

Governance of Distributed Networks

Broadly defined, governance is a set of processes that include opinion-forming and decision-making. Without some sort of governance, progress would stall. In decentralized systems, such as public blockchains, the question arises: Who gets to decide?

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Blockchain protocols occasionally need to be upgraded – be it for bug fixes, protocol improvements or additional features. Since a system is only as decentralized as its least decentralized part, the only solution to permissionless governance is to enable any network participant to propose upgrades. After thorough discussion of a proposal in the relevant cryptocurrency community, the upgrade gets approved or rejected and subsequently implemented in the protocol.

The beauty of decentralized, open source systems is that nobody is compelled to accept a change someone tries to force onto them. People that disagree with the change can fork off their own version of a cryptocurrency – as has happened in the past with the split of Ethereum into ETH and ETC,¹ or with the various Bitcoin forks (such as Bitcoin Cash or its fork Bitcoin SV).²

In the end, it is the market participants that express their view about the future of a specific blockchain fork by buying the coins of that fork. As mentioned in Episode 8 of Bitcoin Suisse Decrypt,³ all markets simply represent our predictions for the future. The relative prices of forks can thus be seen as snapshots of what the market's current perception of the long-term

value distribution is. Investors that disagree with this assessment of how useful one fork (i.e. protocol change) will be in the long run can choose to buy or sell coins of that specific fork.

Decentralized Governance in Practice

A distinction can be made between two types of decentralized governance. The first, protocol-level governance, includes governance mechanisms that directly influence the underlying blockchain protocol – for example by changing the consensus rules. The second, application layer governance, are governance structures implemented in an application built on top of a blockchain protocol. One example of application layer governance are Decentralized Autonomous Organizations (DAOs) such as MakerDAO. Application layer governance is detached from the underlying protocol – for example, changing the stability fee for collateralized debt positions⁴ has no effect on the Ethereum protocol as a whole.

In Bitcoin, no actual on-chain governance exists. Bitcoin

1. <https://www.bloomberg.com/features/2017-the-ether-thief/>

2. <https://bitcoinmagazine.com/articles/infographic-map-bitcoin-forks>

3. <https://www.bitcoinsuisse.com/research/decrypt/connecting-blockchains-to-real-life>

4. <https://www.bitcoinsuisse.com/research/decrypt/leveraging-blockchain-for-decentralizing-finance>

improvement proposals (*BIPs*) are the first step towards implementing a software upgrade.⁵ BIP authors are responsible for gathering community feedback for their proposals. After thorough evaluation, the proposal is either accepted or rejected. Accepted proposals are then implemented, and miners signal their readiness for switching to the upgraded software. This process was established after the launch of the Bitcoin network and is not hard-coded into the protocol itself; the protocol merely supplies the necessary tools for miner signaling.

The process for Ethereum Improvement Proposals (*EIPs*) is similar. In the Ethereum protocol, however, there is also an on-chain governance mechanic: Miners can vote to increase or decrease the block size (*gas limit*) according to the current needs of the network. This has helped to counteract the effects of sudden increases in network usage until improved solutions for scalability⁶ are ready.

Tezos, a new blockchain protocol that raised more than \$200 million in 2017, has on-chain governance more formally implemented in the protocol from the start. In Tezos, protocol amendment proposals are submitted by delegates during the proposal period. After that, delegates vote on whether to move forward with the proposal on a test chain or not. Should the vote pass, the change is implemented on a test chain for 48 hours. If delegates are still happy with the change and vote in favor of the proposal, it is then activated on the main Tezos chain. This formalized process can be observed in real time⁷ and is intended to help finding social consensus about the network's future. Cosmos, a blockchain that seeks to address on scalability and interoperability issues, has similar on-chain voting mechanisms.⁸

In Dash, an early fork of Bitcoin, masternodes vote on proposals. The outcome does not immediately impact the Dash blockchain. Instead, any agreed upon results would need to be coded by programmers and then a new update of the software would be released, and nodes have to decide whether they want to update or not. 10% of the monthly block rewards go directly to the proposal addresses that have been selected to receive the rewards.

While these are examples of protocol-level governance, one example for application layer governance is

MakerDAO and their MKR token. MKR token holders vote on issues such as raising or lowering the stability fee, and in the future will also be responsible to vote on additional collateral types in multi-collateral DAI or on the DAI savings rate.⁹

One issue of MakerDAO votes is the notoriously low voter participation. MKR investors have made several online calls to action to encourage more turnout. MKR polls receive between 1% and 4% voter turnout on average. In contrast, Dash polls have averaged between 15% and 30% in 2019.

Is Voter Participation Relevant for Investors?

“One Voice – One Vote” democratic governance models suffer from the tragedy of the commons, because participants in an ecosystem have insufficient financial incentive to vote. An important question in the academic literature on public policy is how to design incentives in order to encourage voter participation. In fact, the Nobel Memorial Prize in Economic Sciences was granted to Kenneth Arrow in 1972 for his work on voting mechanism design referred to as the *impossibility theorem*.

Research closer to home in Switzerland, called the *Swiss Code of Best Practice for Corporate Governance*, states that voter participation will be higher in firms when the board of directors has a high degree of skin in the game.⁶ This would lead to the hypothesis: cryptocurrencies with decentralized governance models that make investors put more skin in the game could theoretically incentivize more voter turnout, and overall, better governance of the protocol by harnessing more of the crowd's knowledge.

Voter participation rates can be measured in two ways:

- 1.) Number of unique voters that voted on a proposal in relation to the total number of unique voters in the system.
- 2.) Number of votes cast in relation to the total number of castable votes in the system.

The reason this is relevant is because most national democracies around the world use the former while most cryptocurrency systems use the latter.

5. The process borrows heavily from its equivalent in the Python programming language community, see: <https://www.python.org/dev/peps/pep-0001/>

6. <https://www.bitcoinsuisse.com/research/decrypt/scalability-the-missing-piece/>

7. <https://tzscan.io/proposals>

8. <https://blog.chorus.one/an-overview-of-cosmos-hub-governance/>

9. <https://blog.makerdao.com/breaking-launch-date-of-multi-collateral-dai-announced-at-devcon-5/>

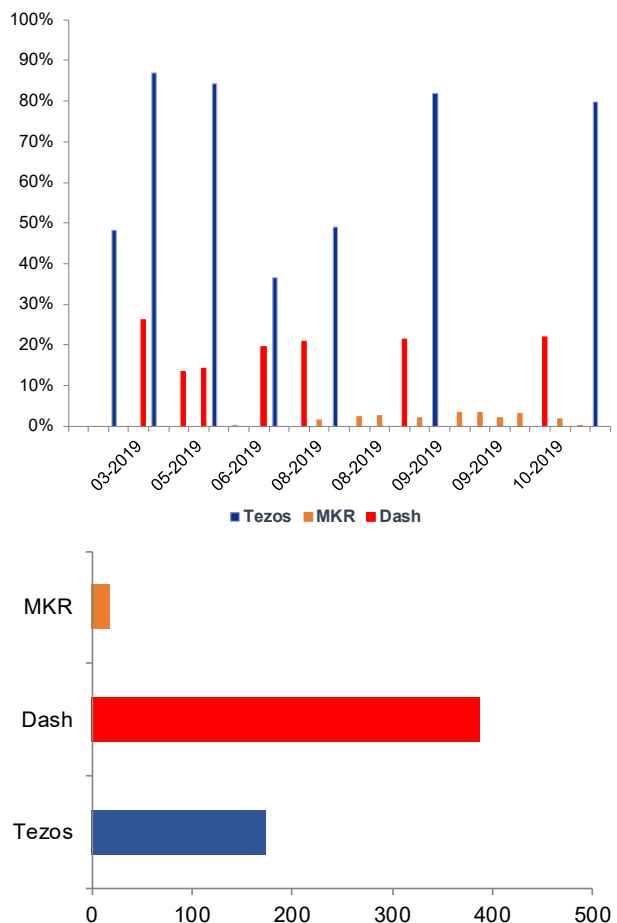
10. https://www.economiesuisse.ch/sites/default/files/publications/economiesuisse_swisscode_e_web.pdf

For example, each Tezos baker is allocated a certain number of votes based on their staking balance. For example, when Tezos bakers voted on increasing the gas limit on the Tezos blockchain on March 20, 2019, the participation rate was a whopping 48.3%, not including votes from the Tezos Foundation, which voluntarily abstained. The Tezos participation rate is calculated as number of votes cast out of total votes available. However, bakers with more Tezos staked are awarded more votes. This means that the participate rate does not take into consideration the number of unique voters voting on that proposal. According to TezosAgora, only 159 out of 458 bakers voted on the Athens proposal, resulting in a unique voter participation rate of 34%. The same applies to MakerDao's MKR token and Dash Masternodes.

However, this is not the end of the story. A decentralized cryptocurrency with a high participation rate but very small number of total voters could have a lower range of diversity with regard to background experience and knowledge compared to a decentralized cryptocurrency with a low participation rate but very large number of total voters. To investigate voter participation rates between protocol and application layer governance models, data on each cryptocurrency's past proposals and their results can be collected from blockchain explorers. The relevant variables are total number of unique voters that participate in each poll and participation rate. However, unique voters are just a proxy for the real unique voters because one voter could vote from multiple addresses.

In summary: Tezos or Cosmos are often cited examples of protocols including on-chain voting. In contrast, tokens of DAOs (such as MakerDAO's MKR) only impact the application layer. Finally, loosely coupled "informal governance" of protocol-level changes refers to the governance models of Bitcoin or Ethereum. On the very limited data available, on-chain voting governance models, such as the Tezos model, appear to have high voter participation. On the other hand, other cryptocurrencies such as Dash appear to have a larger network of unique decision makers. As more data becomes available, investors could potentially use this information to aid investment decisions by investigating if statistically significant patterns exist between the various decentralized governance mechanisms and the market price of the cryptocurrency.

Illustration 1: Voter turnouts in 2019 are highest for Tezos, followed by Dash and MKR (top). In terms of unique voter addresses active in an October 2019 voting poll, Dash is leading, followed by Tezos and MKR (bottom).



Source: tezosagora.org, vote.makerdao.com, mnowatch.org, Incrementum AG.



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