

# Airdrops as a governance tool for DAOs?

## An empirical analysis of voting participation

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*Airdrops are a well-known incentive mechanism for blockchain protocols. In recent years, DAOs in particular have discovered "retroactive" airdrops that reward early adopters. This type of token distribution is also seen as a possible solution to the centralisation and lack of voting participation in DAOs. Therefore, 19 DAO airdrops were empirically analysed for their effect on governance activity. We compare the voting participation of airdrop recipients on Snapshot and (where available) on-chain with all token holders, as well as the delegation share. The participation of airdrop recipients was on average slightly higher than that of non-airdrop recipients, especially on Snapshot. We conclude that carefully designed airdrops can contribute to the overall governance strategy of DAOs.*

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### 1. Introduction

On 16 September 2020, the decentralised exchange Uniswap announced its own UNI token [1]. It was the first time that "free tokens" were issued on a large scale by a DAO ("Decentralised Autonomous Organisation"). Airdrops became particularly well known in the context of Initial Coin Offerings (ICOs) to promote projects [2]. However, Uniswap carried out a "retrospective" airdrop; the tokens were only issued to previous users. This type of airdrop offers little incentive for new users. Instead, Uniswap rewarded early supporters of the protocol. Retrospective airdrops are thus intended to appeal to intrinsically motivated users rather than users who specifically target airdrops ("airdrop farming") [2].

Regarding the governance function of tokens, airdrops in DAOs have another important feature: they distribute tokens to the community in a "decentralised" manner [3]. After all, the recipients are the initial "voter base" that will make decisions about the protocol in the future. This is particularly relevant given that many DAOs face governance challenges, such as unequal token distribution, strategic voting, or lack of voter participation [4].

But are airdrops an appropriate tool for increasing governance activity in DAOs? Previous analyses suggest that the majority of airdrop tokens are transferred or sold after a short time, with airdrops essentially being "free money" [5]. Accordingly, the effectiveness of airdrops in terms of governance is controversial. The aim is therefore to empirically analyse a group of DAO airdrops regarding the voting activity of the recipients. After characterising airdrops as an incentive mechanism in DAOs, we take a closer look at the methodology and selected airdrops (section 3). Section 4 then provides observations on the design of the airdrops, before presenting the results in section 5.

### 2. Airdrops as incentives

Incentives are a popular means of steering people's behaviour in a particular direction. As both sides benefit, incentives are considered ethically unproblematic, for

example in contrast to penalties [6]. They are often financial in nature but can take many different forms. One could also speak of a kind of exchange ("trade") between two parties. On the other hand, an incentive always represents an extrinsic motivation; the recipient does not need to be "convinced" of the action or have a real interest in a product [6]. It is often assumed that non-profit organisations in particular have an incentive problem [7]. On the other hand, non-monetary incentives also shape human behaviour, e.g. social recognition [8].

DAOs are seen as a way to combine cooperative action and incentives [9]. This is largely due to the inherent properties of tokenisation. In many protocols, tokens are both a governance tool and part of the business model. They are also liquid and offer the prospect of price appreciation, unlike shares in 'traditional' collaborative structures. From this perspective, DAOs are more closely aligned with companies [10].

#### 2.1. "Free money" & retrospective airdrops

Airdrops are probably the best-known incentive mechanism in the blockchain ecosystem [3]. In essence, they are the distribution of free tokens [11]. Fan et al. describe airdrops as a type of "digital coupon" that transfers tokens to a wallet [5]. Airdrops can incentivise early users to generate network effects, even if this means a large investment ("cold start problem") [11]. In contrast to companies, however, the tokens are to be understood as shares ("equity") rather than cash, because of ownership and governance rights.

There are many different airdrop design elements: some are passive, and you only qualify by owning a token ("token-based") or a wallet. Others are aimed specifically at users of competing protocols to win over users ("vampire attacks") [3]. These incentives were particularly prevalent in 2017 and 2018 when many ICOs took place. However, many of these projects were not sustainable or even turned out to be fraudulent. As a result, the reputation of airdrops declined [3]. The phenomenon resurfaced from around 2020 with the emergence of DAOs

that "retrospectively" distributed governance tokens [11].

Retrospective airdrops are better at rewarding early users and distributing the token more efficiently. They can be very targeted by tailoring them to on-chain criteria [3]. If an airdrop is not expected, this also prevents "air-drop hunting" or "farming". Today, however, few airdrops are actually "surprising". There is a lot of speculation, as some airdrops have proven to be very lucrative. A significant increase in activity is regularly seen in protocols where a governance token launch is possible [12].

Correspondingly, it can be observed that protocols have become stricter in their selection of participants. Airdrops linked to specific activities ("activity-based") are now the norm [3]. Allen even concludes that the protocols and airdrop hunters are in a kind of "co-evolutionary process" that is slowly making airdrops more sophisticated [2].

## 2.2. Airdrop Farming

Airdrop Farming refers to systematic participation in airdrops, sometimes even the creation of multiple accounts ("Sybils") to receive an airdrop multiple times [13]. This is a hindrance to the decentralisation of protocols and can give a false picture of how large or active a community is [5]. However, it is not easy to recognise or exclude airdrop farmers, especially before the distribution happens.

They can sometimes be detected by analysing the network of participating addresses. It is also typical for sybils that tokens from different addresses are accumulated on a wallet after the airdrop [13]. Some protocols therefore implement anti-sybil measurements, through identifying and excluding suspicious addresses (e.g., Hop Protocol) [13].

## 2.3. On DAOs

DAOs are a vibrant phenomenon across the web3. DAOs in their current form were first mentioned in a blog post by Ethereum co-founder Vitalik Buterin in 2014 [14]. Following the first large-scale DAO ("The DAO") in 2016, these on-chain organisations have evolved into a multi-faceted form that serves various purposes beyond fundraising. DeepDAO, a DAO analytics service, now lists nearly 20,000 aggregated governments, which has multiplied in just a few years [15]. However, not all are active or meet the criteria of a DAO.

The fact that the number of DAOs is difficult to determine is also due to the fact that the DAO concept itself is controversial [16]. DAOs have already been described in the Ethereum whitepaper as "digital entities" whose members can determine the majority of code changes and spend money [17]. They are characterised by the fact that coordination takes place online and is implemented on a blockchain. While traditional organisations are usually hierarchical and tied to a presence or embedded in the legal system, the rules of DAOs are defined in

smart contracts [18]. Technically, DAOs are a collection of these contracts [19].

For the purpose of this paper, we use the systematic definition of Rikken et al. derived from the key characteristics of DAOs:

"A DAO is a system in which storage and transaction of value and notary (voting) functions can be designed, organized, recorded, and archived and where data and actions are recorded and autonomously executed in a decentralised way" [16]. "

## 2.4. Relevance

While much has been learned about governance systems in DAOs, there has been little analysis of the impact of airdrops on governance. In theory, airdrops decentralise token ownership, leading to a more balanced distribution and a larger base of voters [20]. More voters promise a better reflection of the community and give more weight to decisions. This would counteract plutocracy in DAOs. If the governance process is (more) decentralised and smaller token holders have a "voice", this in turn could positively increase voting activity [21]. In this way, airdrops could also counteract a lack of voting participation. An airdrop promotes user loyalty and can be an incentive for recipients to participate in the governance process and "give back" to the protocol [20].

However, there is little empirical evidence to support the assumption that airdrops are a governance tool. Previous analyses of airdrops tend to show that most recipients sell their tokens or leave the community. This means that the shares could even accumulate again. This paper therefore investigates the behaviour of governance voting. The research question is therefore: *What effect do airdrops in Decentralised Autonomous Organisations (DAOs) have, regarding the governance activity of the recipients?*

## 3. Methodology

To analyse the governance activity of airdrop recipients, the airdrop addresses are matched with the voters of the respective DAO (on Snapshot and on-chain).

The proportion of voting addresses is then compared to the governance activity of all token holders. This allows conclusions to be drawn about the activity of airdrop recipients compared to addresses that did not receive an airdrop. For better comparability, a set of DAO airdrops is used, in a period of six and twelve months after the airdrop, as well as at the time of analysis (October 2023).

### 3.1. Voting Retention

The "user retention" or "customer retention" is a well-known indicator used to assess the "stickiness" of users to a product or service [22]. For this purpose, the proportion of active or repeat users is calculated for a certain period [23]. This principle will also be used to analyse governance activity. We refer to this as the *"governance retention ratio"* or *"airdrop governance retention"*

ratio". The proportion of token holders who participated in governance (in period t) is calculated as follows:

$$\text{Governance Retention Ratio} = \frac{\text{Voter}(t)}{\text{Token Holders}(t)}$$

For the proportion of airdrop recipients who took part in governance, the number of airdrop voters (in period t) is divided by the number of all airdrop recipients:

$$\text{Airdrop Governance Retention Ratio} = \frac{\text{Airdrop Voter}(t)}{\text{Airdrop Recipients}}$$

The data was accumulated using SQL queries on Dune Analytics [24]. Voting is based on data from Snapshot and (where applicable) on-chain voting data. Snapshot is an off-chain voting tool and the most widely used voting platform for DAOs, partly because of the (high) fees for on-chain transactions [25]. The platform only requires a wallet signature to verify the token ownership of the respective address, a "snapshot" of the authorised voters.

### 3.2. Selection of Airdrops

It's difficult to determine, how many DAOs have carried out an airdrop. Airdrops do not always leave traces "on-chain", for example when they are distributed via centralised exchanges. Even on-chain airdrops cannot always be recognised as such, e.g. to distinguish them from other payouts.

The DAO landscape, however, is much better mapped. On DeepDAO, the digital organisations can be sorted according to various criteria [15]. We decided to select the largest DAOs by treasury ("bank account" of the DAO) or number of "lifetime participants" (total number of voters to date), to include the most important DAOs in terms of financial strength and community. The number of proposals or votes were ruled out as criteria, as they are heavily dependent on how restrictive DAOs are with proposals and how long a DAO has been in existence.

To select the DAOs, a snapshot of DeepDAO was taken on 15 September 2023, including all DAOs with either a minimum of \$25 million in assets or 5,000 lifetime participants. To exclude smaller bounties, at least 1% of the supply should have been distributed. In addition, the airdrop should be assigned to a clearly definable time period (criteria see Table 1).

Size	Airdrop	Data
Treasury of at least \$25 million	At least 1% of the token supply reserved for the airdrop	Airdrop distributed on an EVM-chain (available on Dune Analytics)
Lifetime participants min. 5,000	Continuous airdrop, no vesting	Governance on Snapshot
	Airdrop publicly available	At least 1 proposal in each analysis period
	Airdrop of a governance token	

Table 1: Requirements for the airdrop selection

The following 19 airdrops were selected for analysis. Table 2 also shows the date (if available) until which airdrop recipients could qualify ("snapshot date"), the airdrop chain and the voting platform(s).

Selected Airdrops					
Protocol	Treasury	Particip.	Airdrop chain	Snapshot date	Voting
Treasury size and lifetime participants					
<b>Optimism 1</b>	3.1b	89k	Opt.	25.03.22	Optimism Agora
<b>Arbitrum</b>	2.8b	202k	Arb.	06.02.23	Snapshot, Tally
<b>Uniswap</b>	1.8b	30k	Eth.	01.09.20	Snapshot, Uniswap Gov. Portal
<b>dydx</b>	628m	4k	Eth.	26.07.21	Snapshot, dydx Gov. Portal
<b>Ens</b>	557m	88k	Eth.	31.10.21	Snapshot, Tally
<b>Galxe</b>	100m	40k	Eth.	28.04.22	Snapshot
<b>Gitcoin</b>	53m	13k	Eth.	01.04.21	Snapshot, Tally
Treasury size					
<b>Frax</b>	150m	1.4k	Eth.	20.02.22	Snapshot
<b>Ribbon</b>	84m	1.6k	Eth.	n/a	Snapshot
<b>Euler Finance</b>	49m	800	Eth.	21.03.22	Snapshot
<b>Instadapp</b>	45m	110	Eth.	16.06.21	Snapshot, Atlas
<b>Hop</b>	32m	1.8k	Eth.	01.04.22	Snapshot, Tally
<b>Superrare</b>	29m	600	Eth.	21.07.21	Snapshot
<b>Thales Markets</b>	25m	800	Eth.	06.09.21	Snapshot
Lifetime participants					
<b>Swapr</b>	n/a	18k	Arb. / Gnosis	01.07.21	Snapshot
<b>Badger</b>	5.8m	11k	Eth.	n/a	Snapshot
<b>Open</b>	n/a	11k	Polygon / Eth.	23.12.21	Snapshot
<b>Ape</b>	9.9m	8k	Eth.	n/a	Snapshot
<b>Convex Finance</b>	4.6m	5k	Eth.	23.04.21	Snapshot

Table 2: Selected airdrops

All the protocols in the dataset use Snapshot, except for Optimism. The protocol discontinued its use at the beginning of 2023 in favour of its own on-chain governance portal [26]. Eight protocols have implemented on-chain voting in addition to Snapshot. Some protocols have a two-stage voting process. Proposals must first be accepted on Snapshot ("temperature checks") before they go into on-chain voting. Uniswap even requires two Snapshot voting cycles before a proposal is qualified for on-chain voting [27].

A multi-stage voting process allows proposals to be revised again after the first vote. Others, e.g., ENS, make the voting platform dependent on the type of proposal.

They use additional on-chain voting only for proposals with fundamental protocol changes [28]. It is noticeable that it is mostly the larger protocols that have implemented on-chain voting. The DAOs from the data set, which were only selected via the lifetime participants, exclusively use Snapshot. All the protocols with on-chain voting also allow delegations or even actively promote them.

#### 4. Observations on airdrop design

The selected airdrops were all retrospective, even if some of the distributions (e.g., Arbitrum) were anticipated [29]. This confirms the assumption that retrospective airdrops are particularly popular with DAOs [3]. In addition, all the airdrops were based on on-chain criteria ("activity-based") [3]. The selected airdrops started between September 2020 (Uniswap) and March 2023 (Arbitrum).

Among the selected airdrops, only Uniswap and Thales correspond to the "fair allocation" model (almost all addresses received the same amount). The remainder distributed individual amounts depending on the individual on-chain activity of the addresses ("differential allocation") [5].

##### 4.1. Target groups

Three different target groups could be roughly recognized among the selected airdrops: Most of them were aimed at early adopters of their own protocol or product. Some of them qualified all users (e.g., Apecoin or ENS), while most protocols only whitelisted a subset of users. This approach is in line with the intention of rewarding early users and binding them to the protocol.

The second group were airdrops that specifically distributed tokens to users of another protocol to which they are connected. For example, Thales is a fork of Synthetix, and Convex was developed for users of Curve [30,31]. It can be assumed that they then give something back to the "partner protocols," but at the same time also intend to attract new users. Although this group of airdrops is retrospective, it is aimed at previously unknown users [11].

The third group shows a similar approach: some have distributed the airdrop to users of competing protocols (e.g., Instadapp or Badger). Here, too, a marketing motive can be assumed. It's also known as a "vampire attack" [3]. Contrary to what one might expect with retrospective airdrops, DAO airdrops are therefore not only used for the subsequent rewarding of their own users. Rather, some DAOs use the distributions to win over existing users of other protocols. Unlike most ICO airdrops, the on-chain activity can be used to select addresses with a potential fit for one's product [3].

#### 4.2. Anti-Sybil measures

Airdrop farming is one of the biggest challenges for the protocols: The HOP Airdrop had a public "Sybil detection" programme. Using network analyses, the protocol excluded approximately 10,000 of the originally 43,000 authorised addresses from the airdrop ("blacklisting") [32].

In a further step, HOP called on its community to report airdrop farmers who had not yet been "discovered" themselves. The protocol also offered airdrop farmers the opportunity to report themselves for a smaller airdrop share [33].

Other airdrops (e.g., Arbitrum) even made use of HOP's Sybil list and excluded the same addresses from its airdrop [34]. Arbitrum and Optimism carried out their own network analysis as well, to identify patterns that indicate airdrop farming [35]. However, more detailed information on the procedure or the excluded addresses is not available, also to avoid accommodating airdrop farmers [36].

#### 5. Results

All data, including the current status, can be found in the respective airdrop dashboards on Dune Analytics, which are [linked here](#).

##### 5.1. Airdrop size and distribution

The analysis of the 19 DAO airdrops shows that each airdrop is indeed individual. They vary greatly in terms of size and volume. This is also reflected in the voting activity. It is noticeable that some airdrops stand out from the others in terms of participating addresses (see Fig. 1).

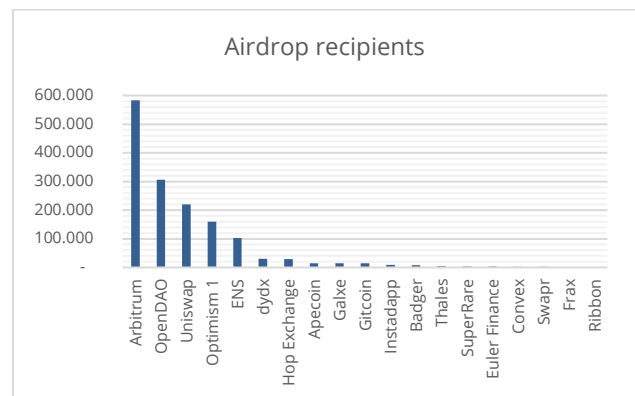


Fig. 1: Number of airdrop recipients

They also differ greatly in the supply that is made available for the airdrop. On average, it is around 11% of the total token supply. The exception is OpenDAO with 50% of the total supply.

##### 5.2. Token distribution

Whether airdrops have a long-term impact on decentralization is controversial [5]. Based on the number of recipients, airdrops (initially) do have a "decentralising" effect in the sense that the token is widely distributed. An airdrop can add several (hundred) thousand token

holders to a project, which would otherwise not be possible, especially in the beginning. In almost all cases, the airdrop was a "genesis event" that heralded the launch of a governance token.

However, the sums distributed to the respective recipients are usually within a wide range. The widespread use of activity-based airdrops tends to reinforce this trend. Early users with high volumes sometimes receive very large shares.

In this analysis, the top 10% of the token recipients accounted for ~44% of the tokens on average, and for six of the selected airdrops, it was even more than half of the intended tokens. In the 1% percentile, an average of ~23% of the supply was distributed. The increased use of on-chain criteria (according to the "differential allocation" model) results in a more "unequal" distribution of tokens in this regard.

### 5.3. Actions after the airdrop

Even more important is what happens to the tokens after the airdrop. Previous studies have cast doubt on whether airdrops have a lasting effect [3]. In this analysis, only the situation at the time of the analysis (October 2023) was taken into account, regardless of how long ago the airdrops took place. This limits the comparability of the airdrops. The "oldest" airdrops in the dataset, Uniswap and Badger, have the highest transfer rates.

Nevertheless, the analysis shows that most recipients do not keep their tokens. On average, ~76% of recipients have now fully transferred their tokens and only ~12% still hold the tokens at the same address. The median "hodling" rate is only ~7%. Looking at OpenDAO, the high holding rate is more likely to be related to the low value of the token.

A transfer is not a confirmation of a sale, it could also be a transfer to a new wallet. However, it is reasonable to assume that the majority of the tokens have been sold - and therefore the recipients do not participate in the governance.

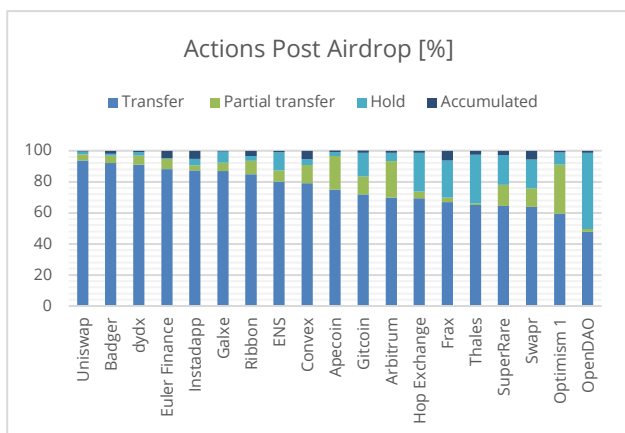


Fig. 2: Actions after the airdrop

### 5.4. Voting

The effect of an airdrop on participation is the core question of this paper. Both on Snapshot and on-chain, it can be seen that the DAOs are differently "active" in their governance in terms of the number of proposals. The airdrops with the fewest proposals (Swapr and Instadapp) also have comparatively low participation, while in reverse, this effect is not seen in the DAOs with many proposals. As Zhao et al. observed, too many proposals even can tend to favour voting fatigue [21]. A certain continuity in the proposals, on the other hand, is naturally a positive factor [21].

In absolute numbers (Snapshot and on-chain), participation differs greatly, with Optimism and Arbitrum standing out with over one million votes each. We can confirm Wang et al.'s assumption that activity in the ecosystem is concentrated on a small proportion of DAOs ("Pareto principle") [25]. The airdrops of these DAOs are also referred to as "high-profile airdrops" [37].

### 5.5. Snapshot voting participation

When looking at the Snapshot voting activity, a wide range is noticeable. On average, overall Snapshot participation has increased from ~8.2% after six months to ~9.7% in October 2023.

However, it is important to take a closer look at an individual case: The high level of participation in ENS is mainly due to one proposal. This was the ratification of the "ENS Constitution", which airdrop recipients were asked to sign during the claim process [38]. The voting frequency shows that around 91% of all ENS voters only voted once. The ENS Airdrop is therefore only comparable with the others to a limited extent.

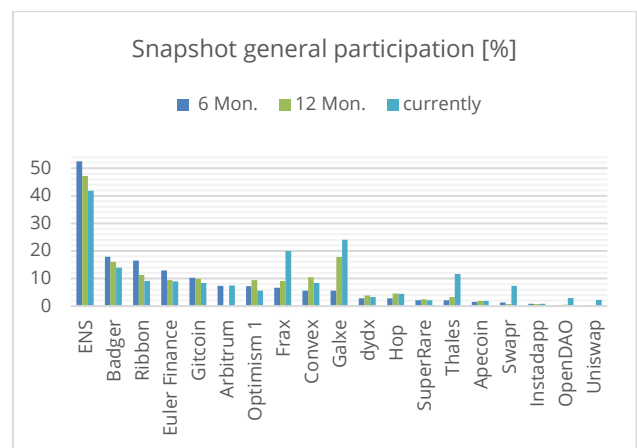


Fig. 3: Governance retention ratio

The proportion of airdrop recipients who voted on Snapshot is on average about 6% higher than the general participation in all time periods (~14% after six months and ~17% in October 2023). We therefore conclude that airdrop recipients in this dataset have increased overall voting participation. The airdrop governance retention rate is calculated from all airdrop recipients who have voted at least once. As a result, the value can only increase and does not reflect the 'loyalty' of the voters.

However, the voting frequency of airdrop recipients is very similar to that of all voters. In both groups, 45% of voters have voted at least three times.

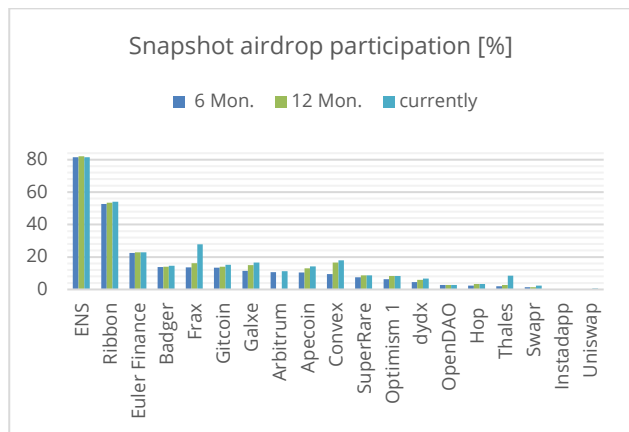


Fig. 4: Airdrop governance retention ratio

To see the effect of airdrop voters more clearly, we also calculated the governance retention ratio for voters excluding airdrop recipients, limited to the time of the analysis. Positive values indicate that a larger proportion of airdrop recipients were active in governance than token holders who did not receive an airdrop.

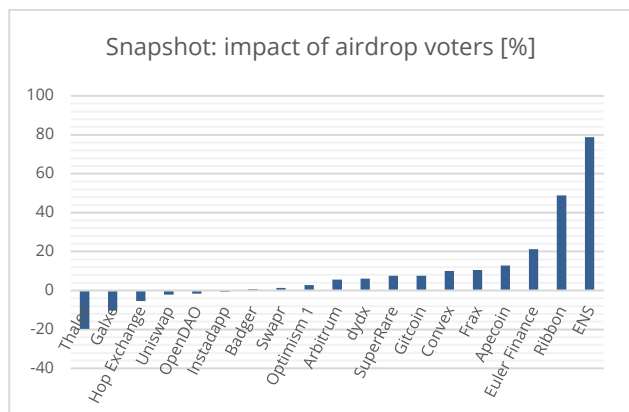


Figure 5: Difference between airdrop voters and voters excluding airdrop recipients

### 5.6. On-chain voting participation

Almost half of the analysed airdrops additionally use on-chain voting. The dominance of Optimism and Arbitrum is also noticeable here, with the most on-chain votes by far. The two DAOs each vote on their own protocol, while the other DAOs vote on Ethereum. The transaction fees could therefore contribute to the fact that the activity on the other DAOs is significantly lower. This is one of the reasons why delegations are widely used for on-chain voting.

The on-chain voting share is comparatively low or below the Snapshot share. The average value was 1.2% after six months 2.1% at the time of the analysis. Instead, on-chain DAOs largely refer to delegations, which are not included here (see. 5.5).

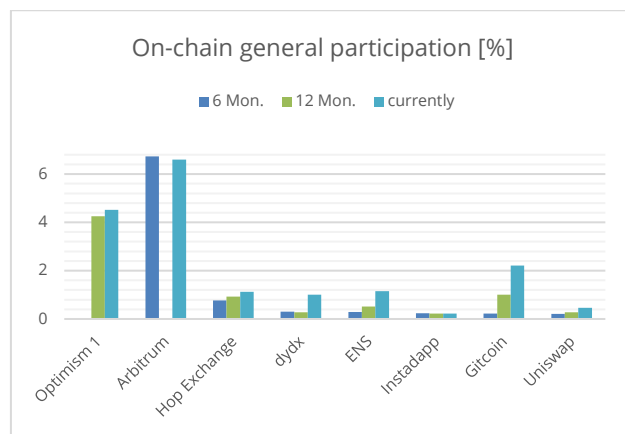


Fig. 6: On-chain governance retention ratio

The proportion of on-chain airdrop voters is slightly higher than that of the general public, ~1.7% after six months and ~2.6% in October 2023. Here, too, the figures are lower than on Snapshot.

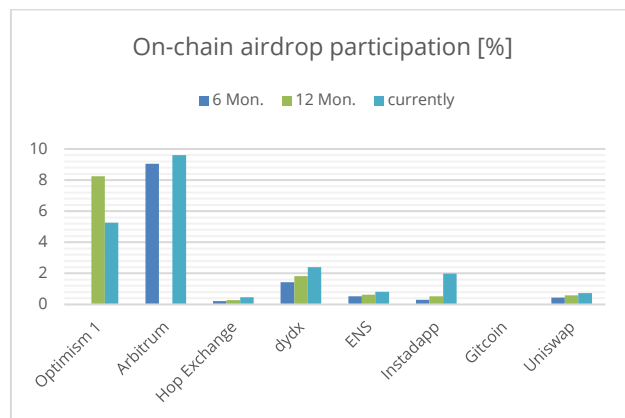


Fig. 7: On-chain airdrop governance retention ratio

### 5.7. A Note on Delegations

Delegating tokens is a popular way to "indirectly" increase voting participation [39]. The average token holder is typically unable to familiarise themselves with all the proposals and make an 'informed' decision each time [26].

This practice is particularly common in on-chain voting. Optimism, for example, now has over 600,000 addresses that have delegated tokens. Token holders can usually choose a delegate based on a public profile and transfer their voting rights. In most cases, due to the structure of governance contracts, delegation is even a prerequisite for voting [40]. Token holders must delegate to themselves in order to vote "directly".

The proportion of all token holders who have delegated their tokens at the time of analysis varies widely, from < 1% (dydx) to > 80% (HOP). In general, the delegation rate is much higher than the voting rate, averaging 35% after twelve months. Looking at airdrop recipients, the majority have delegated (54%). However, the higher proportion of airdrop recipients may be because some protocols required delegation at the time of airdrop request. These include ENS, Gitcoin and HOP, so the delegation

rate (at least one delegation event) among recipients for these airdrops is 100%.

"Mandatory delegations" may be a deliberate strategy to improve governance participation. Airdrop recipients have to decide whether to exercise their voting rights themselves or to pass them on.

## 5.8. Outlook

To better understand DAO airdrops, a number of things can be taken further in the analysis. These include a larger dataset, differentiating between the type of DAO or the role of the token in the protocol. It would also be interesting to look at DAOs that deviate from the one-token-one-vote model, such as NFT-based DAOs.

In terms of analysis, the voting behaviour could be analysed in more detail, e.g. whether small or large token holders show different patterns, or whether token holders are active in multiple DAOs in parallel. Finally, qualitative analysis could provide more insight into the characteristics of voters or airdrop recipients, who remain largely pseudonymous.

## 6. Conclusion: airdrops as a balancing act

We can confirm that retrospective and activity-based airdrops are widespread among DAOs [11]. Most of them are targeted at early users of the protocol, but some also reward external users of partner protocols, or of competing protocols.

But do airdrops serve as a governance tool? Token holder participation in governance is still the exception rather than the rule, especially on-chain. Only a small proportion of holders are active in voting over an extended period of time. Instead, protocols focus on delegations as a form of indirect participation.

Airdrop recipients on Snapshot had an average participation rate about 6% higher than that of token holders in general. This effect was smaller for on-chain voting (0.5%). Voting frequency was similar in both groups. Recipients also had higher delegation shares. *Accordingly, airdrops can be an instrument to increase governance activity.* However, the specific impact needs to be assessed on a case-by-case basis. In about a third of the protocols, the activity of the airdrop recipients was lower.

Airdrops - like any reward - are a balancing act: The aim is to decentralise the distribution of tokens and encourage general community engagement but also to reward active members in particular. A protocol's ability to find proportionality in the airdrop design may determine whether the airdrop achieves the desired goal.

Finally, incentives are only one piece of the puzzle in establishing a DAO long-term. After the initial impact of an airdrop, stable governance processes need to be established. Most importantly, a DAO should provide a useful product that is attractive even without additional incentives [5]. At best, the "extrinsic" motivation becomes an "intrinsic" one.

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