eckoDEX Multiplier Analysis

Implementing Algorithmic Financial Modelling for LP Amplification

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Intro

With the release of this on-chain algorithmic booster program, Liquidity Mining 2.0, eckoDEX is now operating beyond any other DEX in DeFi. By accomplishing sustainable token economics while offsetting impermanent loss, liquidity mining becomes simple and accessible to every user. This step will create long term incentives to drive growth and establish Kadena as the hub of DeFi.

`By using on-chain data, the booster program enables programmatically adjusted LP rewards, preserving pool attractiveness from market fluctuations, and is a key feature of progressive decentralization by empowering liquidity providers through consistent rewards over time.

In this article, we explain how eckoDEX's innovative Liquidity Mining 2.0 can give attractive rewards to LPs in order to mitigate impermanent loss, without compromising the long-term sustainability of the KDX token emissions by keeping the token rewards bounded.

Using On-Chain Data

A blockchain **event** consists of the actions driven by user interactions on a contract. Its emission stores the details of the interaction. An event notifies the applications about smart contract changes, which can be used to track pool state changes over time.

Using the eckoDEX chainweb-data instance, we collected data from all eckoDEX transactions since launch, obtaining the swap volumes, price ratios and volatility for four tokens (KDX, Flux, kwUSDC and Kishu-ken) via **swap** and **update** events.

Swap Events

For every user-generated swap on eckoDEX, a swap event is emitted through Chainweb.

This is how a kaddex.exchange.SWAP event is registered:
SWAP sender, receiver, amount-in, token-in, amount-out, token-out

Using these parameters, it is straightforward to obtain the volume for each token pair using its KDA value. As each token pairs against KDA, simply accumulating the KDA value for a swap will result in the token's volume. Defining a_i, $i=\{1,...,n\}$ as:

$$a_i = \begin{cases} \text{amount-in, if token-in is KDA,} \\ \text{amount-out, if token-out is KDA.} \end{cases}$$

$$volume = \sum_{i=1}^{n} a_i$$

Looking at 116,469 swap transactions, we took the daily swap amount for the four chosen tokens since eckoDEX's launch. The graphic below shows the USD swaps amount for each token. Note that since we are only looking at half of the pool, this accounts for only a share of the TVL.

Also, the on-chain amounts obtained are in KDA. The daily Kadena prices in USD were obtained via CoinMarketCap API.

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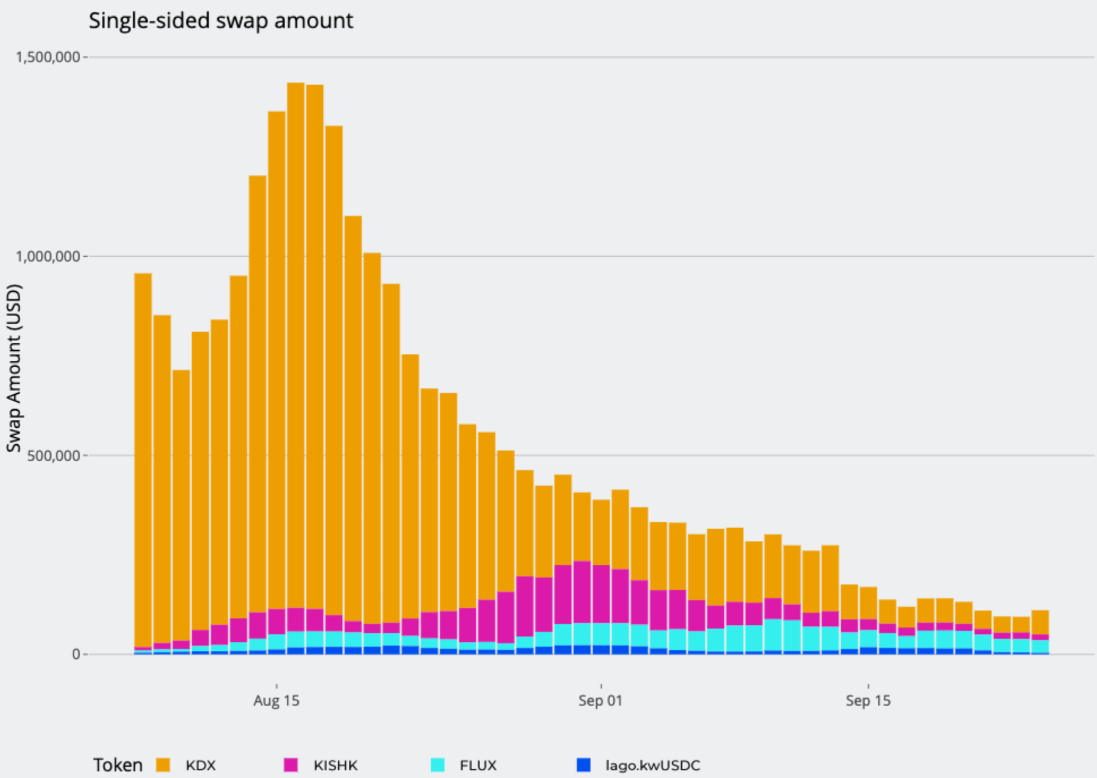

Update Events

Update events are emitted when a pool's Total Value Locked (TVL) changes. This happens when a user swaps a token or adds or removes liquidity into a Liquidity Pool. As its parameters, we have the pair (for instance *coin: kaddex.kdx*) and its respective amounts.

UPDATE pair amount-token1 amount-token2

To retrieve the price rates, we use the TWAP (Time-Weighted Average Prices), which minimizes the impact of large orders, resulting in price estimation improvements. Using the price ratios within a day, we compute the pair's volatility using the rolling standard deviation from the last 7 days.

Analyzing 141,594 update events, we obtained the volatility of the four chosen pairs since their respective listing. Notice the volatility is a parameter without scale, which means it does not have a unit of measure.

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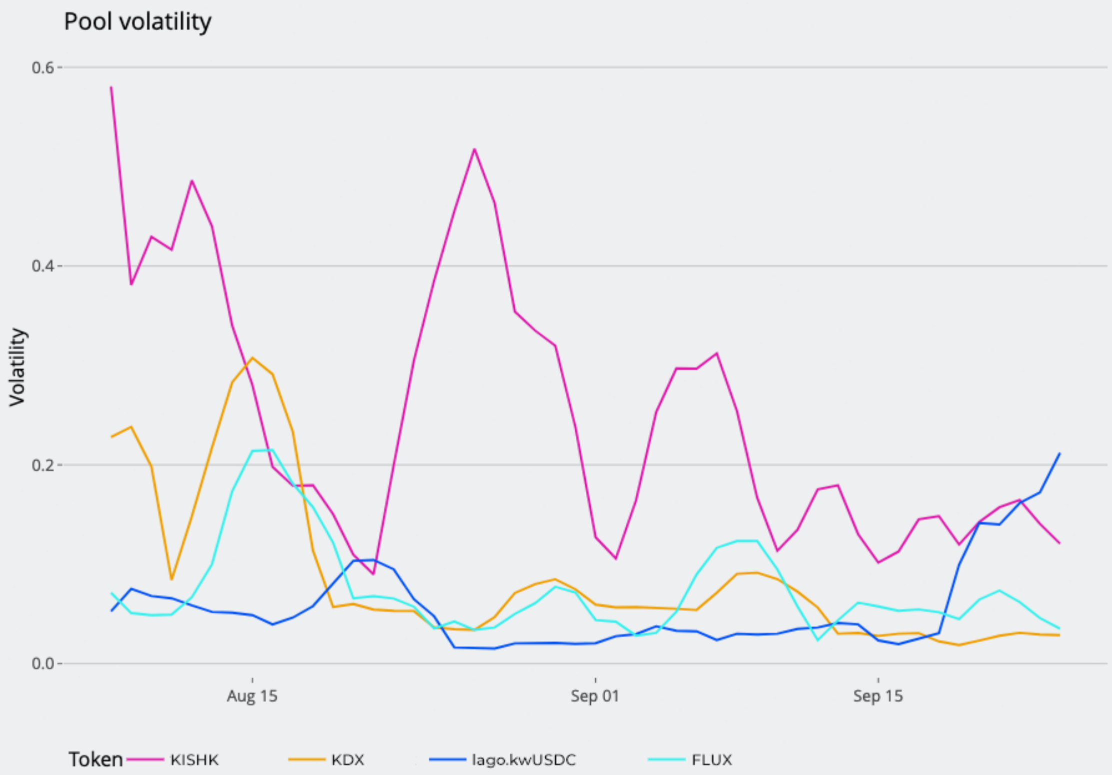

Calculating Swap Volume

In order to work with scaleless measurements in the volume as well, we use the **diluted volume** (*dv*), which is the volume divided by the pool's TVL. This ratio reflects the proportion between in-pool versus the respective token daily traded amounts.

$$dv = \frac{\text{volume}}{\text{TVL}}$$

The graphic below represents the daily diluted volume for the chosen tokens during the elapsed period.

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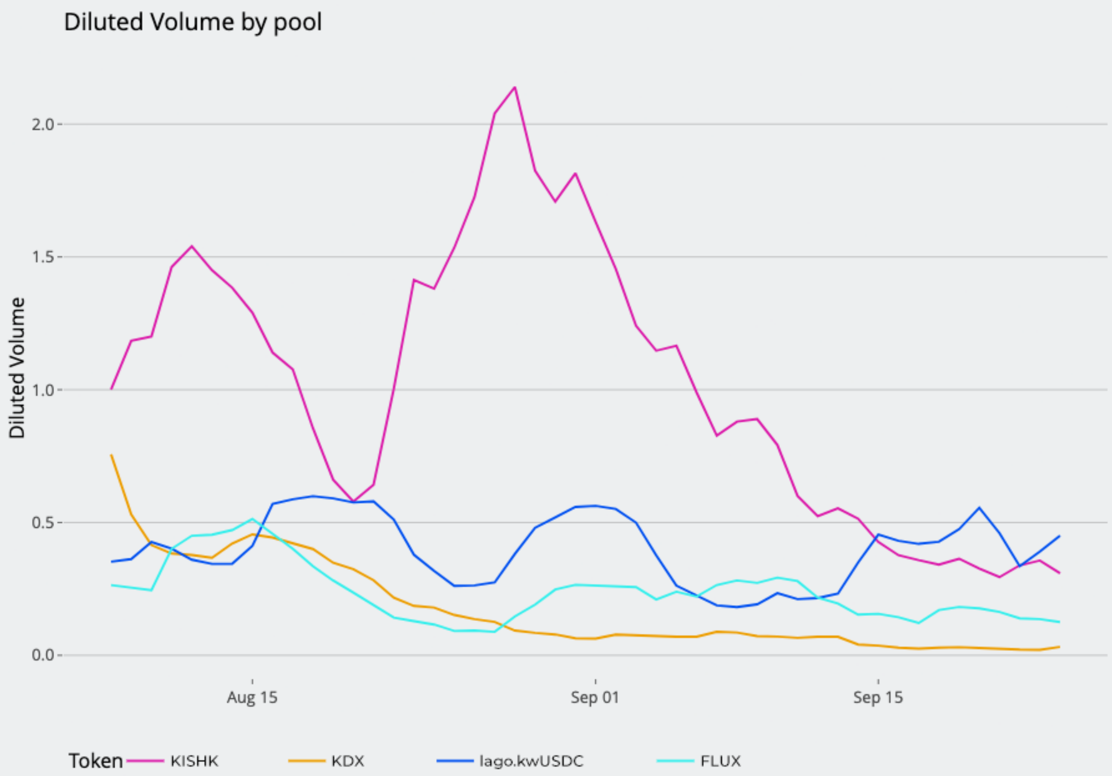

Calculating Impermanent Loss

Impermanent Loss (IL) is a cost of opportunity calculated by the difference between the value accrued by providing liquidity into a pool versus holding the tokens. To calculate IL, we use the formula provided here, with k being a given change in price ratios between two days.

The Impermanent Loss is estimated as:

$$IL(k) = \frac{2\sqrt{k}}{1+k} - 1$$

IL is a complex DeFi phenomenon with some idiosyncrasies. Since a Liquidity Provider only faces IL when their liquidity position is removed from the pool, the losses become permanent only when the action is taken. Further, the pool price ratio continually changes, and can even return to the same ratio as when the liquidity was provided. In this case, impermanent loss would be completely avoided.

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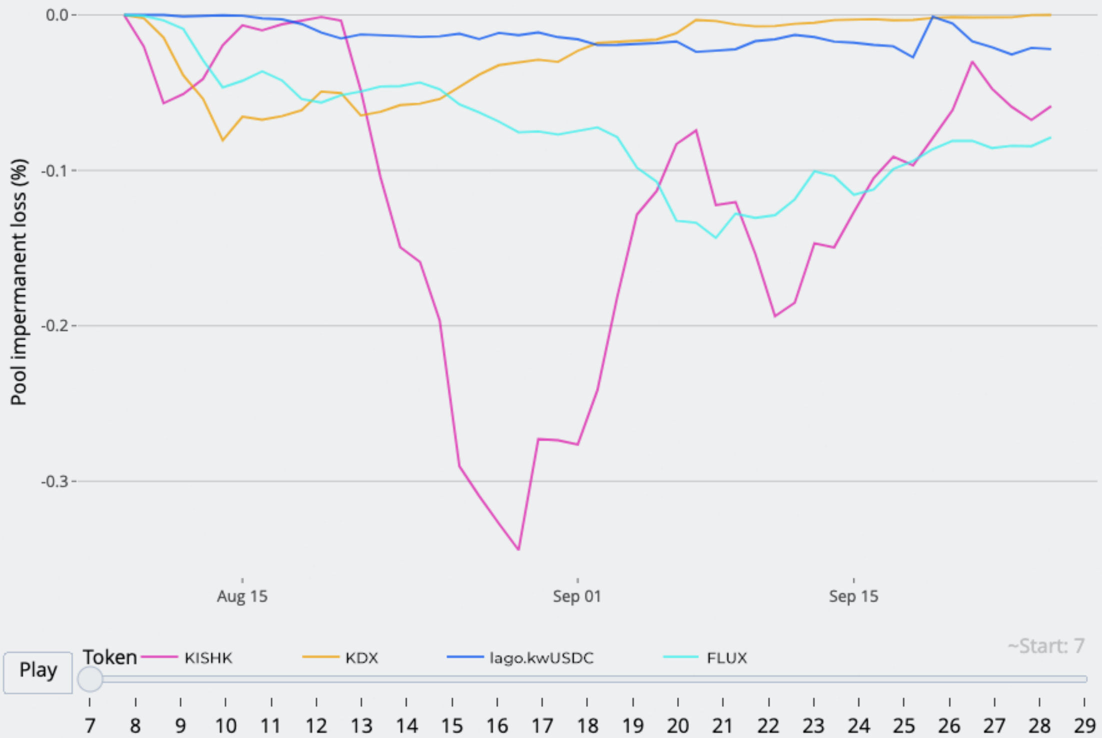

It is important to notice this approach only allows us to estimate the IL in the context of daily price movement. If we use a narrower time window, with hourly data for example, the price rate variations could be larger.

Since all the estimates were calculated using the KDA in-pool values, we are only taking into account the token-side variations, that is, we are not considering the KDA variation of prices itself, as is typical when working with IL.

Calculating Pool Rewards

The pool raw daily rewards (i.e., not boosted by the multiplier) are obtained by multiplying the pool's volume by its fee (0.0025). Comparing it with the IL previously calculated, we have a graphically direct way to see when a pool becomes too volatile to provide returns.

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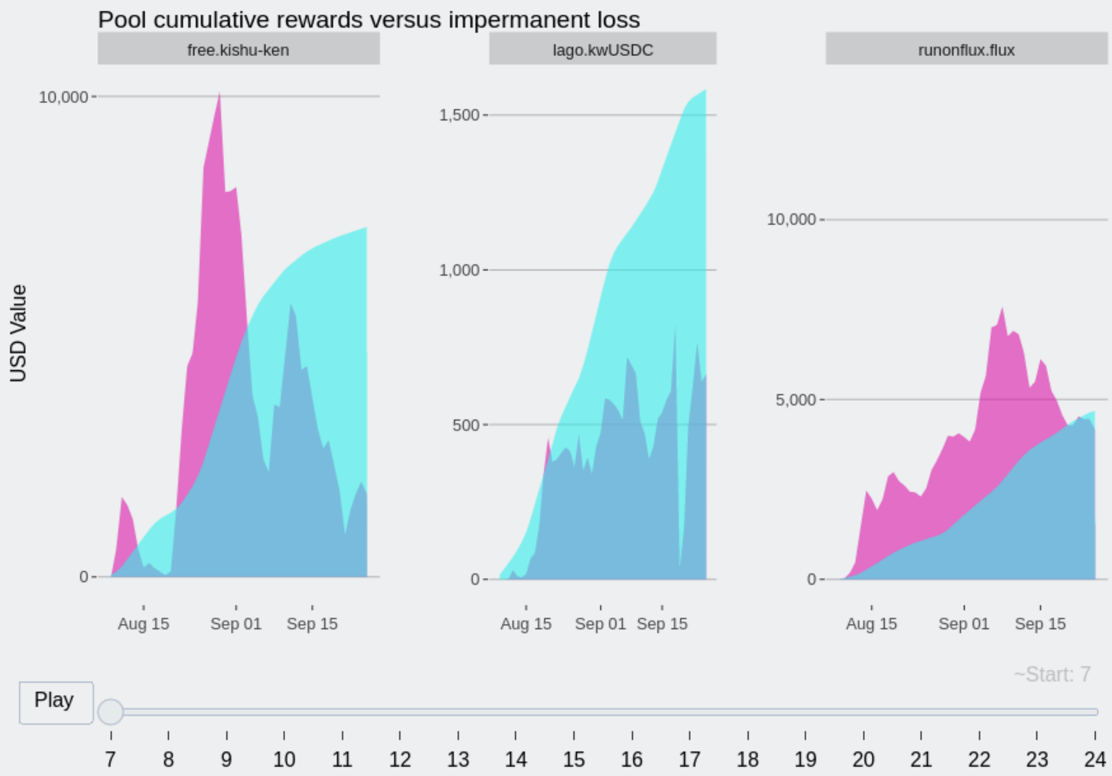


KDX Tokenomics are equipped to combat this issue with a unique feature: the KDX Multiplier. To boost pool rewards, users from the KDA:KDX pool can opt into boosted rewards in the form of KDX, leading to boosted APR rates.

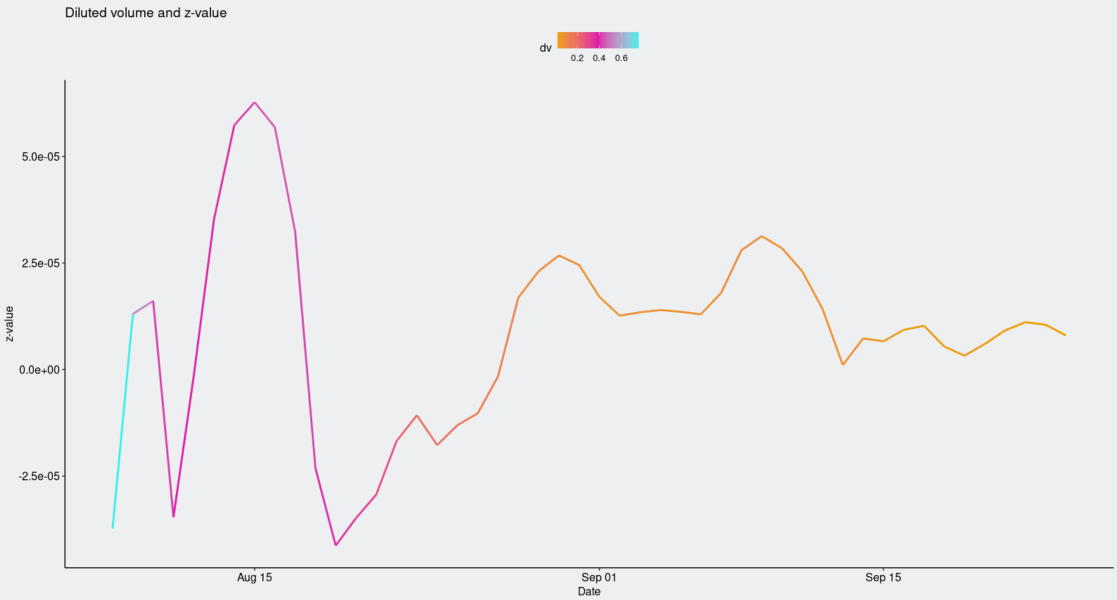
The “z” variable

Since this article is more focused on a data-driven approach, we will leave out some aspects of the multiplier, however, we strongly recommend you take a look at this article to understand the math involved.

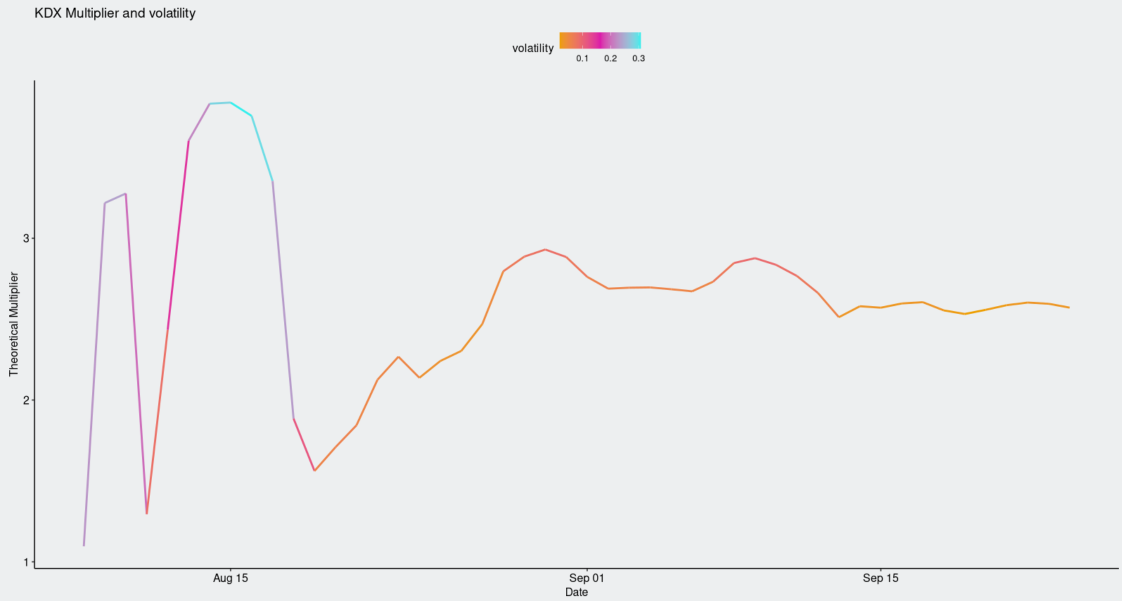
For now, let’s consider the relationship between volatility and diluted volume via the variable z, which is then used to calculate the booster multiplier. We estimate z with the formula:

$$z=(5*volatility-2*volume)/10000;$$

Let’s see how the z-value behaves daily with activity in the KDX pool:



Using the obtained z-value, this displays the algorithmic multiplier for the KDA-KDX pool we would have had during the period:



However, the booster was operating with a 4.0x multiplier to incentivize Liquidity Providers at launch.

Now, accounting for KDX emissions, which had been left out from the previous analysis, we are able to compare the emissions given by the 4x multiplier against the model of what we had obtained through the algorithmic multiplier.

If we combine the obtained KDX rewards with the impermanent loss over the period, we can measure how both programs' rewards are to be able to mitigate the impermanent loss in the entire KDA/KDX pool during the considered time frame.

The graphic above shows us that the emission program from the algorithmic program covers the cumulative impermanent loss by ~30% during the period.

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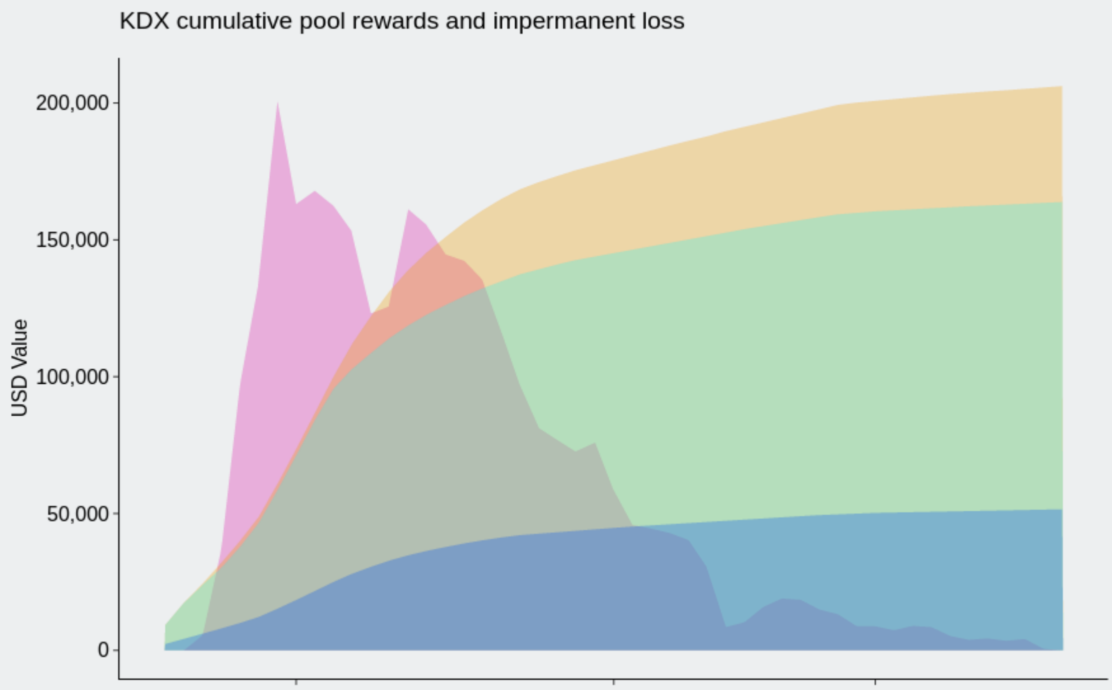

This comparison shows the emission rates to be more sustainable via the algorithmic program, without compromising the rewards. This clearly indicates that the programmatically adjusted multiplier achieves the desired results by covering impermanent loss over the given timescale.

Modeling Emissions

The last step of this analysis is to check the currently minted rewards against those that would be minted via the algorithmic booster program. Using data from 1818 minting transactions from August 1st to September 25th, we obtained all the KDX mint transactions during the elapsed period. To retrieve the USD value, we multiplied the KDX amount by its current pool price rate, and thus retrieved the value in KDA, multiplied by the previously obtained Kadena USD prices.

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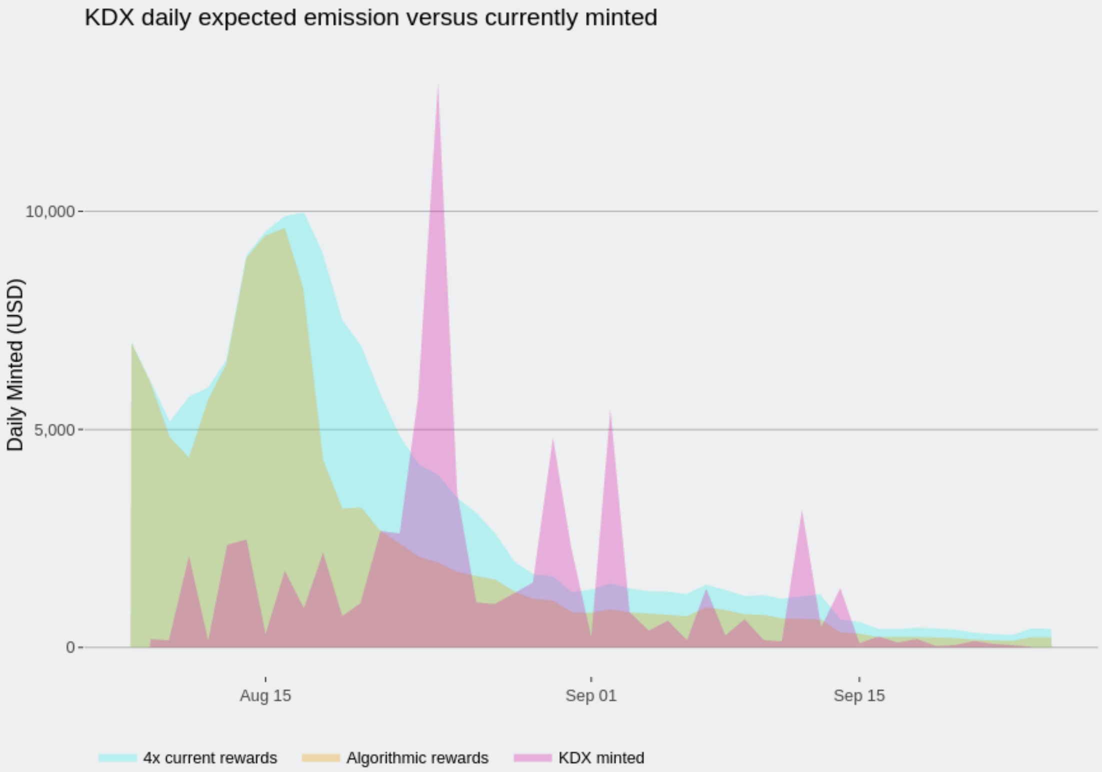

The emission spikes seen above are an expected consequence, due to a necessary 7-day waiting period when a user removes their liquidity position, before being able to collect the minted KDX rewards.

Looking at the cumulative values in the graphic below, we can see that about 55% of the rewards were minted, which means 45% of the rewards have stayed in the pool. The data also suggests that the emission rate will be reduced by around 27% if the algorithmic multiplier is adopted instead of the initial, 4x multiplier.

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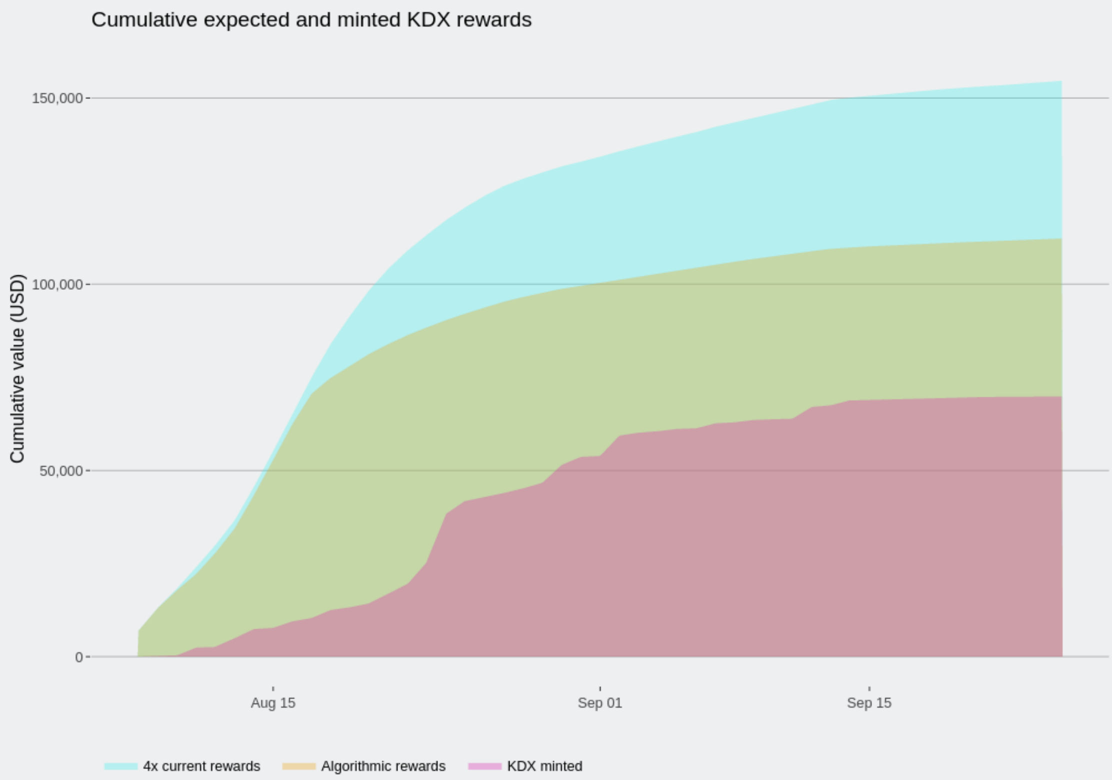

Conclusion

In this article we discussed how we retrieve the information necessary to calculate the multiplier via on-chain data, using eckoDEX transactions in the first two months since its launch.

The estimation of the volume and the price rates via blockchain events gave us a broader approach to deal with impermanent loss, calculating it for the entire pool, while also accounting for the daily price rate variations.

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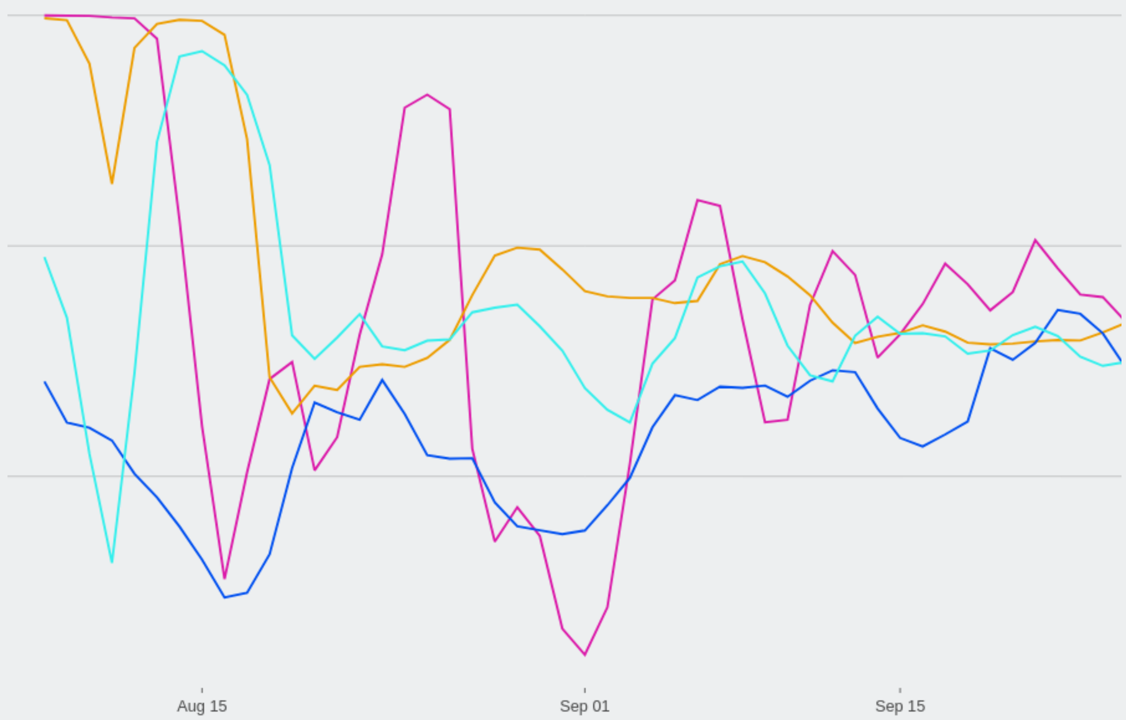

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