Momentum is a dynamically deflating ERC20 token. This paper will explain the core concepts behind how the token contract works.

1. Momentum Values

The contract maintains two important values that update with every transfer: The short momentum and the long momentum

These values are used to track the average amount transferred. This average is not calculated over a discrete length where past values are stored. Instead, the current amount being transferred is integrated into each respective momentum value by emoving a unit of a certain weight, then including the new amount at the same weight and recomputing the momentum:

$$Momentum = Momentum_{previous} + \frac{(amountTransferred - Momentum_{previous})}{Momentum_{weight}}$$

Two separate weights are used for calculating the new long momentum. Transfer amounts below the short momentum will cause a heavier weight to be used when computing the new long momentum. Amounts above the short momentum will cause a lighter weight to be used.

2. Weights

There are 3 separate weights used for computing the new momentum values:

The short momentum weight, SM_w = 16.1803
The long momentum expanding weight, LM_{we} = 26.1803
The long momentum contracting weight, LM_{wc} = 42.3605

The ratio of these values with respect to one another uses an approximation of the golden ratio:

$$\phi = 1.61803398....$$

To better illustrate this:

$$SM_w \cong 10\phi$$

$$LM_{we} \cong SM_w\phi \cong 10\phi^2$$

$$LM_{wc} \cong SM_w\phi^2 \cong 10\phi^3$$

Since $LM_{wc} \cong LM_{we}\phi$, it follows that the ratio of the pressures moving the long momentum in either direction will also adhere to to the golden ratio. The values used in the contract are accurate to 6 significant figures, giving approximate convergence.

3. Range

The absolute difference between the short momentum and long momentum is the range. Every transfer will update the range, either increasing it or decreasing it and ultimately determining the transfer fee. The change in the range can be understood by:

$$\Delta R = \left|LongMomentum_{new} - ShortMomentum_{new}\right| - \left|LongMomentum_{old} - ShortMomentum_{old}\right|$$

If the change in the range is a negative value, the transfer is considered to have stabilized the momentum and will have a fee of 0.75%.

If the change in the range is a positive value, the transfer is considered to have destabilized the momentum and a dynamically calculated transfer fee will be applied.

4. Destabilization fee

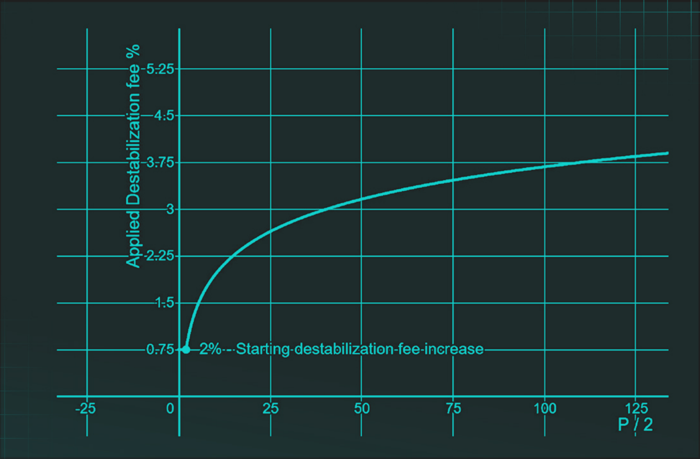
The destabilization fee is a logarithmically formulated value that takes the percent of the new range of the new long momentum as input.

$$P = new\ Range\ percent\ of\ \ new\ Long\ Momentum = 100\left(\frac{Range_{new}}{LongMomentum_{new}}\right)$$

Using P, the destabilization fee is given by:

$$Destabilization\ Fee = \sim 0.75\left(1 + \ln\left(\frac{P}{2}\right)\right)$$

This can be also understood graphically:



This graph demonstrates the logarithmically easing growth of the applied destabilization fee as the short momentum moves further away from the long momentum.

5. Summary

The Momentum contract incentivizes stabilizing transfer sizes. This effect will punish outliers by applying a logarithmically scaled transfer fee.

6. Disclaimer

This paper is for educational purposes and is not financial advice.