Commitment voting: a mechanism for intensity of preference revelation and long-term commitment in blockchain governance

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Abstract: Commitment voting is a mechanism for signalling intensity of preferences and long-term commitment to governance decisions in proof of stake blockchains. In commitment voting, the voting weight of a vote in any given election is determined by 1) the amount of tokens under a voters control and 2) the time that the voter is willing to lock their tokens up for that election. Winning votes are locked up for the nominated amount of time. Losing votes are released as soon as the election has results. Commitment voting requires voters to commit to the decisions they make while still allowing those who disagree with the majority to exit the community.

1. Introduction

This paper presents *commitment voting* – a mechanism for variable time-weighted governance voting on blockchains that have staking or can implement other token lockup mechanisms. It is motivated by two concerns: 1) that governance systems need strong, credible signals of preference intensity that are not supplied in traditional one-token, one-vote approaches, and 2) that it is normatively desirable to favour the decisions of voters who are willing to stake their tokens for longer, as they are more invested in the future of the network.

In commitment voting, a voter's vote weight for any given election is a function of the amount of tokens under that voters control multiplied by the time they are willing to lock those tokens up. Voters 'bid' in elections by sacrificing token liquidity into a pool with others bidding liquidity out of their tokens to register votes. The bloc willing to bid the most liquidity out of their tokens (to lock them up for the longest) has signalled the strongest preference backed by the longest time commitment to the governance proposal under consideration.

Commitment voting reveals preference intensity, allows for both expressive voting, incentivises informed voting, directs political competition to socially desirable ends, and mitigates the risk of oligopoly and centralisation in blockchain governance. Commitment voting is incentive compatible, in that it is less costly to a party who believes that the governance decision will produce long run value.

2. Motivation

One of the major design problems for preference revelation mechanisms is determining how intense preferences are. In markets we use property rights and the price system to identify those preferences and

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allocate resources accordingly. Willingness-to-pay is used as an indication of preference intensity – the more a consumer is willing to sacrifice to obtain a resource, the more we expect they desire to acquire it.

For many non-market decisionmaking situations we use voting systems to identify preferences and arrive at collective decisions. One-person, one-vote (1p1v) decision making systems are common – they are simple to understand and operate, and are widely perceived as being equitable. 1p1v systems, however, do not reveal preference intensity. Nor do they necessarily reveal superior information. They weight a low-information or low-preference voter equally with a high information, high preference voter.

One high-profile modification to 1p1v systems to identify preference intensity is quadratic voting (Posner and Weyl 2015). Voters are able to increase their voting weight by paying for additional votes, priced quadratically to prevent wealthy voters from excessively dominating decision making. However, because of its reliance on stable fixed identities and collusion-detection (Allen, Berg and Lane 2019; Goodman and Porter 2020), quadratic voting is not ideal for the governance of decentralised blockchains.

Most current blockchain voting mechanisms are structured comparably to shareholder voting in modern corporations. They weight according to the amount of tokens under the voter's control:

vote weight = token quantity

This *one-token, one-vote* (1t1v) approach favours wealth, but not preference intensity, superior information, or long-term strategic thinking. The normative implications of 1t1v are under-analysed in the blockchain space (Allen and Berg 2020).

Time-weighted voting is a known approach to governance in the blockchain space. Curve, for example, allows governance token holders to lock up their tokens in exchange for enhanced voting weights. The longer tokens are locked up, the more voting weight the token holder is granted. However, in Curve the choice of lockup period comes before participation in any given election – it grants long term lockups more weight but lacks a mechanism for voters to express their intensity of preference in any given election.

3. The mechanism

Commitment voting is a type of time-weighted voting. It has three pillars:

1) The weight of a vote is determined both by the token quantity and the period of time a voter is willing to stake (and henceforth lockup) those tokens:

   *vote weight = token quantity * staking lockup period*

   During a staking lockup period, token holders are unable to sell their tokens on chain. Lockup contributes towards security-through-staking on proof of stake chains, and can be the beneficiary of any relevant staking rewards.

   The idea behind this is that the more intense a voter's preferences, the more they will be willing to sacrifice immediate liquidity. In a market and quadratic voting system this sacrifice is the amount of money they pay to a counterparty or to a quadratic voting authority respectively. In commitment voting voters sacrifice their liquidity: the period of time in which they are unable to sell their token(s).

2) Tokens are only subject to the nominated lockup period if they vote on (what turns out to be) the winning side. Votes for the losing side of a governance vote are released from lockup as soon as the election is finished (*election day*). The intuition here is that losers should not be obliged to keep their tokens on a chain whose governance direction they disagree with. At the same time,

winners should be required to commit to the chain whose governance they have successfully directed.

3) Lockup time is calculated cumulatively. Blockchain governance typically sees multiple elections in any given time period. If a voter participates in two elections (*election a* and *election b*) with the same election day on the winning side then:

$$\textit{total lockup period} = \textit{staking lockup period}^{\textit{election a}} + \textit{staking lockup period}^{\textit{election b}}$$

4. Implications

In addition to intensity of preference revelation, commitment voting has a number of desirable features.

Reducing the harm of rational ignorance

Good governance doesn't just come from having token holders to vote, it comes from having token holders vote *well*.

One of the important findings from public choice is the predominance of expressive voting – where the decision to vote is not driven by an desire to exercise instrumental control but as an act of expression or consumption. Brennan and Lomasky (1993) use expressive voting to explain why many people still vote even while their vote is unlikely to make a material difference to the outcome. Caplan (2011) and Achen and Bartels (2016) have shown how low cost expressive voting this fosters rational ignorance, with negative public policy consequences

Expression is a legitimate use of the right to vote. Expressive voting is still available at a low cost under commitment voting. However voters who are willing to sacrifice more through commitment to the network are able to both influence the outcome more than voters who are motivated by expression (and may be less willing to make such long-run commitments).

Harnessing socially desirable political competition

Staking is desirable for securing the chain. To the extent that political competition encourages voters to increasingly invest in the outcome (which in the democratic politics encourages the expenditure of vast amounts of money for campaigns) this produces the socially beneficial outcome of more staking, and therefore more security.

Mitigating oligopoly

One criticism of weighted voting mechanisms that it they can be dominated by wealthier investors. In a traditional corporation, the more shares a voter has the more political control they have. While that aligns interests well in corporate accountability, it is undesirable in the blockchain space where governance concentration is seen as a risk to the twin goals of decentralisation and security.

Commitment voting mitigates the dominance that large token holders have over governance. Sufficiently motivated minority token holders can outvote majority token holders if they commit to a longer lockup period. The less a token holder expects to need to liquidate their tokens the more influence they can have over governance. This should incentivise both long term token holding and informed voting.

Preventing custodial dominance

Currently, custodial exchanges that hold staking tokens on behalf of their customers have *de facto* governance rights (unless they have systems for their customers to participate in governance themselves). Under commitment voting, exchanges that choose to use the tokens they hold on behalf of their customers to make governance votes with lockup periods wear the prudential risk that customers may seek to withdraw their tokens during the lockup period.

5. References

Achen, CH and Bartels, LM 2016, *Democracy for Realists: Why Elections Do Not Produce Responsive Government*, Princeton University Press.

Allen, DW and Berg, C 2020, 'Blockchain Governance: What We Can Learn From the Economics of Corporate Governance', *The Journal of the British Blockchain Association*, vol. 3, no. 1, pp. 1-10.

Allen, DW, Berg, C and Lane, AM 2019, *Cryptodemocracy: How Blockchain Can Radically Expand Democratic Choice*, Lexington Books.

Brennan, G and Lomasky, L 1993, *Democracy and Decision: The Pure Theory of Electoral Preference*, Cambridge University Press.

Caplan, B 2011, *The Myth of the Rational Voter: Why Democracies Choose Bad Policies*, Princeton University Press.

Goodman, JC and Porter, PK 2020, 'Will quadratic voting produce optimal public policy?', *Public Choice*, pp. 1-8.

Posner, EA and Weyl, EG 2015, 'Voting squared: Quadratic voting in democratic politics', *Vand. L. Rev.*, vol. 68, p. 441.