Proposed formula for early user COMP rewards

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1 Introduction

This document describes a proposed formula for determining the amount of COMP to distribute to addresses that interacted directly with the Compound protocol prior to the release of the COMP token and distribution model.

For further context about the rationale and degree of support for this idea in the community, please see the Relevant discussion on the Compound Forums.

2 Formula Details

The two strategies for allocating an airdrop to early users that have clear traction in the forums are:

- **socially-weighted**: every qualifying address receives a fixed amount of COMP

- **capital-weighted**: COMP received per address depends on the value of assets supplied and borrowed to the protocol, possibly relative to the total value locked (TVL) in the protocol, over time

There are valid arguments in favor of both approaches. The UNI airdrop featured a combination of the two: socially-weighted for all interacting non-contract addresses (even including would-be users whose transactions failed!), plus a capital-weighted distribution to liquidity providers.

The proposed formula is therefore a simple linear combination of socially-weighted and capital-weighted terms, with COMP awarded to user i having the form

$$\mathrm{COMP}_i = w \cdot \mathrm{socialCOMP}_i + (1 - w) \cdot \mathrm{capitalCOMP}_i$$

The parameter w, $0 \leq w \leq 1$ controls what fraction of the distribution is allocated socially and what fraction is allocated by capital, with $w = 0$ being fully capital-weighted and $w = 1$ being fully socially-weighted.

2.1 Definition of a qualifying address

Addresses qualifying for an early user airdrop under this proposal meet the following criteria:

- Issued at least one supply (`mint()`) or borrow (`borrow()`) transaction with Compound V1 money market contract or Compound V2 contracts in the following window:

  - First eligible block: Compound V1 launch on Sept 26, 2018 UTC (block 6400278)
  - Last eligible block: one week prior to COMP token launch, June 8, 2020 UTC (block 10228172)

- Is an external owned account (EOA). This requirement includes all addresses that interacted directly with the protocol but excludes interactions that were mediated by contracts. A rationale for this criterion can be found in the forums (entry 214).

- Does not show evidence of participation in the Sybil attack on early governance; see `SybilAttackRemover.py` for address detection details.

2.2 Evaluation of social term

The social term simply takes the total COMP to be distributed and apportions it equally to every qualifying address:

$$\text{socialCOMP}_i = \frac{\text{TotalCOMP}}{\text{Number of qualifying addresses}}$$

2.3 Evaluation of capital term

The Compound protocol would not have been able to scale to its current size without the capital of its earliest users. The capital term is intended to recognize the importance of early capital to the protocol by distributing COMP to addresses in proportion to how much capital they supplied to (and possibly borrowed from) the protocol over the early-user eligibility window.

Compound currently uses an established capital-weighted formula for distributing COMP to current suppliers and borrowers in the protocol. Here, a simpler model is proposed in which the value supplied/borrowed by an address at each interaction with the protocol is multiplied a simple TVL multiplier m based on when the interaction took place. This multiplier ranges linearly from $m = 1$ for interactions occurring at the end of the eligibility window to $m = 86$ at the beginning of the eligibility window, where $m = 86$ represents the approximately 86-fold increase in TVL for the Compound protocol during the eligiblity window.

For each user i and supply/borrow transaction α, we estimate the capital associated with the transaction $C_{i\alpha}$ by multiplying the amount of tokens of type T, $N_{i\alpha,T}$ by the average price per token, P_T, over the eligibility window,

$$C_{i\alpha} = N_{i\alpha,T} P_T$$

where the average price per token for non-stablecoins is obtained from a simple two-point average of the price at the beginning and end of the eligibility window according to CoinGecko,

$$\bar{P}_T = \frac{1}{2} \left[P_T(\text{Compound V1 launch date}) + P_T(\text{COMP token launch date}) \right]$$

Average price per token for stablecoins is fixed at 1. A more accurate accounting could be achieved using daily price history data from Coingecko, but we argue that the price histories of all tokens compatible with the protocol were sufficiently nonvolatile during the eligibility window that this approximation does not materially affect the calculation.

For each transaction's capital value $C_{i\alpha}$, we account for its "earliness" by computing the TVL multiplier $m_{i\alpha}$ described above from the block number b_α of the transaction,

$$m_{i\alpha} = 1 + k \frac{b_\alpha - b_{\text{end}}}{b_{\text{start}} - b_{\text{end}}}$$

where b_{start} and b_{end} are the beginning and ending blocks of the eligibility window, described in section 2.1, and $k = 85$ is chosen so that each TVL multiplier $m_{i\alpha}$ satisfies $1 \leq m_{i\alpha} \leq 86$ as described above.

With this information, the capital term for address i is computed by taking the product of the capital value $C_{i\alpha}$ and the TVL multiplier $m_{i\alpha}$ for each qualifying transaction, summing over all transactions by that address, and dividing by the sum over all qualifying addresses. The result is the fraction of TotalCOMP apportioned to address i, so we multiply by TotalCOMP to convert from a unitless fraction to a total denominated in COMP.

$$\text{capitalCOMP}_i = \text{TotalCOMP} \cdot \left[\frac{\sum\limits_{\text{transactions } \alpha} m_{i\alpha} C_{i\alpha}}{\sum\limits_{\text{users } j} \left(\sum\limits_{\text{transactions } \alpha} m_{j\alpha} C_{j\alpha} \right)} \right]$$

2.4 "Top-up" adjustment to TotalCOMP

Any nonzero value of the weight factor w will produce a COMP distribution with a "floor", that is, a minimum number of COMP that every qualifying address will receive. To help align the distribution with the governance goals of the airdrop, we propose to include a "top up" quantity of COMP, distributed equally to all qualifying addresses, to raise this floor to an integer number. By setting the floor at an integer number, any future proposals to support early user participation in govenance (e.g. decreasing the minimum COMP required to submit a CAP) will be easier for the community to understand and implement. This "top-up" adjustment effectively increases the amount of COMP to be distributed by some small inflationary factor, which this proposal aims to keep modest (below 10%).

2.5 Selection of the social-vs-capital weight parameter w

Given community support for both capital-based and social-based weights, w should be neither 0 nor 1, but something in between. A natural starting point for conversation is $w = 0.5$, which

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places equal weight on the two terms.

A 50-50 weight scheme has the apparent advantage of splitting the difference between these two philosophical approaches to early user rewards, but it has several disadvantages that stem from the exponential features of capital:

- It distributes most of the early user rewards to deep-pocketed users whose "capital at risk" in the protocol may have been a relatively small *fraction* of their available capital, compared to smaller users who may have risked a considerably larger *fraction* of their available capital. It's unlikely that awarding the deepest-pocketed users most of the distribution will achieve the goal of increasing widespread early user participation in governance or overall project growth.

- It leaves the vast majority of early users with an amount of COMP insufficient to enable or motivate genuine participation in governance

Community members interested in exploring how the choice of w affects the early user distribution list can run the script `EarlyUserProposal.weighted.py` with different values of w (expressed as an integer percentage between 0 and 100) as the single argument and compare the outputs.

The distribution that appears to best meet the goal of empowering the early user community with a meaningful shot at a role in governance is 95% socially-weighted, 5% capital-weighted:
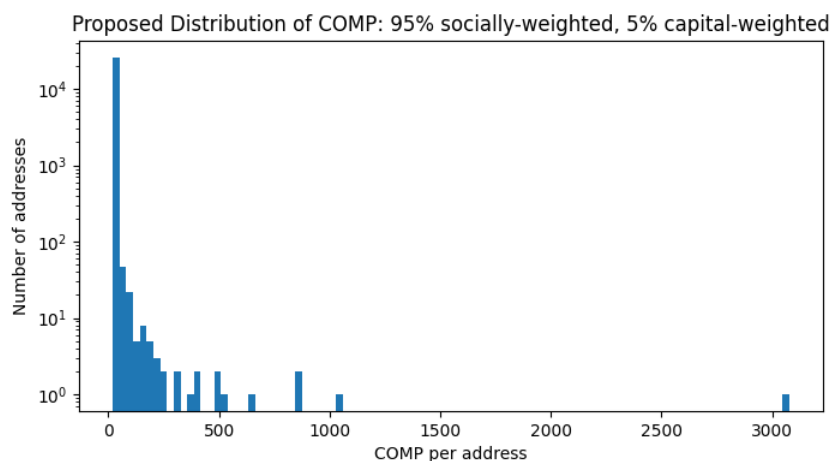
Merits of this choice of w include:

- The largest amount distributed to any single address (≈ 3000 COMP) is roughly two orders of magnitude greater than the floor amount (20 COMP).

- More than 9 in 10 early users receive between 20 and 21 COMP, with fewer than 50 addresses receiving in excess of 100 COMP and only 2 addresses exceeding 1000 COMP.

3 References

1. "Should Compound Retroactively Airdrop Tokens to Early Users?" Compound Forum.

2. `CompEarlyUserAnalysis` repository on GitHub, where the implementation and results are hosted.

3. Proposed early user distribution of COMP by address.