# A Proposal to Enhance Dynamic Discounting in Autonolas Bonding Mechanism

22th September 2023

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## TL;DR

This document presents a proposal for dynamic discount techniques for Autonolas bonding mechanism influenced by four pivotal factors: code contribution, vesting period, program supply, and bonder's veOLAS holdings. The proposal aims to enhance the existing bonding mechanism relying on fixed pricing parameters for security reasons. As a side effect, this approach encourages greater participation in veOLAS, thereby fostering a more resilient and secure ecosystem

## Introduction

Due to security considerations, we are unable to calculate the price of an LP share dynamically based on the current pool reserve status during the bonding program. As a result, when proposing a bonding program with governance, we are required to establish the price of an LP share as a fixed input parameter. This approach may lead to scenarios where the prevailing market price deviates from the initially set price.

To address this discrepancy and ensure both security and consistency, we propose the implementation of dynamic discount techniques. These techniques can offer participants the opportunity to engage with the bonding program and gain advantages, even in cases where the existing market conditions deviate unfavorably from the initial pricing.

## Dynamic discounting overview

The proposed dynamic discounting mechanism considers four key factors, each contributing to a participant's engagement and influencing the discount provided.

1. **Code Contribution and Epoch Performance.** The discount granted is linked to the amount of valuable code generated during the preceding settled epoch. When the quantity of useful code generated approaches the code registered for the specific epoch, the discount will proportionally increase (refer to Fig. 1 for illustration).
2. **Vesting Period Consideration:** The duration of the vesting period is another determinant of the discount. Participants who approach the maximum vesting time frame are eligible for a more substantial discount (see Fig. 2 for a visual representation).
3. **Proportion of supply of the program:** The level of outstanding bond debts (amount to give as a payout to bonders) with respect to the product supply determines the discount magnitude. The discount is directly related to the amount of supply left for the bonding product, lower supply remaining resulting in a lower discount (depicted in Fig. 3).
4. **Proportion of the amount of veOLAS owned by the bonder:** As the bonder ‘sveOLAS holdings approach the target lock selected by the DAO, the discount increases (depicted in  Fig. 4)

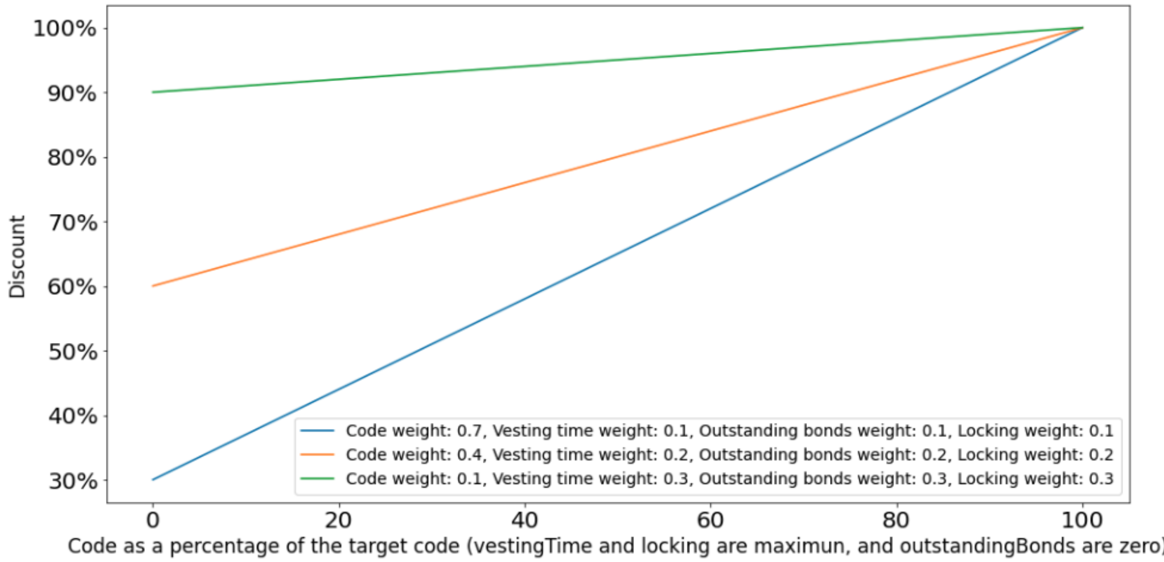


Fig. 1 Percentage of discount with respect to the code contribution of the last settled epoch.

Fig. 1 assumes that the discount components attributed to vesting time, locking, and outstanding liquidity are at their maximum values. As you can see, the greater code weight results in a more rapid increase in the discount percentage as the code contribution grows.

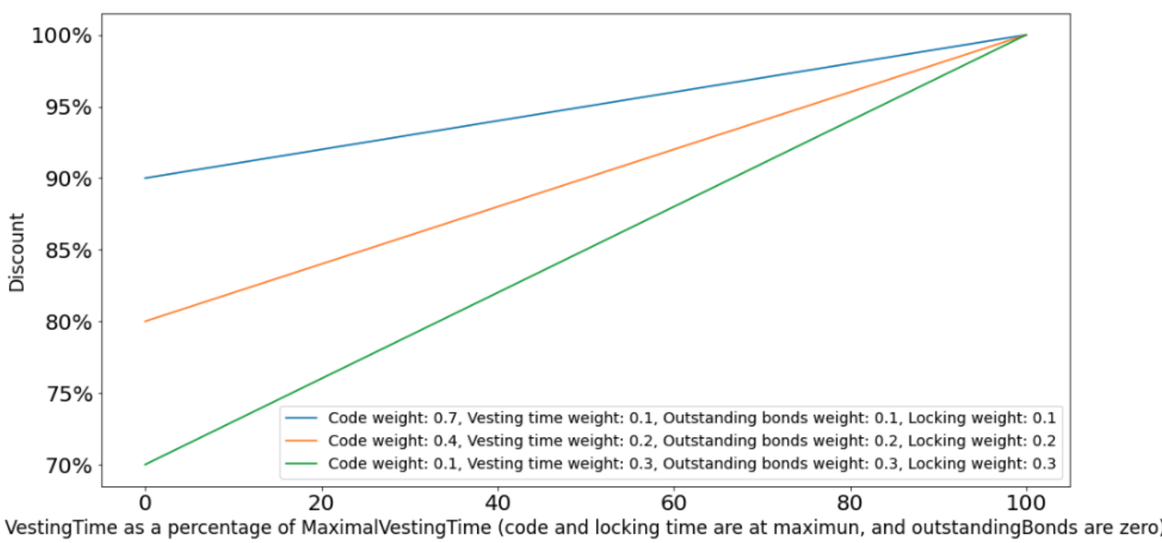


Fig. 2 Percentage of discount with respect to the vesting time.

In Fig. 2, we're assuming that the discount components linked to the code amount, locking, and outstanding liquidity are all at their maximum levels. As you can see from the figure, when the weight of the vesting time increases, the rate at which the discount percentage grows in response to the duration of the vesting period also accelerates.

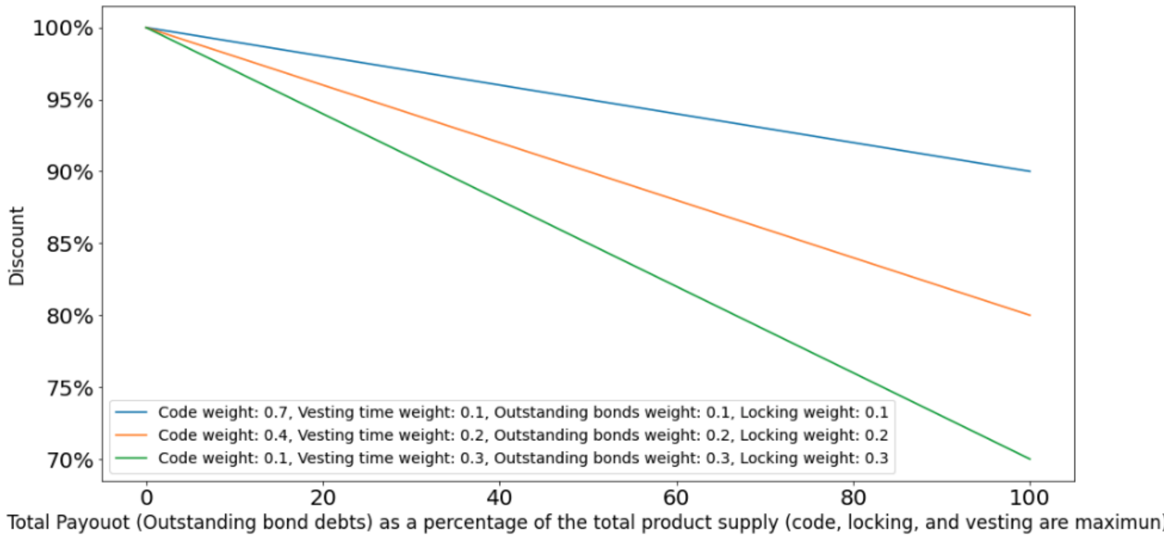


Fig. 3 Percentage of discount with respect to the increase of bonding payout (e.g. as more bonds are accrued with respect to the product supply).

In Fig. 3, we're assuming that the discount components tied to the code amount, locking, and vesting are all at their highest levels. As the weight of the bonds increases, the speed at which the discount percentage declines in response to an increase in the bond outstanding also intensifies.

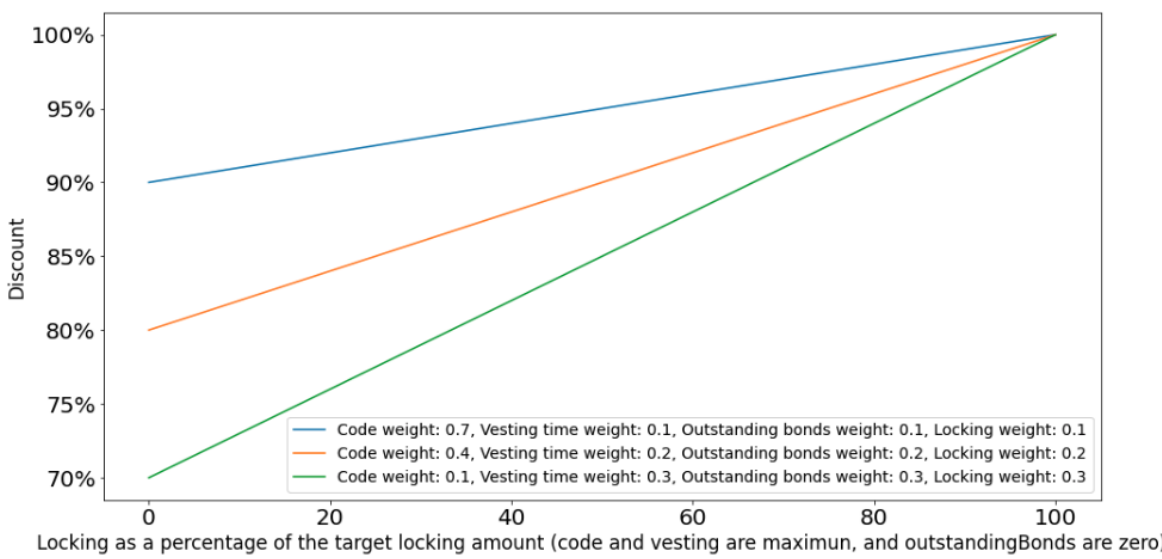


Fig. 4 Percentage of discount with respect to the locked amount of the bonder as a percentage of the target amount for the locking.

Fig.4 assumes that the discount components attributed to code, the vesting time and outstanding liquidity are at their maximum values. As you can see, the bigger the locking weight results in a more rapid increase in the discount percentage as the locking grows.

**Remark.** While the code factor still depends on past epoch performance, the remaining factors dynamically adjust when a participant deposits their assets. This dynamic approach enables the discount to adapt to specific ecosystem conditions and participant actions, enhancing overall flexibility and effectiveness. Furthermore, by considering bonder voting power, it incentivizes greater asset locking, contributing to a more robust and secure ecosystem.

## Formula for the new discount factor

First, let's consider the following definitions.

- Let $NumNewUnit(previousEpoch)$ be the number of the new useful code donated in the $previouEpoch$
- Let $TargetNewUnit(previouEpoch)$ be the number of the new useful code registered in the $previouEpoch$
- Let $vestingTime$ be the time a border select for their bonds to vest
- Let $maximumVestingTime$ be the maximum time selected by the DAO at the bonding product creation
- Let $TotalPayout(at\ bonding\ time)$ be the supply already used for bonds payout of OLAS at the time of the bonding deposit
- Let $SupplyProgram$ be the supply of the bonding program used for deposits
- Let $getVotes(bonder)$ is the veOLAS holding of the bonder at the time of its deposit
- Let $TargetVotingPower$ is the veOLAS holding selected at the bonding creation by the DAO in order to provide a maximum discount from the veOLAS part.
- Let $k_1$, $k_2$, $k_3$ , $k_4$ the weights of each of the factors that compose the discount selected by the DAO at the time of bonding program creations.

Now, let's define the inverse of the discount factor (IDF).

**Case A.** When the following happen

1. $NumNewUnit(previousEpoch) < TargetNewUnit(previouEpoch)$,
2. $getVotes(bonder) < TargetVotingPower$

the IDF can be defined as follows

IDF=1 $+ (k_1 * \ NumNewUnit(previous\ \ epoch)/ TargetNewUnit(previous\ \ epoch)$

$+ \ k_2 * (vestingTime/maximumVestingTime)$

$+ \ k_3 * \ (1 - TotalPayout(at\ bonding\ time)/SupplyProgram)$

$+ \ k_4 * getVotes(bonder)/TargetVotingPower$

**Case B.** If $NumNewUnit(previous\ \ epoch) >= \ TargetNewUnit(previous\ \ epoch)$

the IDF can be defined as follows

IDF= $1 + (k_1 + k_2 * (vestingTime/maximumVestingTime))$

$+ \ k_3 * \ (1 - TotalPayout(at\ bonding\ time)/SupplyProgram$

$+ \ k_4 \ * getVotes(bonder)/TargetVotingPower)$

**Case C.** If $TargetNewUnit(previous\ \ epoch)$=0

IDF=1 $+ \ k_2 * (vestingTime/maximumVestingTime))$

$+ \ k_3 * \ (1 - TotalPayout(at\ bonding\ time)/SupplyProgram$

$+ \ k_4 \ * getVotes(bonder)/TargetVotingPower)$

**Case D.** when $getVotes(bonder) \ >= TargetVotingPower$

IDF=1 $+ (k_1 * \ NumNewUnit(previous\ \ epoch)/ TargetNewUnit(previous\ \ epoch)$

+ $k_2 * (vestingTime/maximumVestingTime))$

$+ \ k_3 * \ (1 - TotalPayout(at\ bonding\ time)/SupplyProgram + \ k_4)$

**Case E.** If $TargetVotingPower = 0$

IDF=1 $+ (k_1 * \ NumNewUnit(previous\ \ epoch)/ TargetNewUnit(previous\ \ epoch) +$

$k_2 * (vestingTime/maximumVestingTime))$

$+ \ k_3 * \ (1 - TotalPayout(at\ bonding\ time)/SupplyProgram)$

**Maximum Interest Cap:** The weight $k_1$, $k_2$, $k_3$, $k_4$ have to be set by the DAO at the bonding program creation in such a way, $k_1 + k_2 + k_3 + k_4 = 1/m$, where $m \geq 1$ is a rational number.
Considering, $m = 1$, The formula ensures that the maximum Interest Discount Factor (IDF) is capped at 2, limiting the highest interest rate to 100% and the discount to 50%. However, DAO can trigger lower interest rates by selecting $m > 1$. In other words, the weight $k_1$, $k_2$, $k_3$, $k_4$ can be adjusted to fine-tune the interest distribution to desired percentages.

**Example.** A straightforward method for the DAO to determine the $TargetVotingPower$ is by comparing it with the total supply of veOLAS tokens and the quorum required to approve a proposal. For example, if a governance vote requires the approval of m users, setting the $TargetVotingPower$ at 1/mth of the total voting power needed for approval aligns the members voting power with the quorum, ensuring a smooth and effective governance process.

## Note on the implementation updates

In order to integrate these proposed discount techniques, it is necessary to update both the tokenomics and depository contracts. These changes involve two key aspects.

- **Tokenomics Contract Update:** This update primarily focuses on the refinement of the existing $NumNewUnit$ logic within the tokenomics contract. By incorporating these refinements, we ensure the accurate computation of the summand of the interest Discount Factor (IDF) related to the Code Contribution and Epoch Performance

- **Depository Contract Update:** The depository contract must be modified to accommodate additional parameters and summands associated with the IDF calculation. These parameters include factors such as weights, vesting period related parameters, supply and payout of the program, and proportion of the amount of veOLAS owned by the bonder.

## References

For in-depth insights into the current design and comprehensive details on the discount factor and bonding mechanism, we recommend consulting the following sources.

- Autonolas Tokenimics v1
- Autonolas Tokenomics repository documentation
- References cited within the above documents.