

Preamble

Given the importance of the Smart Burn Engine (SBE) in the wider Endgame Initiative, it is important to keep monitoring the parameters and ensure transactions are running smoothly. Following the [Smart Burn Engine - Transaction Analysis #2](#), where we analyzed the sensitivity of the parameters to drawdowns in MKR prices and drops in Liquidity Pool sizes, this time the aim is providing a sensitivity analysis to increases in gas prices, as well as suggesting the new optimized parameters for the SBE.

The analysis covers the period 05 October - 21 November, and takes into account the effective update of the meta parameter Rate of MKR Accumulation (9.1.2), which will likely be lowered from 100M DAI per year to 60M DAI per year in order to achieve higher SBE transactions uptime once the MIP102c2-SP20 is ratified on 27th November. In addition, the new language in 9.1.2 specifies that the Rate of MKR Accumulation has to be increased in the case where it is evident that the excess surplus buffer above Upper Limit is accumulating; BA Labs will be monitoring this in addition to other SBE related items going forward and propose necessary parameter and meta parameter changes according to the scope language. Finally the new language in the element 9.1.3.6 dictates the SBE parameter reconfiguration methodology and frequency of updates; the Dss Flapper parameters must be configured in a way where the transacting costs including price impact and gas related costs are minimized. This document is thus the required analysis which shows that parameter configuration is minimizing the cost and thus does not require an on-chain governance poll anymore and can go directly to the executive vote, once it is formally proposed by the Responsible facilitator of Stability Scope. More details can be found in the [MIP102c2-SP20 element 9](#).

Data Gathering

All data is pulled and presented as of 16:00 UTC 21 November 2023.

We pulled data from Etherscan on [Uniswap v2 DAI/MKR LP accumulation by the DSS Pause Proxy](#), as well as [DAI tokens Transferred from the DSS Flapper](#), while ETH prices are weighted average prices across major exchanges. Historical gas prices are pulled from [Etherscan](#). This provides a general overview of the amount of DAI used and LP tokens accumulated which can help determine total execution costs, efficiency, and LP focused metrics.

[Smart Burn Engine - Transaction Statistics and Metrics to 21 November 2023](#)

[Smart Burn Engine - Parameter Configuration & Gas Price Analysis 21 November 2023](#)

Further information can be found on the [Makerburn](#) site.

SBE Transaction Analysis

For the period 05 October 2023 - 21 November 2023, the SBE has used a total of 16,064,360 DAI - of which 8,040,000 spent and 8,024,360 paired - to accumulate a total of 201,394 units of Uniswap v2 DAI/MKR LP token. Compared to 05 October the Uniswap v2 DAI/MKR LP has grown by \$15,638,256 in nominal terms (a 49.4% increase) to reach a total pool size of \$47,285,762.

The DAI necessary to be paired has dropped from 19,965 to 19,956 following the trend identified in the previous SBE Transaction Analyses. Once again, the reason behind the drop is the growth in the pool liquidity size, which mostly comes from SBE and general general increases in MKR price.

Distribution of Delay Periods

During the 05 October 2023 – 21 November 2023 period (47.38 days), the SBE executed a total of 401 actions, ~38.2% lower than the theoretical maximum of 648 operations given hop

of 6,308. Even though below the theoretical threshold, the efficiency improved compared to the last period analyzed, where the executed actions were ~54.7% lower than the theoretical threshold.

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When looking at the individual delays, we can see that most of the delay time is due to some significant outliers. Specifically, 3% of swaps were responsible for 99.2% of the total delay time. The twelve swaps namely delayed for:

- 31.60 minutes
- 46.40 minutes
- 03.04 hours
- 04.99 hours
- 13.17 hours
- 19.51 hours
- 01.04 days
- 01.19 days
- 01.71 days
- 03.50 days
- 03.61 days
- 05.01 days

The reason for these delays is the surplus buffer limit not exceeding the 50M threshold after which the SBE activates. The update to The Rate of MKR Accumulation in the MIP102c2-SP20 will increase the SBE uptime, since the transacting will be slower and excess surplus buffer above Upper limit will be used slower.

Market Impact

The realized Market Impact of the SBE's trades can be calculated by looking at the amount of DAI that must be paired with MKR to provide in the LP, accounting for the 0.3% swap fee charged by Uniswap. To calculate the average market impact of each execution, we use the equation:

The fact that Maker is almost the entire pool's liquidity, allows for the market impact to decline monotonically, in line with the previous analyses.

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Parameter Optimization

For the current pool liquidity size, parameters would be optimized to reduce losses at bump

= 25,000 and hop

= 13,140 seconds. This can be seen from the following graphs, illustrating the relationship between bumps and losses for the current LP size.

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On the other hand, it is important to consider the fact that when the next spell will go to the executive vote on 29 November, the LP will have a different size. Based on the current daily growth of the LP size, by that day the pool will be at least \$51m large. Based on this pool liquidity size, the parameter configuration will differ, specifically the optimized parameters would result in a hop

of 15,768 seconds and a bump

of 30,000.

Sensitivity Analysis

We will now analyze a new factor to monitor when optimizing the SBE's parameters, the sensitivity to gas related costs. Since the SBE optimizes parameters for dollar-value gas prices, it is important to outline the relationship between average gas prices and ETH prices. In order to do so, we used a simple regression model to have more precise simulations of the resulting dollar-value gas cost. The data considers only the period 15 September 2022 - 21 November 2023, in order to exclude the period when ETH was still utilizing Proof-of-Work.

When plotting the relationship between gas prices and ETH prices, we can see a weak positive relationship between a raise in ETH prices and a raise in gas prices. We will use these coefficients to simulate gas prices for different ETH prices.

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The final results used to model the optimal parameters given increasing gas prices assume a current ETH price of \$2,000 and 25% jumps in price. The cost per flap (\$) is one of the parameters that allows us to find the optimal bump

and hop

that minimize annual costs.

ETH Price (\$)

Gas Price (Gwei)

Cost per flap (\$)

2,500

54.68

43.75

3,000

69.22

66.45

3,500

83.76

93.81

4,000

98.30

125.82

Assuming a constant LP size (the current one equal to \$47,267,019), increases in Gas Prices would move the optimal bump to the right, towards larger lot sizes. This is intuitive, since higher transaction costs would mean reducing the number of transactions and increasing the lot size.

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SBE Parameter Reconfiguration Proposal

Based on the current average daily liquidity growth rate of ~\$352,446 in the Uniswap v2 DAI/MKR pool which is based on the current configuration of SBE parameters, the pool size will be at least \$51M large when the spell containing parameter changes will go to the executive vote on 29 November. The proposed parameters will allow for cost optimization, sandwich attack prevention, and protection against increases in gas prices.

Therefore we suggest the Stability Facilitator to propose the following parameter changes:

Hop: Increase for 9,460 seconds from 6,308 seconds to 15,768 seconds

Bump: Increase for 10,000 DAI from 20,000 DAI to 30,000 DAI

Stability Scope Bounded Mutable Alignment Artifact Changes

Assuming that the aforementioned changes are implemented, we also propose to incorporate these figures into the [MIP104: Stability Scope Bounded Mutable Alignment Artifact](#) as follows:

- 9.1.3.1A: The hop

parameter is: 15,768

- 9.1.3.3A: the bump

parameter is: 30,000

Conclusion

The main takeaways from this analysis are the following:

- The SBE is currently transacting below the theoretical rate of accumulation, mainly due to the Surplus buffer being below the Surplus buffer limit of 50M DAI, but improved compared to the 01 August - 05 October period.
- The market impact of SBE's activity is declining monotonically, as expected given the growth of the pool liquidity through the SBE's actions.
- Current parameters are not optimized for cost efficiency and should move towards a larger bump

and larger hop

, for the current LP Size and the new Rate of MKR Accumulation.

- In case of increasing gas costs due to ETH price surges and/or network activity, SBE's parameters would need to be reconfigured towards larger bump

and hop

parameters.

- BA Labs will continue monitoring the SBE and propose an update to the parameters and meta parameters according to the language in the Stability Scope when it is needed.

References

Data sheets:

[Smart Burn Engine - Transaction Statistics and Metrics to 21 November 2023](#)

[Smart Burn Engine - Parameter Configuration & Gas Price Analysis 21 November 2023](#)

More about SBE:

[Introduction of Smart Burn Engine and Initial Parameters](#)

[Smart Burn Engine - Performance to 30 July 2023](#)

[Smart Burn Engine Parameters Update #1](#)

[Smart Burn Engine Transaction Analysis #2](#)

External Resources:

<https://etherscan.io/token/0x517f9dd285e75b599234f7221227339478d0fcc8?a=0xbe8e3e3618f7474f8cb1d074a26affef007e98fb>

<https://etherscan.io/token/0x6b175474e89094c44da98b954eedeac495271d0f?a=0x0c10ae443ccb4604435ba63da80ccc63311615bc>

<https://etherscan.io/chart/gasprice>

makerburn.com

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Dashboard for watching DAI minting and MKR token burning in real time.