

# Introduction

We at BA Labs are thrilled to announce an exciting addition to the Spark risk dashboard – the SPK Airdrop Leaderboard page. This feature, available at <https://spark.blockanalitica.com/>, results from our collaborative efforts with Phoenix Labs. It leverages our comprehensive database of Spark users' historical collateral and debt positions to calculate the SPK token airdrop distribution, aligning with the proposed pre-farming airdrop formula discussed in [this forum post](#).

Because we understand the importance of transparency in such matters, we will present our methodology in detail. This allows you, the community, to thoroughly review and identify any potential discrepancies in our approach. Although we strive for accuracy, we acknowledge the possibility of implementation errors in our backend. Therefore, we invite you to visit the leaderboard page, evaluate our calculations, and share any inconsistencies you might discover right here on this post. Your insights are invaluable in ensuring the integrity of the SPK token distribution.

## Introducing the Spark Airdrop Leaderboard

We're excited to unveil the Airdrop Leaderboard on the Spark dashboard, a feature many of you have eagerly anticipated. This new page, accessible directly at [Spark | Block Analitica](#) or via the 'Airdrop' tab in our main navigation, brings you the latest standings in the pre-farming SPK token distribution.

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Spark Risk dashboard landing page.

1431×683 80.2 KB

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When you visit this page, you will see a comprehensive table that presents the protocol users' individual token amounts accrued from supplying ETH or borrowing DAI, as well as a combined total. The last column, labeled 'Total Projected,' indicates the estimated total amount each user would receive at the end of the pre-farming period, assuming no changes occur in their activities.

Furthermore, you have the capability to input your projected market capitalization for the Spark (SPK) token in its fourth year, when the total token supply will reach 1.5 billion. Based on the market cap you input, we will calculate the USD value of the SPK tokens that users will be airdropped. This calculated USD value will then be displayed on the table, offering a comprehensive view of the potential rewards at the end of the pre-farming period.

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SPK Airdrop Leaderboard

1329×731 67.5 KB

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## Scoring methodology

Our airdrop scoring process is conducted hourly, based on historical user data from our database. Conceptually, it involves two distinct calculations corresponding to ETH and DAI, as each requires specific considerations. This methodology involves applying penalties for supplying sDAI at the same time as borrowing DAI, and borrowing ETH at the same time as supplying ETH.

The initial step entails gathering all historical DAI borrowing data, identifying unique wallet addresses from these transactions, and then retrieving corresponding sDAI supply data for these wallets.

We analyze each user's transaction history, segmenting it into periods defined by a start block, an end block, and a calculated liquidity score for each period.

Simple scenario:

Consider the current block number is 200. User A's activity includes:

- Borrowing 1000 DAI at block 0.
- Borrowing another 1000 DAI at block 100.

Our method segments this into two parts, each with its liquidity score calculated as the product of supply amount and the number of blocks in that segment:

- Segment 1: {startBlock: 0, endBlock: 100, liquidityScore: 100,000}
- Segment 2: {startBlock: 100, endBlock: 200, liquidityScore: 200,000}

In this simple case, User A's total liquidity score is 300,000. While direct tallying of scores per user seems straightforward, segmentation becomes crucial for accurately applying penalties.

Complex Scenario:

Let's examine a more complex situation with the assumption that the price of sDAI equals 1 DAI:

Current block: 300. User A's actions are:

- Borrows 1000 DAI at block 0.
- Supplies 1000 sDAI at block 50.
- Repays 1000 DAI at block 100.
- Borrows 1000 DAI again at block 150.
- Withdraws 1000 sDAI at block 200.

In this scenario, we separate the actions into DAI and sDAI segments. For sDAI, the liquidity score is adjusted by multiplying by sDAI's liquidation threshold. This adjusts for the amount of DAI that could potentially be borrowed against the supplied sDAI. The segments are as follows:

- DAI Segment 1: {startBlock: 0, endBlock: 100, liquidityScore: 100,000}
- DAI Segment 2: {startBlock: 150, endBlock: 300, liquidityScore: 150,000}
- sDAI Segment: {startBlock: 50, endBlock: 200, liquidityScore: 114,000 ( $150,000 * 0.76$ )}

To accurately assess the impact of sDAI supply, we identify overlaps between DAI borrow and sDAI supply segments. In this instance, the sDAI supply overlaps with both DAI borrow segments for 50 blocks each. Given that the sDAI segment duration is 150 blocks, the overlap accounts for one-third of its duration. Therefore, we reduce each DAI segment's liquidity score by a third of the sDAI segment's score. Post-adjustment, the segments are:

- DAI Segment 1: {startBlock: 0, endBlock: 100, liquidityScore: 62,000}
- DAI Segment 2: {startBlock: 150, endBlock: 300, liquidityScore: 112,000}

The total adjusted score for User A is 174,000, which is more precise than a blanket penalty for the entire sDAI supply, which would have resulted in a score of 136,000.

We apply a similar process for ETH transactions, with a key difference in how we calculate the liquidity score for ETH borrowing. Unlike the sDAI case, where the liquidity score is multiplied by the sDAI liquidation threshold, for ETH, we divide the liquidity score by the liquidation threshold of the ETH market. This adjustment is made to account for the amount of ETH that serves as collateral for the borrowed ETH.

For example, if a user supplying ETH also borrows 100 ETH for a duration of ten blocks, the adjustment to their reward token liquidity score wouldn't simply be the product of the amount borrowed and the duration (1000 in this case). Instead, it would be adjusted to approximately 1,212 ( $1000 / 0.825$ ), taking into account the ETH market's liquidation threshold.

## Scoring Methodology with Formulaic Representations and Proof

With the above examples we can break down the scoring methodology into the following set of definitions and formulas:

Segments and Liquidity Score

Segment types

Segment overlap and Adjusted Liquidity Score

Total user Liquidity Score

To validate our methodology, let's consider multiple user scenarios with agreed-upon outcomes:

Example 1:

- Current block height: 20 million.
- User A borrows 1000 DAI at block 18 million.
- User B borrows 2000 DAI at block 19 million.

In this scenario, User A borrows half the amount of DAI as User B but for twice the duration. Both users achieve a liquidity score of 200,000, leading to a distribution of 50% of the SPK token airdrop to each.

Example 2:

Current block height: 20 million.

Current sDAI price: 1 DAI

- User A:
- Borrows 2000 DAI and supplies 1315.78 sDAI at block 18 million.
- Segments for User A:
- DAI Segment: {startBlock: 18m, endBlock: 20m, liquidityScore: 4,000,000,000}
- sDAI Segment: {startBlock: 18m, endBlock: 20m, liquidityScore: 2,000,000,000}
- DAI Segment: {startBlock: 18m, endBlock: 20m, liquidityScore: 4,000,000,000}
- sDAI Segment: {startBlock: 18m, endBlock: 20m, liquidityScore: 2,000,000,000}
- Final score for User A = 2,000,000,000
- Borrows 2000 DAI and supplies 1315.78 sDAI at block 18 million.
- Segments for User A:
- DAI Segment: {startBlock: 18m, endBlock: 20m, liquidityScore: 4,000,000,000}
- sDAI Segment: {startBlock: 18m, endBlock: 20m, liquidityScore: 2,000,000,000}
- DAI Segment: {startBlock: 18m, endBlock: 20m, liquidityScore: 4,000,000,000}
- sDAI Segment: {startBlock: 18m, endBlock: 20m, liquidityScore: 2,000,000,000}
- Final score for User A = 2,000,000,000
- User B:
- Borrows 2000 DAI at block 19 million.
- Segment for User B:
- DAI Segment: {startBlock: 19m, endBlock: 20m, liquidityScore: 2,000,000,000}
- DAI Segment: {startBlock: 19m, endBlock: 20m, liquidityScore: 2,000,000,000}
- Final score for User B = 2,000,000,000
- Borrows 2000 DAI at block 19 million.
- Segment for User B:
- DAI Segment: {startBlock: 19m, endBlock: 20m, liquidityScore: 2,000,000,000}
- DAI Segment: {startBlock: 19m, endBlock: 20m, liquidityScore: 2,000,000,000}
- Final score for User B = 2,000,000,000
- User C:
- Borrows 2000 DAI at block 18 million and supplies 2631.57 sDAI at block 19 million.

- Segments for User C:
- DAI Segment: {startBlock: 18m, endBlock: 20m, liquidityScore: 4,000,000,000}
- sDAI Segment: {startBlock: 19m, endBlock: 20m, liquidityScore: 2,000,000,000}
- DAI Segment: {startBlock: 18m, endBlock: 20m, liquidityScore: 4,000,000,000}
- sDAI Segment: {startBlock: 19m, endBlock: 20m, liquidityScore: 2,000,000,000}
- Final score for User C = 2,000,000,000
- Borrows 2000 DAI at block 18 million and supplies 2631.57 sDAI at block 19 million.
- Segments for User C:
- DAI Segment: {startBlock: 18m, endBlock: 20m, liquidityScore: 4,000,000,000}
- sDAI Segment: {startBlock: 19m, endBlock: 20m, liquidityScore: 2,000,000,000}
- DAI Segment: {startBlock: 18m, endBlock: 20m, liquidityScore: 4,000,000,000}
- sDAI Segment: {startBlock: 19m, endBlock: 20m, liquidityScore: 2,000,000,000}
- Final score for User C = 2,000,000,000

As demonstrated in this example, despite the users entering the market in different ways, their final scores align, with each receiving a third of the airdrop.

## Community Validation and Feedback

As we move forward, the role of our community is pivotal in ensuring the accuracy and fairness of the airdrop distribution process. We strongly encourage everyone to rigorously validate the proofs and calculations presented.

We also invite you to explore the airdrop page on our dashboard, where you can see the methodology in action. This transparency is not just for clarity, but also to foster trust and collaboration within our community.

Please do not hesitate to raise any concerns, discrepancies, or suggestions you may have. Whether it's a potential error, an aspect that isn't clear, or simply a suggestion for improvement, we are open to all forms of feedback.