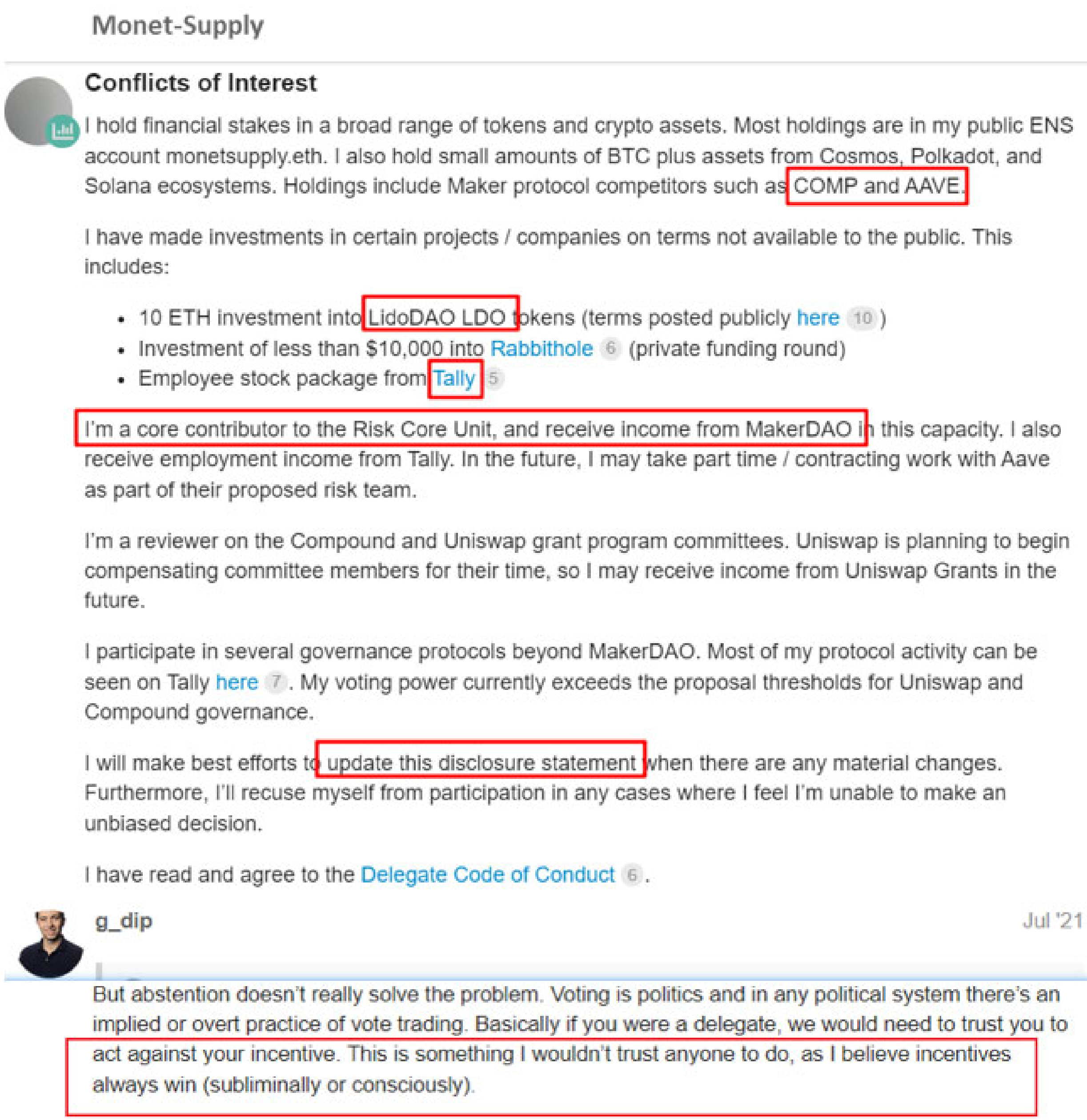


Figure 7
Conflicts of Interest Due to Delegates' Token Holdings: An Example

This figure presents a case illustrating potential conflicts of interest involving the delegate 'Monet-Supply' and MKR holders, as displayed on the delegate's forum homepage. Monet-Supply holds tokens from MakerDAO's competitors, including COMP and AAVE, as well as tokens from LidoDAO, a company that produces collateral assets for MakerDAO. Furthermore, Monet-Supply serves as an employee within MakerDAO's Risk Core Unit. The agency issues may arise when a proposal may benefit MakerDAO but adversely affect the interests of competitors such as Aave. Following this disclosure, an MKR holder known as g_dip expressed concerns about a potential agency problem.


Monet-Supply

Conflicts of Interest

I hold financial stakes in a broad range of tokens and crypto assets. Most holdings are in my public ENS account monetsupply.eth. I also hold small amounts of BTC plus assets from Cosmos, Polkadot, and Solana ecosystems. Holdings include Maker protocol competitors such as COMP and AAVE.

I have made investments in certain projects / companies on terms not available to the public. This includes:

- 10 ETH investment into LidoDAO LDO tokens (terms posted publicly here 10)
- Investment of less than $10,000 into Rabbithole 6 (private funding round)
- Employee stock package from Tally 5

I'm a core contributor to the Risk Core Unit, and receive income from MakerDAO in this capacity. I also receive employment income from Tally. In the future, I may take part time / contracting work with Aave as part of their proposed risk team.

I'm a reviewer on the Compound and Uniswap grant program committees. Uniswap is planning to begin compensating committee members for their time, so I may receive income from Uniswap Grants in the future.

I participate in several governance protocols beyond MakerDAO. Most of my protocol activity can be seen on Tally here 7 . My voting power currently exceeds the proposal thresholds for Uniswap and Compound governance.

I will make best efforts to update this disclosure statement when there are any material changes. Furthermore, I'll recuse myself from participation in any cases where I feel I'm unable to make an unbiased decision.

I have read and agree to the Delegate Code of Conduct 6 .

g_dip Jul '21

But abstention doesn't really solve the problem. Voting is politics and in any political system there's an implied or overt practice of vote trading. Basically if you were a delegate, we would need to trust you to act against your incentive. This is something I wouldn't trust anyone to do, as I believe incentives always win (subliminally or consciously).

Figure 8
Voting Participation and Concentration Since 2019

This figure demonstrates that the MKR shares participating in the voting process (blue line) increase following the implementation of the delegation scheme in October 2021. Simultaneously, voting concentration decreases, as evidenced by the reduced proportion of MKR shares cast by the top voters (orange dot line).

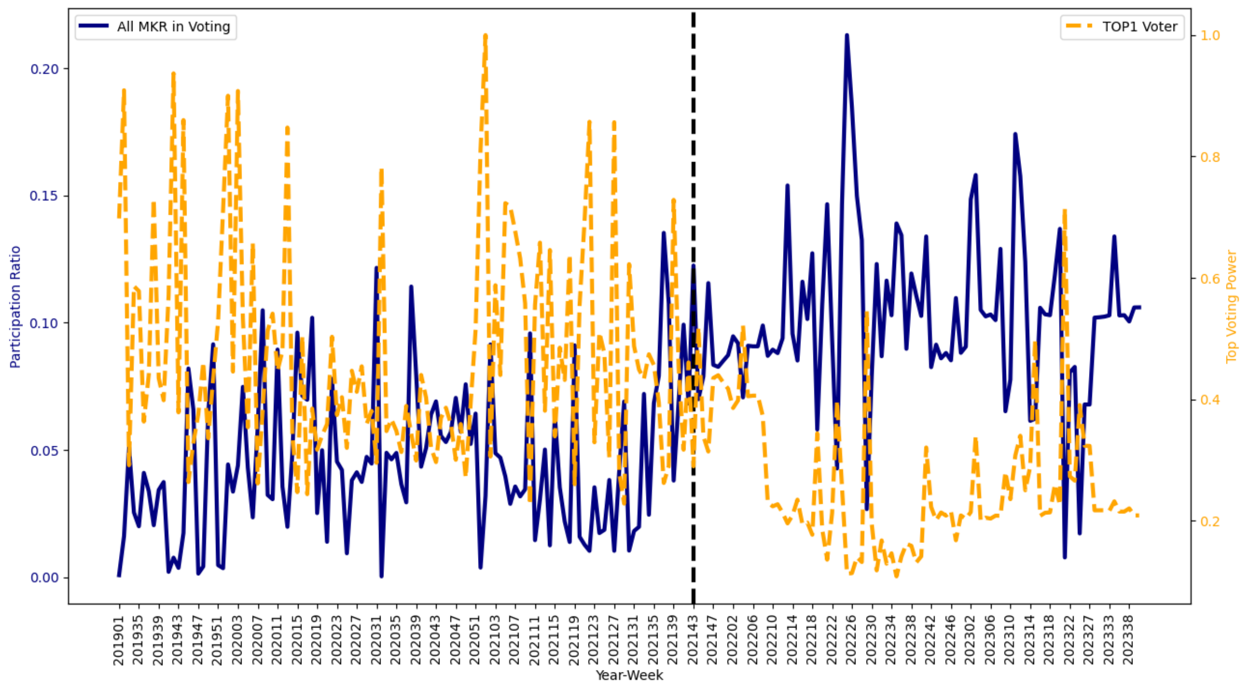


Table 1
Classifications of Correct Votes

This table presents hypothetical examples to illustrate the classification of correct votes by delegates. We first use the MKR market response on the pivotal vote date and winning votes to decide whether a proposal is value enhancing or destroying. Next, we decide if a delegate's vote is correct or not based on the alignment of their vote with the value implication of the proposal.

	Poll A	Poll B	Poll C	Poll D
MKR market reaction on the pivotal vote date	Positive	Positive	Negative	Negative
Winning votes	Yes	No	Yes	No
Decision 1: Value enhancing or destroying	*Enhancing*	*Destroying*	*Destroying*	*Enhancing*
Delegate's Vote	Yes	No	No	Yes
Decision 2: Vote Correctness	*Correct*	*Incorrect*	*Correct*	*Incorrect*

Table 2
Summary Statistics

Panel A presents measures at delegate-vote date level. *Delegate Growth* is the ratio of the net change in the MKR delegation amount within 30 days after the vote date to the delegate's existing MKR delegation amount on the vote date. To avoid outliers, we winsorize delegate growth at the 90^{th} percentiles. *Increase MKR* is a dummy that equals 1 if the delegation amount change in the 30 days after the delegate's vote is positive, and 0 otherwise. *Increase Delegators* is the number of delegators who give new delegation minus the number of delegators who withdraw their delegation. *Participation* is the number of proposals participated by the delegate on the vote date. *Correct Vote* is the ratio of the number of correct votes over *Participation* on the vote date. Panel B lists measures at delegate-poll level. *Topic Experience* is the historical count of voting participations in proposals with the same tags as the current proposal. *Token Experience* is the ratio of the number of unique tokens mentioned in the proposal discussion and had been held by the delegate ("expertise token"), to the total number of unique tokens in the delegate's portfolio prior to the time of voting (excluding those currently held by the delegate). *Holding Value ($)* is the average dollar value of tokens that have been held by the delegate and mentioned in discussion posts. *Portfolio Weight* is the average percentage of the dollar value of tokens held by the delegate and mentioned in discussion posts. *Conflicted (Aligned) Ratio* is the number of the delegate's tokens that are incentive-misaligned (aligned) with MKR under current poll divided by the number of tokens held by the delegate on the vote date. The baseline is interest uncorrelated. *Conflicted (Aligned) Dummy* is a dummy that equals 1 if the delegate holds any interest conflicted (aligned) tokens on the vote date. *Conflicted (Aligned) Number* is the number of conflicted (aligned) tokens held by the delegate on the vote date. *Conflicted (Aligned) Holding Value* is the dollar value of the interest-conflicted (aligned) token held by the delegate on the vote date. Panel C reports summary statistics on measures from October 2021 to October 2023 about MakerDAO at weekly level. *Abnormal Return* is the weekly adjusted return of MKR. *Delegates' Correctness* is the weekly weighted average of delegates' voting correctness. *Ordinary MKR Voters' Correctness* is the version for ordinary MKR voters. All the other variables are defined in Appendix A.

	#Obs	Mean	SD	Min	P25	P50	P75	Max
Panel A: Delegate-Vote Date Level Measures								
Delegate Growth	1,814	0.02	0.46	-1.00	0.00	0.00	0.00	1.00
MKR Increase	1,814	0.31	0.46	0.00	0.00	0.00	1.00	1.00
Delegator Increase	1,814	0.27	1.68	-10.00	0.00	0.00	1.00	15.00
Participation	1,814	2.73	2.28	1.00	1.00	2.00	4.00	19.00
Correct Vote	1,814	0.44	0.45	0.00	0.00	0.33	1.00	1.00
Shadow	1,814	0.20	0.40	0.00	0.00	0.00	0.00	1.00
Days to Expire	1,814	119.90	127.15	0.00	0.00	70.25	243.00	362.00
Num of Delegators	1,814	4.11	4.71	0.00	1.00	2.00	6.00	27.00
Num of High Impact	1,814	1.30	1.51	0.00	0.00	1.00	2.00	9.00
Voting Power (%)	1,814	5.05	7.39	0.00	0.01	1.10	8.55	48.93
ln (1+ MKR Holding)	1,814	0.09	0.86	0.00	0.00	0.00	0.00	2.86
Panel B: Delegate-Poll Level Measures								
ln (1+ Topic Experience)	4,959	1.59	1.12	0.00	0.00	1.61	2.51	4.12
Token Experience	1,713	0.03	0.12	0.00	0.00	0.00	0.00	1.00
ln (1+ MKR Holding)	4,959	0.09	0.83	0.00	0.00	0.00	0.00	10.29
ln (1+ Holding Value)	1,674	0.90	2.45	0.00	0.00	0.00	0.00	12.04
Portfolio Weight	1,674	0.05	0.19	0.00	0.00	0.00	0.00	1.00
Conflicted Ratio	1,470	0.01	0.08	0.00	0.00	0.00	0.00	1.00
Aligned Ratio	1,470	0.05	0.19	0.00	0.00	0.00	0.00	1.00
Conflicted Dummy	1,470	0.04	0.18	0.00	0.00	0.00	0.00	1.00
Aligned Dummy	1,470	0.08	0.28	0.00	0.00	0.00	0.00	1.00
Conflicted Number	1,470	0.05	0.32	0.00	0.00	0.00	0.00	5.00
Aligned Number	1,470	0.21	0.95	0.00	0.00	0.00	0.00	11.00
ln (1+ Conflicted Holding Value)	1,470	0.19	1.14	0.00	0.00	0.00	0.00	11.78
ln (1+ Aligned Holding Value)	1,470	0.47	1.90	0.00	0.00	0.00	0.00	10.25
Vote Early	4,959	0.42	0.32	0.00	0.14	0.33	0.67	1.00
Panel C: Weekly Measures								
Return	87	0.00	0.11	-0.24	-0.08	0.00	0.06	0.31
Abnormal Return	87	0.01	0.11	-0.42	-0.05	-0.01	0.04	0.41
Delegates' Correctness	87	0.46	0.38	0.00	0.06	0.52	0.84	1.00
Ordinary MKR Voters' Correctness	87	0.42	0.40	0.00	0.00	0.36	0.89	1.00
Num of Votes	87	144.92	124.98	8.00	51.00	103.50	194.50	579.00

Table 3
Delegate Vote Correctness and Future Delegation Changes

This table presents delegate-vote date level regressions that investigate whether delegates making correct (incorrect) vote choices are rewarded (punished) by MKR holders. The sample includes observations where a delegate casts a vote on a given day. The dependent variable in Model (1) and (2) is *MKR Increase*, a dummy variable equal to one if the delegation amount changes positively within 30 days after the delegate's vote, and zero otherwise. In Models (3) and (4), the dependent variable is *Delegator Increase*, defined as the net change in the number of delegators within 30 days after the delegate's vote. In Model (5) and (6), the dependent variable is *Delegate Growth*, defined as the growth rate of MKR delegation shares within 30 days after the delegate's vote. The main independent variable is *Correct Vote*, defined as proportion of correct votes cast by delegate *d* across all proposals voted on that date. We also control for a broad set of delegate and proposal characteristics. Definitions of the variables are provided in Appendix A. We also include year-month fixed effects and delegate fixed effects. T-statistics adjusted for heteroscedasticity and clustered at delegate level are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively.

Dep. Var.	MKR Increase		Delegator Increase		Delegate Growth	
	(1)	(2)	(3)	(4)	(5)	(6)
Correct Vote	**0.040***	**0.046****	**0.213*****	**0.202****	**0.038***	**0.032**
	(1.94)	**(2.11)**	**(2.84)**	**(2.58)**	**(1.82)**	**(1.48)**
Shadow	-0.193***		-0.485***		-0.189***	
	(-5.14)		(-3.59)		(-3.51)	
Days to Expire	0.002***	0.003***	0.003***	0.002***	0.001***	0.001***
	(18.63)	(16.47)	(5.50)	(3.56)	(3.81)	(2.71)
Prev Delegate Growth	-0.060***	-0.064***	0.047	-0.123	0.010	-0.073**
	(-2.82)	(-2.91)	(0.49)	(-1.60)	(0.31)	(-2.42)
Num of Delegators	-0.008**	-0.027**	-0.063**	-0.401***	-0.014**	-0.037***
	(-2.22)	(-2.51)	(-2.17)	(-8.95)	(-2.33)	(-2.96)
Num of High Impact	0.005	0.006	0.040***	0.027*	0.009	0.009
	(1.12)	(1.42)	(2.84)	(1.92)	(1.45)	(1.58)
Voting Power	0.001	-0.002	0.025	0.049**	-0.009***	-0.025***
	(0.34)	(-0.38)	(1.54)	(2.06)	(-3.40)	(-4.91)
MKR Holdings	0.002	-0.003	0.021	0.006	0.010	-0.016
	(0.26)	(-0.20)	(0.55)	(0.10)	(0.57)	(-0.94)
Constant	0.106***	0.110*	-0.026	1.383***	0.049	0.225***
	(3.80)	(1.81)	(-0.22)	(6.12)	(1.24)	(3.47)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Delegate FE	No	Yes	No	Yes	No	Yes
Observations	1814	1768	1814	1768	1814	1768
Adj. R^2	0.439	0.518	0.140	0.311	0.169	0.412
vce	Delegate	Delegate	Delegate	Delegate	Delegate	Delegate

Table 4
Delegates' MKR Holdings and Vote Correctness

This table presents the delegate-poll level regressions of delegates' correct voting on their MKR holdings. The regression is at delegate-poll level. The dependent variable, *Correct*, is a dummy that equals one if the delegate vote correctly on the poll, and zero otherwise. The main independent variable is the natural logarithm of one plus the dollar value of MKR holdings by the delegate at the time of voting. We also control for delegate and poll characteristics Definitions of all the variables are in Appendix A. Some models include delegate individual fixed effect and year-month fixed effect. T-statistics adjusted for heteroscedasticity and clustered at delegate level are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively.

Dep. Var.	Correct	
	(1)	(2)
ln (1+MKR Holdings)	**0.023*** **	**0.029*** **
	(5.65)	**(6.64)**
High Impact	-0.025	-0.030
	(-1.26)	(-1.58)
Days to Expire	0.000*	-0.002
	(1.84)	(-1.07)
Vote Early	-0.123***	-0.087**
	(-3.11)	(-2.15)
Num of Delegators	-0.006	0.001
	(-1.35)	(0.34)
Voting Power	0.000	-0.000
	(0.16)	(-0.12)
Constant	0.477***	0.867**
	(9.40)	(2.49)
Delegate FE	Yes	Yes
Month FE	No	Yes
Observations	4936	4936
Adj. R^2	0.040	0.124
vce	Delegate	Delegate

Table 5
Conflicts of Interest and Delegate Vote Correctness

This table presents delegate-poll level regressions of delegates' vote correctness and their holdings of tokens with misaligned interests. The dependent variable is *Correct,* which equals 1 if the delegate votes correctly on a proposal or 0 otherwise. The independent variables measure the potential incentives of delegates to cast votes. *Conflicted (Align) Dummy* is a dummy that equals 1 if the delegate holds any interest Conflicted (aligned) tokens on the vote date. *Conflicted (Align) Number* is the number of Conflicted (aligned) tokens held by the delegate on the vote date. *Conflicted (Align) Ratio* is *Conflicted Number* divided by the number of tokens held by the delegate on the vote date. Definitions of the variables are in Appendix A. Year-month fixed effect is included in Model (1), (3) and (5). Delegate fixed effect is added in Model (2), (4) and (6). T-statistics adjusted for heteroscedasticity and clustered at delegate level are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively.

Dep. Var.	Correct					
	(1)	(2)	(3)	(4)	(5)	(6)
Conflicted Dummy	**-0.249***** **(-4.04)**	**-0.226***** **(-3.86)**				
Aligned Dummy	0.134* (1.77)	0.077 (1.00)				
Conflicted Number			**-0.124***** **(-3.53)**	**-0.120***** **(-3.84)**		
Aligned Number			0.007 (0.28)	-0.003 (-0.13)		
Conflicted Ratio					**-0.311*** **(-1.95)**	**-0.354**** **(-2.56)**
Aligned Ratio					0.051 (0.55)	-0.030 (-0.32)
High Impact	0.010 (0.26)	0.038 (0.98)	0.013 (0.34)	0.042 (1.04)	0.012 (0.32)	0.043 (1.07)
Days to Expire	0.000 (0.10)	0.002 (0.74)	0.000 (0.18)	0.002 (0.71)	0.000 (0.13)	0.002 (0.81)
Vote Early	-0.062 (-0.93)	-0.053 (-0.85)	-0.072 (-1.08)	-0.059 (-0.95)	-0.062 (-0.91)	-0.051 (-0.82)
Num of Delegators	-0.013* (-1.90)	-0.010 (-0.94)	-0.014** (-2.10)	-0.010 (-0.98)	-0.014** (-2.07)	-0.010 (-1.00)
Voting Power	-0.002 (-0.52)	-0.002 (-0.46)	-0.002 (-0.47)	-0.001 (-0.38)	-0.002 (-0.44)	-0.001 (-0.39)
MKR Holdings	0.016* (1.88)	0.029*** (2.80)	0.015* (1.92)	0.028*** (2.95)	0.016* (1.95)	0.029*** (3.01)
Constant	0.515*** (6.12)	0.112 (0.21)	0.522*** (6.45)	0.142 (0.28)	0.517*** (6.40)	0.094 (0.19)
Delegate FE	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	No	Yes	No	Yes	No	Yes
Observations	1452	1451	1452	1451	1452	1451
Adj. R^2	0.060	0.135	0.055	0.134	0.054	0.133
vce	Delegate	Delegate	Delegate	Delegate	Delegate	Delegate

Table 6
Delegate Expertise and Vote Correctness

This table presents delegate-poll regressions of delegates' vote correctness on their expertise with respect to the proposals. The dependent variable is, *Correct*, is a dummy variable which equals one if the delegate's vote in one poll is correct and zero otherwise. The main independent variable in Model (1) and (2) is *Token Experience,* which is the ratio of the number of unique tokens mentioned in the proposal discussion and had been held by the delegate ("expertise token") to the total number of unique tokens in the delegate's portfolio prior to the time of voting (excluding those currently held by the delegate). The independent variable in Model (3) and (4) is *Holding Value*, which is the average dollar value of tokens that have been held by the delegate and mentioned in discussion posts. In Model (5) and (6), the independent variable is *Portfolio Weight*, which is the average portfolio ratio of the dollar value of tokens held by the delegate and mentioned in discussion posts. Definitions of the variables are in Appendix A. Year-month fixed effect is included in Model (1), (3) and (5). Delegate individual fixed effect is added in Model (2), (4) and (6). T-statistics adjusted for heteroscedasticity and clustered at delegate level are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively.

Dep. Var.	Correct					
	(1)	(2)	(3)	(4)	(5)	(6)
Token Experience	**0.202**** **(2.19)**	**0.259**** **(2.38)**				
ln(1+Holding Value)			**0.005** **(1.15)**	**0.008*** **(1.84)**		
Portfolio Weight					**0.080**** **(2.01)**	**0.117***** **(2.66)**
Shadow	0.048 (1.15)	0.000 (.)	0.052 (1.22)	0.000 (.)	0.054 (1.25)	0.000 (.)
High Impact	0.034 (1.04)	0.025 (0.75)	0.035 (1.03)	0.026 (0.75)	0.035 (1.04)	0.026 (0.75)
Days to Expire	0.000 (1.65)	0.003 (1.57)	0.000 (1.61)	0.004 (1.66)	0.000 (1.61)	0.004* (1.70)
Vote Early	0.036 (0.57)	-0.018 (-0.21)	0.040 (0.63)	-0.019 (-0.24)	0.039 (0.63)	-0.019 (-0.23)
Num of Delegators	0.001 (0.22)	0.012* (1.92)	0.001 (0.19)	0.014** (2.16)	0.001 (0.22)	0.014** (2.23)
Voting Power	0.002 (0.31)	-0.004 (-0.53)	0.002 (0.39)	-0.004 (-0.43)	0.002 (0.41)	-0.004 (-0.43)
MKR Holdings	0.016* (1.69)	0.029*** (3.26)	0.016 (1.66)	0.029*** (3.22)	0.016* (1.69)	0.029*** (3.22)
Constant	0.335*** (9.96)	-0.374 (-0.79)	0.328*** (8.61)	-0.433 (-0.90)	0.326*** (8.74)	-0.456 (-0.94)
Delegate FE	No	Yes	No	Yes	No	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1713	1703	1674	1664	1674	1664
Adj. R^2	0.104	0.117	0.104	0.119	0.105	0.120
vce	Delegate	Delegate	Delegate	Delegate	Delegate	Delegate

Table 7
Delegate Topic Experience and Vote Correctness

The table presents delegate-poll level regressions of delegates' vote correctness on their experience in the poll topics. The dependent variable, *Correct*, is a dummy variable which equals one if the delegate's vote in one poll is correct and zero otherwise. The main independent variable is *Topic Experience*, which is the historical count of participations in proposals with the same topic tags as the current proposal. For proposals with multiple tags, we calculate the average count. Definitions of the variables are in Appendix A. Delegate individual fixed effect is included in Model (1). Year-month fixed effect is added in Model (2). T-statistics adjusted for heteroscedasticity and clustered at delegate level are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively.

Dep. Var.	Correct	
	(1)	(2)
ln(1+Topic Experience)	**0.053***	**0.044**
	(2.77)	(2.13)
High Impact	-0.024	-0.031*
	(-1.27)	(-1.67)
Days to Expire	0.001***	-0.001
	(2.94)	(-0.49)
Vote Early	-0.141***	-0.101**
	(-3.62)	(-2.60)
Num of Delegators	-0.006	0.000
	(-1.21)	(0.11)
Voting Power	-0.000	-0.001
	(-0.02)	(-0.26)
MKR Holdings	0.022***	0.028***
	(5.52)	(6.24)
Constant	0.278***	0.614*
	(2.87)	(1.69)
Delegate FE	Yes	Yes
Month FE	No	Yes
Observations	4936	4936
Adj. R^2	0.045	0.127
vce	Delegate	Delegate

Table 8
Delegate's Expertise and Timing of Votes

The table presents delegate-poll level regressions of delegates' vote time choice on their experience. The dependent variable, *Vote Early*, is the duration between a delegate's vote and the end of the poll, normalized by the total voting duration from the poll's start to its conclusion. In Model (1), *Topic Experience*, is the historical count of participations in proposals with the same topic tags as the current proposal. For proposals with multiple tags, we calculate the average count. In Model (2), *Token Experience* is the ratio of the number of unique tokens mentioned in the proposal discussion and had been held by the delegate ("expertise token") to the total number of unique tokens in the delegate's portfolio prior to the time of voting (excluding those currently held by the delegate). In Model (3), *Holding Value*, is the average dollar value of tokens that have been held by the delegate and mentioned in discussion posts. In Model (4), *Portfolio Weight*, is the average portfolio ratio of the dollar value of tokens held by the delegate and mentioned in discussion posts. Definitions of the variables are in Appendix A. Delegate individual fixed effect and Year-month fixed effect are added in all models. T-statistics adjusted for heteroscedasticity and clustered at delegate level are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively.

Dep. Var.	Vote Early			
	(1)	(2)	(3)	(4)
ln(1+Topic Experience)	**0.058*****			
	(4.72)			
Token Experience		**0.019**		
		(0.40)		
ln(1+Holding Value)			**0.006***	
			(1.95)	
Portfolio Weight				**0.069**
				(1.62)
High Impact	0.012	0.021	0.019	0.019
	(1.24)	(1.27)	(1.13)	(1.13)
Days to Expire	0.007***	0.007***	0.007***	0.007***
	(8.87)	(3.59)	(3.50)	(3.50)
MKR Holdings	0.001	0.003	0.004	0.004
	(0.14)	(0.30)	(0.33)	(0.33)
Voting Power	-0.001	0.013	0.013	0.014*
	(-0.29)	(1.61)	(1.67)	(1.70)
Constant	-1.215***	-1.078**	-1.042**	-1.051**
	(-6.68)	(-2.58)	(-2.49)	(-2.49)
Delegate FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
Observations	4936	1703	1664	1664
Adj. R^2	0.337	0.377	0.372	0.371
vce	Delegate	Delegate	Delegate	Delegate

Table 9

Delegate Vote Correctness and Future MKR Returns

The table presents the weekly regressions of MKR returns on the average delegate vote correctness in the previous week. The dependent variable is *Weekly Abnormal Returns* of MKR. The 1F indicates that the abnormal return (both the weekly and the daily used to define voting correctness) is the residual from Crypto-CAPM model. The 2F indicates that the abnormal return is the residual from a 2-factors (CMKT, CSMB) model. The 3F indicates that the abnormal return is from a 3-factors (CMKT, CSMB. CMOM) model. In Model (1) to (4), the voting correctness is defined on the daily abnormal return of MKR on the pivotal vote date, but Model (5) uses 2-day window CAR[0,+1] to define voting correctness. The main independent variable is last week's *Delegates' Correctness*, which is the voting power weighted average of delegates' voting correctness over last week. Definitions of the variables are in Appendix A. Year fixed effect is included. T-statistics adjusted for heteroscedasticity are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively.

Dep. Var.	Weekly Abnormal Returns			
	1F	2F	3F	1F, 2Days
	(1)	(2)	(3)	(4)
Delegates' Correctness	**0.109****	**0.098****	**0.080****	**0.093*****
	(2.60)	(2.25)	(2.06)	(2.97)
Num of Polls	-0.002	-0.001	-0.001	-0.001
	(-1.02)	(-0.70)	(-0.58)	(-0.60)
Num of Votes	-0.000	-0.000	-0.000	0.000
	(-0.60)	(-0.63)	(-0.44)	(0.08)
Num of High Impact	-0.003	-0.003	-0.004	-0.003
	(-0.50)	(-0.54)	(-0.71)	(-0.46)
Ordinary Voters' Correctness	-0.015	-0.008	0.018	0.005
	(-0.41)	(-0.22)	(0.51)	(0.18)
Constant	-0.004	-0.004	-0.013	-0.026
	(-0.19)	(-0.19)	(-0.61)	(-0.91)
Year FE	Yes	Yes	Yes	Yes
Observations	87	87	87	87
Adj. R^2	0.091	0.069	0.073	0.084
vce	Robust	Robust	Robust	Robust

Appendix A: Variable Definition

Variable	Definition
Delegate-Vote Date Level:	
Correct Vote	The ratio of the number of correct votes to the number of proposals the delegate participates in on the vote date.
MKR Increase	Dummy variable that equals 1 if the delegation amount change in the 30 days after the delegate's vote is positive, and 0 otherwise
Delegator Increase	The number of MKR holders who give new delegation minus the number of delegators who withdraw their delegation from the delegate.
Delegate Growth	The ratio of the net change in the MKR delegation amount within 30 days after the vote date to the delegate's existing MKR delegation amount on the vote date. It is winsorized at the 90th percentiles.
Num of Delegators	The number of MKR holders who give his voting rights to the delegate before the vote time.
Prev Delegate Growth	The ratio of the delegation amount changes in the 30 days before the vote date over the delegation amount 30 days earlier. It is winsorized at 90^{th}.
Participation	The number of proposals participated by the delegate on the vote date.
Days to Expire	The number of days for the delegate left from current vote date to the delegation contract expiration date.
Num of High Impact	The number of High Impact tagged proposal on the vote date
Vote Early	The proportion of the voting period remaining after the delegate casts his vote, calculated as the ratio of the time interval from the moment of the delegate's vote to the end of the voting period, divided by the total duration of the voting period.
ln(1+MKR Holdings)	The dollar value of the delegate's MKR holdings on the vote date. In regression, we use the logarithm of this value plus one to ensure that the measure equals zero when the delegate has no holding of MKR.
Delegate-Poll Level:	
Correct	Dummy variable that equals one if the delegate casts a correct vote.
ln(1+Topic Experience)	The historical count of participations in proposals with the same tags as the current proposal, excluding those labeled as High Impact, Medium Impact, and Low Impact. For proposals with multiple tags, we calculate the average count. In the regression, we use the logarithm of this value plus one. This transformation ensures that the measure equals zero when there has been no prior voting participation in proposals with related tags.
Token Experience	The ratio of the number of unique tokens mentioned in the proposal discussion and had been held by the delegate ("expertise token"), to the total number of unique tokens in the delegate's portfolio prior to the time of voting (excluding those currently held by the delegate). A token name is matched when either the full name is found in the discussion (for token with single word name) or at least 2 parts of the name are found.
ln(1+Holding Value)	The average dollar value of tokens that have been held by the delegate and mentioned in discussion posts. For each token, the dollar value is calculated as the mean of its daily historical holdings.

Variable	Definition
Portfolio Weight	The average percentage of the dollar value of tokens held by the delegate and mentioned in discussion posts. For each token, this percentage is calculated as the historical mean of the daily ratio of its dollar value to the total value of all token holdings.
Conflicted Dummy	A dummy that equals 1 if the delegate holds any interest-conflicted tokens on the vote date.
Aligned Dummy	A dummy that equals 1 if the delegate holds any interest-aligned tokens (exclude MKR itself) on the vote date.
Aligned Number	The number of interest-aligned tokens in the delegate *d*'s holdings on the vote date for proposal *p*.
Conflicted Number	The number of interest-conflicted tokens in the delegate *d*'s holdings on the vote date for proposal *p*.
Aligned Ratio	The ratio of *Aligned Number* divided by the number of tokens held by the delegate on the vote date.
Conflicted Ratio	The ratio of *Conflicted Number* divided by the number of tokens held by the delegate on the vote date. The baseline is interest uncorrelated.
Weekly Level:	
Return	The weekly return of MKR.
Abnormal Return	The weekly adjusted return of MKR. It is the residual of the Crypto-CAPM model, $r_{i,t} - r_{f,t} = \alpha_i + \beta_i\, CMKT_t + \epsilon_i$, following Liu, Tsyvinski, and Wu (2022).
Delegates' Correctness	Weekly voting power weighted average of delegates' voting correctness.
Ordinary MKR Voters' Correctness	Weekly voting power weighted average of ordinary MKR voters' voting correctness.
Num of Votes	The total count of voting participation during a week.
Num of Polls	The number of proposals under voting in a week.
Num of High Impact	The number of proposals with tag "High Impact" under voting in a week.
Conflicted Number	The number of conflicted tokens held by the delegate on the vote date.
Aligned Number	The number of aligned tokens (exclude MKR itself) held by the delegate on the vote date.
Ln(1+Conflicted Holding Value)	The logarithm of the dollar value of the interest-conflicted tokens held by the delegate on the vote date.
ln(1+Aligned Holding Value)	The logarithm of the dollar value of the interest-aligned tokens (exclude MKR itself) held by the delegate on the vote date.
Voting Power (%)	The ratio of MKR shares voted by the delegate to the total number of MKR shares voted in the poll.
Delegate-Level:	
Shadow	Dummy variable that equals 1 if the delegate is shadow, otherwise, 0.

Appendix B: Additional Figures and Tables

Figure B1
Liquidation Mechanism When the Collateral Value Crashes

This figure illustrates MakerDAO's loan liquidation process in the event of a significant drop in collateral value, causing the collateral-to-debt ratio to fall below the required threshold (for example, the threshold ratio is 1.5 when using ETH as collateral). In Case 1, where the collateral value is sufficient to cover the debt, a Collateral Auction is conducted, allowing external participants to bid for the collateral. After the debt is fully repaid, a portion of the remaining proceeds is allocated to the Maker Buffer, with any leftover returned to the borrower. In Case 2, where the collateral value is insufficient to cover the debt, a Collateral Auction is conducted, but the proceeds are inadequate to fully repay the debt. The remaining deficit is covered by the DAI reserves in the Maker Buffer. However, if the shortfall persists, a Debt Auction is initiated. In this process, new MKR tokens are minted and sold to cover the deficit, effectively recapitalizing MakerDAO but at the cost of diluting existing MKR holdings.

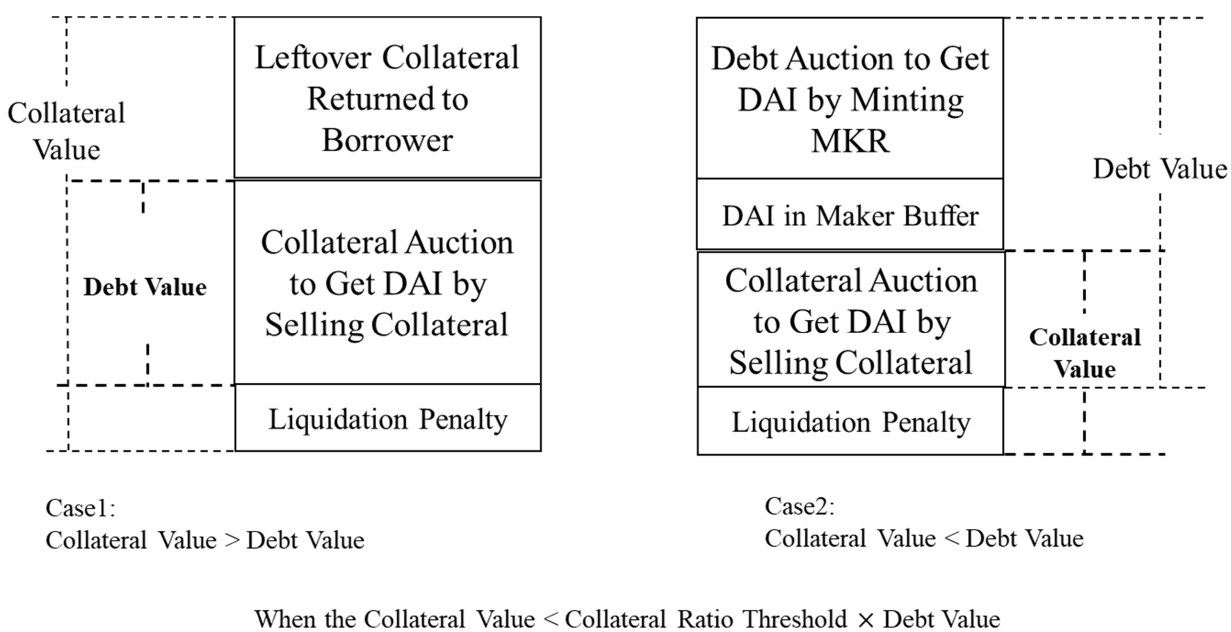


Figure B2
PSM Inflows and Outflows after Execution of Poll 665

The figure illustrates the PSM inflows, outflows, and net balance (calculated as outflows minus inflows) around Poll 665. There is a substantial increase in PSM volume, with both inflows and outflows rising significantly. The net balance experiences a temporary decrease but gradually returns to its previous level.

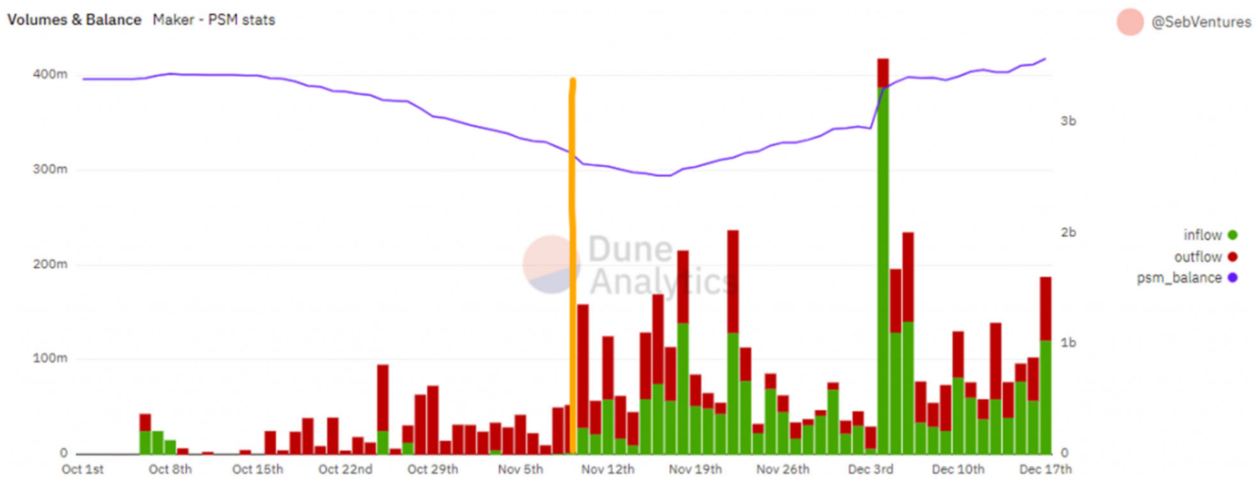


Figure B3
DAI's Peg to US Dollar Around Poll 665

The figure shows Dai's peg with US dollar around the days of Poll 665 voting. The DAI price peg remains stable after November compared to fluctuations observed in October.

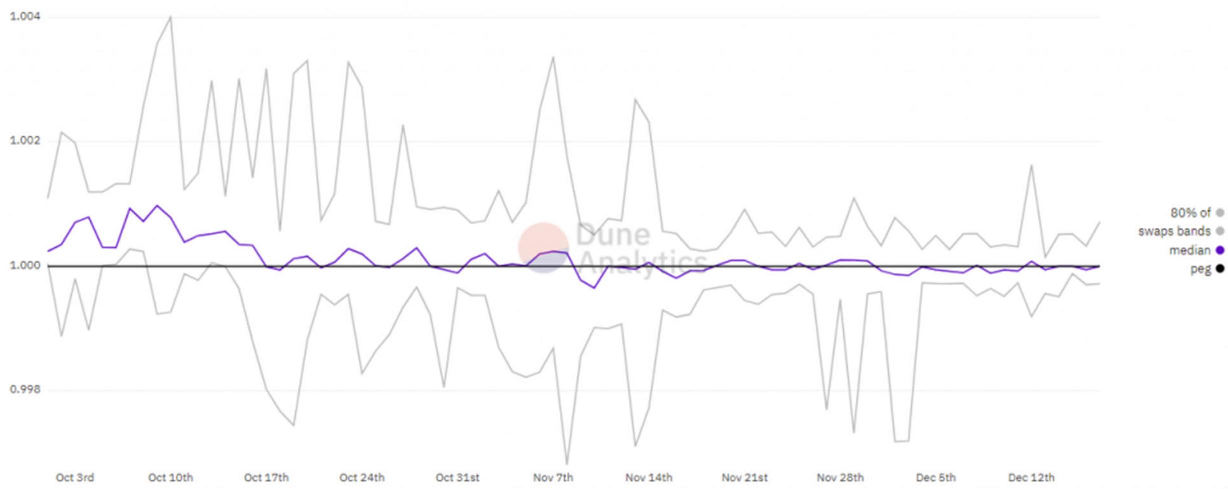


Table B1
Prompt Used to Obtain Sentiment Label from Gemini

This table displays the prompt used to instruct Gemini in assigning sentiment labels to each discussion post. The prompt specifies the task, details the elements to be returned, and provides guidelines for Gemini to consider during the classification process.

Prompt
* Task: Analyze the sentiment expressed in each discussion post from the MakerDAO forum, considering the context provided by the proposal content. * Guidelines: * Contextual Analysis: Consider the proposal content when interpreting the sentiment of each discussion post. The same phrase might convey different sentiments depending on the proposal's specific details. * Score: For each discussion post, provide a sentiment score in a range of 0 to 1: - 0: Extremely negative sentiment. - 0.5: Neutral sentiment. - 1: Extremely positive sentiment. * Explanation: Justify the assigned score using no more than 20 words. Do not include any quotation marks in explanation. * Pay attention to: - The relationship between the post's content and the proposal's details. - Distinguish between objective statements, questions, and subjective opinions. A post can be neutral if it primarily presents factual information, summaries or requests input without expressing strong personal opinions. - Citations: - Citations from other posts are marked by four newlines (\n) before and three newlines after the quoted text. - After the citation, the current discussant expresses their opinion. - Ensure your sentiment analysis is based on the discussant's own opinion, not the quoted content. Use this JSON schema: Sentiment = {'index':int, 'sentiment_score': int,'explanation':str} Return: list[Sentiment]

Table B2
Sentiment Labeling of Discussion Posts: Examples

The table presents three example posts labeled by Gemini for Poll 655, along with their assigned sentiment scores. The sentiment score takes the value of 0 (negative), 0.5 (neutral), or 1 (positive), where higher scores indicate more positive sentiment. The first example is a supportive post, labeled with a sentiment score of 1 given by Gemini. The second example suggests a compromise solution, resulting in a sentiment score as 0.5. The third example is an opposing post, assigned a sentiment score of 0.

Index	Discussion Post	Score	Explanation
1	**Strongly support this, obviously. I believe this is the biggest way** we are currently shooting ourselves in the foot on a daily basis when it comes to momentum and growth. 4 million in revenue, or whatever, is nothing compared to allowing Dai to be a viable alternative to USDC and other centralized stablecoins. There's also the context that a lot of large scale collateral solutions are finally seeing the light of day, like staked ETH, the direct deposit module for aave, and real world assets / backbone collateral such as corporate bonds, so the short term growth in USDC exposure should be seen as a positive rather than a negative, since it means more capital available at 0% cost that we can allocate to other assets and earn profits from. IMO we cannot afford to drop the ball on this so I will follow this up with a MIP that would allow MKR holders to have the final say on this, should the forum process block it. Again, this is the biggest way we are shooting ourselves in the foot on a daily basis - seeing Dai left out of solutions that include all other stablecoins, and also letting people think of Dai differently as simply a "not-quite-stable" coin rather than a real 1:1 USD stablecoin. **It is really a quantum leap in terms of Dais role in the market and we shouldn't let it be delayed longer than the quickest our governance processes will allow.** as an example I learned a while back that most OTC desks have special markets they call 1:1 markets for stablecoins like USDC and other things where there is a 1:1 arbitrage available somewhere. Since Dai doesn't have the 1:1 arb, it doesn't get this kind of treatment and most OTC desks instead consider it a volatile cryptocurrency, using different, more complicated and more expensive processes to price it and make it available to their users. This has forced me to use USDC over Dai in multiple transactions in the past because it creates a significant friction and inefficiency, especially at larger scale.	1	Strongly supports this proposal, seeing it as beneficial for Dai.
2	**I'm in favor of lowering the fees for PSM, but would prefer an intermediate option instead of going all the way to 0%.** Maybe starting with 0.05% fee in, 0% fee out, and then reassessing for further reductions (potentially all the way to 0%) after a month. Another option we could consider is "centering" the peg around 1% by reducing fee in but increasing fee out slightly above 0%. For example we could charge 0.025% for both fee in and fee out, which would result in a 0.05% spread / round trip fee from USD	0.5	Suggests a compromise: gradual fee reduction instead of complete removal.

	to DAI and back, but would create market conditions where the peg would trade right around 1:1 most of the time and never more than 2.5 bps away from peg (versus up to 10 bps off peg currently). This preserves our ability to earn some revenues from stablecoin swaps (maybe even growing revenues if we see a lot more volume), and also ensures we don't negatively impact Curve pools which serve as an important driver of DAI demand.		
3	The fees in the PSM serve several purposes that keep the system from going off of the rails. The PSM module was deployed to help take on as only as many 3rd-party stablecoins as necessary to get Dai's peg back down to an "acceptable" level after a market downturn. It's stated purpose was to be able to take the hit from a market crash and get enough Dai on the market at a reasonable price to let vaultholders cover their positions. **Moving the TIN to 0% means that we will take on to our books all of our competitors stablecoins until that market is completely saturated.** According to the market, Dai is objectively more valuable than the other stables. **I like to think it's subjectively because we're censorship resistant, but Dai's value will only equal other stablecoins when we've cut enough corners on issuance to counteract it's real benefits vs. other stables.** PE has been working for the last year and a half on various solutions to get USDC and other regulated stablecoins off of the books, and **this does the exact opposite of that.** Maker governors should be prepared to take on many multiples of the current portfolio regulated stablecoins if this is adopted. Having the PSM's full or at even greater percentages of Dai backing than what we're currently seeing is going to **limit the appetite to take on more stables in a market crisis** (when we need it the most). Without any spread, there's no limit to how much stable risk the protocol takes on, and zero friction for anyone looking to pass that risk to us. **We would be taking on blacklist, technical, and insider risks for 0 premium in an environment where we absolutely can and should expect to be rugged on these tokens. This is a short-term fix that exacerbates a long-term problem.** There are also **potential legal considerations** around this change, which is why the Foundation did not want to touch the PSM. I'd strongly recommend getting a legal core unit to weigh in on the implications here.	0	Argues against the proposal, highlighting risks and potential negative consequences.

Table B3

Robustness Test: Using 2 or 3 Factor Model to Estimate Abnormal Returns for Table 3

This table presents the robustness tests of Table 3 to test whether the delegate will be properly rewarded if he casts correct votes. In this table, following Liu, Tsyvinski, and Wu (2022), we construct 2 additional factors: CSMB (small minus big) and CMOM (3-day momentum) to get the abnormal returns adjusted by 2-factor (Model (1), (4) and (7)) or 3-factor model (Model (2), (5) and (8)). Additionally, in Model (3), (6) and (9), we focus on a 2-day window after the pivotal vote date. All models use delegate and year-month fixed effects. T-statistics adjusted for heteroscedasticity and clustered at delegate level are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively.

Dep. Var.	MKR Increase			Delegator Increase			Delegate Growth		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Correct Vote (2F)	**0.046****			**0.197****			**0.027**		
	(2.12)			**(2.58)**			**(1.28)**		
Correct Vote (3F)		**0.045****			**0.168****			**0.024**	
		(2.14)			**(2.45)**			**(1.21)**	
Correct Vote (1F, 2Days)			**0.034***			**0.164***			**0.029**
			(1.78)			**(1.83)**			**(1.36)**
Days to Expiration	0.003***	0.003***	0.003***	0.002***	0.002***	0.002***	0.001***	0.001***	0.001***
	(16.48)	(16.48)	(16.55)	(3.55)	(3.55)	(3.53)	(2.70)	(2.70)	(2.71)
Prev Delegate Growth	-0.064***	-0.064***	-0.064***	-0.124	-0.125	-0.122	-0.073**	-0.073**	-0.072**
	(-2.93)	(-2.92)	(-2.97)	(-1.62)	(-1.63)	(-1.62)	(-2.43)	(-2.43)	(-2.42)
Num of Delegators	-0.027**	-0.027**	-0.027**	-0.401***	-0.400***	-0.401***	-0.038***	-0.037***	-0.037***
	(-2.51)	(-2.51)	(-2.49)	(-8.95)	(-8.96)	(-8.96)	(-2.96)	(-2.96)	(-2.94)
Num of High Impact	0.005	0.005	0.006	0.027*	0.025*	0.028*	0.009	0.009	0.009
	(1.40)	(1.33)	(1.47)	(1.89)	(1.81)	(1.96)	(1.56)	(1.54)	(1.61)
Voting Power	-0.002	-0.001	-0.002	0.049**	0.049**	0.049**	-0.025***	-0.025***	-0.025***
	(-0.37)	(-0.36)	(-0.38)	(2.07)	(2.06)	(2.05)	(-4.91)	(-4.91)	(-4.93)
MKR Holdings	-0.003	-0.003	-0.003	0.007	0.007	0.008	-0.016	-0.016	-0.016
	(-0.19)	(-0.20)	(-0.17)	(0.11)	(0.12)	(0.14)	(-0.93)	(-0.93)	(-0.92)
Constant	0.109*	0.109*	0.114*	1.382***	1.397***	1.398***	0.227***	0.228***	0.225***
	(1.79)	(1.81)	(1.94)	(6.09)	(6.18)	(6.00)	(3.48)	(3.50)	(3.57)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Delegate FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1768	1768	1768	1768	1768	1768	1768	1768	1768
Adj. R^2	0.518	0.518	0.517	0.311	0.310	0.310	0.412	0.412	0.412
vce	Delegate	Delegate	Delegate	Delegate	Delegate	Delegate	Delegate	Delegate	Delegate

Table B4

Robustness Test: Using Alternative Measure of Correct for Table 3

This table presents the robustness tests of Table 3 to test whether the delegate will be properly rewarded if he casts correct votes. In Table 3, the key independent variable is *Correct Vote*, which is the ratio of correct choices in all poll participations on one vote date. While in this table, we use *Net Num of Correct*, which is the number of correct votes minus the number of wrong votes. All models use delegate and year-month fixed effects. T-statistics adjusted for heteroscedasticity and clustered at delegate level are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively.

Dep. Var.	MKR Increase	Delegator Increase	Delegate Growth
	(1)	(2)	(3)
Net Num of Correct	**0.007****	**0.025****	**0.004**
	(2.23)	**(2.17)**	**(1.08)**
Days to Expiration	0.003***	0.002***	0.001***
	(16.49)	(3.56)	(2.72)
Prev Delegate Growth	-0.064***	-0.122	-0.073**
	(-2.90)	(-1.59)	(-2.41)
Num of Delegators	-0.027**	-0.400***	-0.037***
	(-2.50)	(-8.98)	(-2.96)
Num of High Impact	0.007*	0.032**	0.010
	(1.76)	(2.21)	(1.61)
Voting Power	-0.002	0.049**	-0.025***
	(-0.39)	(2.04)	(-4.93)
MKR Holdings	-0.003	0.008	-0.016
	(-0.19)	(0.12)	(-0.93)
Constant	0.129**	1.469***	0.238***
	(2.24)	(6.54)	(3.81)
Month FE	Yes	Yes	Yes
Delegate FE	Yes	Yes	Yes
Observations	1768	1768	1768
Adj. R^2	0.518	0.310	0.412
vce	Delegate	Delegate	Delegate

Table B5
Robustness Test: Using Samples after Aligned Voter Committee (AVC)

This table presents the robustness tests of Table 3 to test whether the delegate will be properly rewarded if he casts correct votes. This table focuses on a subperiod which starts from April, 2023 when MakerDAO starts a new delegation scheme. All models use delegate individual and year-month fixed effects. T-statistics adjusted for heteroscedasticity and clustered at delegate level are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively.

Dep. Var.	MKR Increase	Delegator Increase	Delegate Growth
	(1)	(2)	(3)
Correct Vote	**0.075*** **	**0.300*** **	**0.092** **
	(2.74)	**(3.90)**	**(2.47)**
Days to Expiration	0.002***	0.001***	0.000
	(11.51)	(3.15)	(0.99)
Prev Delegate Growth	-0.075***	-0.159***	-0.075***
	(-2.90)	(-2.73)	(-2.91)
Num of Delegators	-0.132***	-0.476***	-0.139***
	(-4.43)	(-5.06)	(-4.12)
Num of High Impact	0.011	0.033	0.014
	(1.19)	(1.05)	(0.90)
Voting Power	-0.012**	0.024	-0.043***
	(-2.12)	(0.75)	(-4.04)
MKR Holdings	-0.023***	-0.017	-0.014**
	(-3.49)	(-1.09)	(-2.12)
Constant	0.204***	0.648***	0.320***
	(3.25)	(2.81)	(3.59)
Month FE	Yes	Yes	Yes
Delegate FE	Yes	Yes	Yes
Observations	485	485	485
Adj. R^2	0.534	0.476	0.472
vce	Delegate	Delegate	Delegate

Table B6

Illustration of Conflicted and Aligned Dummy Construction

This table presents seven examples of the *Conflicted Dummy* and *Alignment Dummy* between MKR and Token X. For Proposal Polls A, B, and C, the market reactions of either MKR or Token X on the pivotal vote date fall within 10% to 90% range of their corresponding distribution. This pattern suggests that MKR and Token X are uncorrelated in the context of Proposals A, B, and C. Conversely, in Proposals D and E, both MKR and Token X exhibit market reactions in either their respective lower or upper 10% ranges. This alignment in the market reactions implies that MKR and Token X share interest alignment under these proposals, in which the *Alignment Dummy* will take 1 but *Conflicted dummy* takes 0. Under Proposal F and G, if MKR (Token X) is in its own upper 10%, then Token X (MKR) is found in its own lower 10%, which indicates an interest Conflicted relationship between MKR and Token X under these proposals, in which case *Conflicted Dummy* takes 1 but *Alignment Dummy* takes 0.

	Poll A	Poll B	Poll C	Poll D	Poll E	Poll F	Poll G
MKR Market Reaction	>10% and <90%	<10%	>10% and <90%	<10%	>90%	>90%	<10%
Token X Market Reaction	>90%	>90% and <10%	>10% and <90%	<10%	>90%	<10%	>90%
Conflicted Dummy	0	0	0	0	0	1	1
Alignment Dummy	0	0	0	1	1	0	0

Table B7

Robustness Test for Table 5: Using Alternative Measure for Conflicted Incentives

This table shows robustness test for Table 5 that to confirm the evidence of agency problem by considering the token holding value for a delegate on the vote date. The regression is conducted on delegate-poll level. The dependent variable is *Correct* Dummy. The independent variables *Conflicted (Align) Holding Value* is the logarithm of the dollar value of the interest-Conflicted (aligned) token (Excluding MKR itself) held by the delegate on the vote date. Model (1) includes year-month fixed effect and Model (2) adds delegate fixed effect. T-statistics adjusted for heteroscedasticity and clustered at delegate level are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively.

Dep. Var.	Correct	
	(1)	(2)
Conflicted Holding Value	**-0.019***	**-0.018****
	(-1.85)	**(-2.39)**
Align Holding Value	0.016**	0.009
	(2.19)	(1.17)
High Impact	0.009	0.038
	(0.23)	(0.96)
Days to Expire	0.000	0.002
	(0.20)	(0.79)
Vote Early	-0.059	-0.050
	(-0.89)	(-0.80)
Num of Delegators	-0.013*	-0.010
	(-1.88)	(-0.94)
Voting Power	-0.002	-0.001
	(-0.37)	(-0.33)
MKR Holdings	0.017**	0.030***
	(2.19)	(3.03)
Constant	0.504***	0.092
	(5.86)	(0.18)
Delegate FE	Yes	Yes
Month FE	No	Yes
Observations	1452	1451
Adj. R^2	0.055	0.131
vce	Delegate	Delegate

Table B8

Tokens Mentioned in the Discussion Forum

This Table lists the names of tokens (excluding MKR, DAI, and ETH) that are mentioned in the MakerDAO proposal forum discussions, specifically those instances where the token's name are present. The mostly mentioned tokens include stablecoins like USDC and Gemini Dollar. Both of them also serve as collateral on MakerDAO. It also includes MakerDAO's competitors in DeFi lending platform like Aave, Compound and Nexo. It also includes collateral tokens like Rocket Pool ETH, WETH as well as some DeFi exchanges like Uniswap and Sushiswap.

Token Name	**Type and Relationship with MakerDAO**
USD Coin	Stablecoin, Collateral on MakerDAO
Tether	Stablecoin
Gemini Dollar	Stablecoin, Collateral on MakerDAO
Compound	MakerDAO's Competitor in DeFi Lending
Nexo	MakerDAO's Competitor in DeFi Lending
Uniswap	Decentralized Exchange Uniswap's Governance Token
Sushiswap	Decentralized Exchange Sushiswp's Governance Token
1inch	Decentralized Exchange 1inch's Governance Token
3Crv	Decentralized Exchange Curve's Liquidity Provider Token
Chainlink	Oracle. Update DAI and Collateral Market Price for MakerDAO
stETH	Wrapped Token. Collateral on MakerDAO
Rocket Pool ETH	Wrapped Token. Collateral on MakerDAO
WETH	Wrapped Token. Collateral on MakerDAO
HOP	Multi-Chain Bridge. MakerDAO's Collaborator on Layer-2
Stargate Token	Multi-Chain Bridge. MakerDAO's Collaborator on Layer-2
Lido DAO Token	Lido DAO's Governance Token. stETH is its product
Gitcoin	Gitcoin DAO's Governance Token
Gnosis	Gnosis DAO's Governance Token. Collateral on MakerDAO
Curve DAO Token	Curve DAO's Governance Token

Table B9
Robustness Test: Using 2 or 3 Factor Model to Estimate Abnormal Returns for Table 6

This table presents the robustness tests of Table 4. In this table, we define correct vote choice based on the abnormal returns adjusted by either 2-factor (Model (1) to (3)) or 3-factor model (Model (4) to (6)). Additionally, in Model (7), (8) and (9), we focus on a 2-day window after the pivotal vote date. All models use delegate and year-month fixed effects. T-statistics adjusted for heteroscedasticity and clustered at delegate level are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively.

Dep. Var.	Correct								
	2F			3F			1F, 2 Days		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Token Experience	**0.289**** **(2.52)**			**0.292**** **(2.54)**			**0.152** **(1.47)**		
Holding Value		**0.007*** **(1.74)**			**0.006** **(1.45)**			**0.009***** **(2.79)**	
Portfolio Weight			**0.114**** **(2.59)**			**0.108**** **(2.49)**			**0.105**** **(2.03)**
High Impact	0.019 (0.58)	0.022 (0.65)	0.022 (0.66)	-0.007 (-0.26)	-0.005 (-0.17)	-0.005 (-0.17)	0.058* (1.93)	0.056* (1.79)	0.056* (1.78)
Days to Expire	0.003 (1.45)	0.003 (1.55)	0.003 (1.58)	0.003 (1.60)	0.004* (1.68)	0.004* (1.72)	0.002 (0.83)	0.002 (0.89)	0.002 (0.91)
Vote Early	0.003 (0.03)	0.003 (0.04)	0.003 (0.04)	-0.003 (-0.04)	-0.002 (-0.03)	-0.003 (-0.03)	0.038 (0.54)	0.034 (0.49)	0.036 (0.51)
Num of Delegators	0.013* (1.85)	0.014** (2.04)	0.014** (2.11)	0.011* (1.74)	0.012* (1.94)	0.012** (2.00)	0.014* (1.76)	0.015* (1.74)	0.015* (1.79)
Voting Power	-0.004 (-0.54)	-0.004 (-0.42)	-0.004 (-0.42)	-0.007 (-0.89)	-0.006 (-0.74)	-0.006 (-0.74)	-0.002 (-0.37)	-0.000 (-0.03)	-0.000 (-0.03)
MKR Holdings	0.014 (1.37)	0.015 (1.37)	0.015 (1.37)	0.027*** (3.02)	0.027*** (3.02)	0.027*** (3.03)	-0.012 (-0.79)	-0.011 (-0.75)	-0.012 (-0.75)
Constant	-0.290 (-0.64)	-0.355 (-0.77)	-0.379 (-0.81)	-0.343 (-0.75)	-0.399 (-0.85)	-0.423 (-0.90)	-0.092 (-0.20)	-0.123 (-0.28)	-0.136 (-0.30)
Delegate FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1703	1664	1664	1703	1664	1664	1703	1664	1664
Adj. R^2	0.130	0.134	0.134	0.099	0.101	0.102	0.241	0.242	0.242
vce	Delegate	Delegate	Delegate	Delegate	Delegate	Delegate	Delegate	Delegate	Delegate

Table B10

Robustness Test: Using 2 or 3 Factor Model to Estimates Abnormal Returns for Table 7

This table presents the robustness tests of Table 5 to test whether delegates with expertise on related topics can improve voting performance. In this table, we define correct vote choice based on the abnormal returns estimated by either 2-factor (Model (1)) or 3-factor model (Model (2)). Additionally, in Model (3), we focus on a 2-day window after the pivotal vote date. All models control for delegate and year-month fixed effects. T-statistics adjusted for heteroscedasticity and clustered at the delegate level are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% level, respectively.

Dep. Var.	Correct		
	2F	3F	1F, 2Days
	(1)	(2)	(3)
Topic Experience	**0.037**	**0.048****	**0.008**
	(1.61)	**(2.20)**	**(0.91)**
High Impact	-0.060***	-0.069***	-0.043**
	(-3.29)	(-3.87)	(-2.27)
Days to Expire	0.001	0.001	0.001
	(0.38)	(0.52)	(0.63)
Vote Early	-0.091**	-0.106***	-0.029
	(-2.42)	(-2.88)	(-0.82)
Num of Delegators	0.002	0.000	0.008
	(0.45)	(0.08)	(1.50)
Voting Power	-0.002	-0.002	-0.003*
	(-0.82)	(-1.15)	(-1.67)
MKR Holdings	0.017**	0.025***	-0.001
	(2.53)	(5.43)	(-0.08)
Constant	0.374	0.321	0.276
	(1.16)	(0.96)	(1.02)
Delegate FE	Yes	Yes	Yes
Month FE	Yes	Yes	Yes
Observations	4936	4936	4936
Adj. R^2	0.156	0.140	0.274
vce	Delegate	Delegate	Delegate

Appendix C: Validation for the Classification of Value-Enhancing vs. Value-Destroying Proposals

The classification of value-enhancing vs. value destroying proposals in our paper is novel. To bolster the confidence in our approach, we use both a case study and a text-based sentiment analysis as validity check.

For a case study, we revisit Poll 665, which proposes reducing the swap transaction fees from DAI to USDC to zero.[19] This initiative aims to enhance the stability of DAI's peg to the US dollar by enabling seamless and cost-free swaps between USDC and DAI. However, this approach carries certain risks, particularly an increased exposure to USDC, which is subject to censorship risk due to its reliance on centralized reserves to maintain its peg. Additionally, the elimination of fees could result in a reduction of revenue generated from Peg Stability Module (PSM) transactions. Thus, this proposal represents a strategic trade-off between enhancing liquidity and peg stability while managing the associated risks of heightened exposure to centralized assets. As discussed in the previous section, this proposal is classified as *value-enhancing* by our approach, given the prevailing "Yes" vote and the positive abnormal return of MKR on the pivotal vote date.

To evaluate the consequences of this proposal, a crypto analyst examines the performance of the Peg Stability Module (PSM) following the implementation of the proposal. As shown in Figure B2 in Appendix B, there is a substantial rise in PSM volume, with daily inflows and outflows reaching historically high levels. This rise enhances liquidity and contributes to a more stable DAI peg, thereby confirming the realization of the proposed benefits. Additionally, Figure B2 shows that the PSM balance only experiences a temporary decrease before recovering to its previous levels, indicating that net exposure to USDC is not as large as initially anticipated.

Furthermore, Figure B3 in Appendix B further shows that DAI's price peg remains stable, especially when compared to the fluctuations observed in October, successfully achieving the proposal's primary objective of maintaining a 1:1 peg with the U.S. dollar. The analyst emphasizes that "the reduction in fees facilitates smoother arbitrage opportunities," which helps stabilize DAI's

[19] The swap system in MakerDAO, known as the Peg Stability Module (PSM), is a mechanism designed to maintain the stable value of DAI by enabling direct swaps between DAI and other stablecoins, such as USDC, at a fixed exchange rate. The PSM allows users to exchange USDC for DAI (and vice versa) with minimal slippage, thereby supporting DAI's peg to the US dollar.

price by aligning it more closely with its intended peg.[20] Therefore, the subsequent developments validate our classification of Poll 665 as value-enhancing.

To further validate our classification approach systematically, we analyze the sentiment of forum discussions related to each proposal. For a proposal that is value-enhancing for MakerDAO, we would expect to observe positive sentiment in the corresponding discussion thread. To assess this, we utilize the Gemini-pro-latest API to label each discussion post as positive, negative, or neutral.[21] The prompt used to determine sentiment labels is detailed in Table B1 of Appendix B. In addition to assigning sentiment levels, we request that Gemini provide a rationale for its classifications. Table B2 in Appendix B presents three example posts from the discussion thread for Proposal 665, showcasing positive, neutral, and negative sentiments, along with Gemini's corresponding labels and reasonings.

To aggregate post-level sentiment to the proposal level, we first require that each proposal's discussion thread contains at least 20 posts, resulting in a sample of 71 proposals. Since a single discussant may comment multiple times, we first aggregate sentiments at the proposal-discussant level using a simple average to represent each discussant's overall opinion about the proposal. We then average these discussant sentiments to derive an overall sentiment at the proposal level. The sentiment score for Poll 665 is 0.64, indicating that it is generally viewed favorably by the discussants as a value-enhancing proposal. The overall correlation between the proposal-level discussion sentiment and our classification, which equals 1 for value-enhancing proposals and 0 for value-destroying proposals, is 30%, indicating that the discussants' opinions tend to align with our classification approach.

[20] For more details, see a crypto analyst report at https://cryptobanking.network/the-history-of-a-dai-at-par-value/.
[21] Gemini, developed by Google DeepMind, is a large language model (LLM) designed to compete with other advanced AI models like GPT-4.

Appendix D: MakerDAO Governance Changes in April 2023

In April 2023, MakerDAO experiences significant governance changes as part of its "Endgame Plan", which aims to further decentralize governance, improve efficiency, increase resilience, boost voter participation, and ensure long-term sustainability. The delegation scheme experiences five major changes.

First, Aligned Voter Committees (AVCs) are established within MakerDAO. These are groups of MKR holders that operate based on specific values and strategies. Recognized delegates, now referred to as Aligned Delegates (ADs), must join at least one AVC, while shadow delegates are not obligated to do so.

Second, ADs are divided into two groups: Prime Delegates (PDs) and Reserve Delegates (RDs). PDs are the delegates ranked highest by the number of MKR shares delegated to them and receive higher compensation than RDs. Once a delegate's status is determined, their monthly payment is based solely on their participation in voting and forum communication, following a structure similar to the previous system, where compensation gradually increases from 75% participation to a maximum at 95% participation.

Third, monthly compensation now consists of two components: MKR and DAI. The maximum monthly MKR payment is 13.75 MKR for PDs and 1.25 MKR for RDs. The maximum monthly DAI payment is $54,167 for PDs and $8,333 for RDs. The DAI payments provide a stable salary, while the volatile MKR component is designed to align delegates' incentives with the long-term value of MakerDAO.

Fourth, instead of directly transferring payments to delegates, compensation is accumulated as a budget in MakerDAO's treasury buffer accounts. Once a delegate has accrued at least one month's worth of income, they can submit a request to withdraw any amount below their accumulated savings each month.

Finally, all delegates, including ADs, are prohibited from disclosing their real-world identities. This measure aims to protect delegates from potential threats and reduce the bribery by making it harder for internal or external actors to identify them. A "whistleblower bounty" is simultaneously offered to anyone who can prove that a delegate has revealed their identity.

These changes can potentially affect the delegates' incentives to vote correctly in several ways. First, being part of an aligned voter committee may bind delegates' actions to the committee's shared missions and subject the delegates to peer monitoring. Second, while the number of MKR shares delegated to each delegate no longer directly factors into the compensation calculation, it determines which delegates are designated as prime delegates each month. The substantially higher compensation for prime delegates compared to reserve delegates can create powerful incentives for delegates to compete for the top prizes by securing more share delegation. This is akin to the tournament incentives in many other settings, such as sports, the asset management industry, and the managerial labor market. Third, the inclusion of MKR in the monthly compensation to delegates can further align their interests with MakerDAO's long-term value. Finally, the anonymity requirement can enhance delegates' independence and integrity, but it can also weaken delegates' incentives by lessening reputational costs.