

Proposal: Dynamic Risk Parameters

Summary

A proposal for continuous market risk management to optimize yield, capital efficiency, and mitigate depositor losses.

Background

Across DeFi protocols, some things never change. Depositors want risk-adjusted yield, borrowers want capital efficiency, traders want lower fees, liquidity providers want to avoid impermanent loss, and the list goes on. Everything else changes from the participant behavior to the market microstructure. These are market risks.

[Aave's Risk Framework](#) shows the importance this community puts towards understanding and mitigating risk. Over the past year, Gauntlet deployed our simulation platform to model Aave V1, V2, and the Safety Module under extreme market conditions. We were happy to [report](#) the protocol structure is broadly sound and made risk parameter recommendations to further reduce insolvency risk.

Preventing insolvency is not the only market risk Aave faces. Deflationary spirals and shocks to market prices can't simply be prevented without reducing the protocol's utility. Tail-event scenarios are rarely the result of bad actors taking malicious actions against the protocol. The vast majority of Aave's participants are honest but what's good for the lender is not always good for the borrower. Depositors lend, borrowers borrow, and liquidators rebalance. This intersection is where Gauntlet comfortably sits, directing traffic per the stated desires of the community.

Gauntlet continues to rerun our simulations since publishing the Market Risk Assessment. What we observe is regular changes in the optimal risk parameters, which raise several questions. Is the market risk framework only needed at asset onboarding? Is the existing framework good enough? Or does it block the next wave of protocol growth? Do changes in [volatility and liquidity](#) risk need to be accounted for as TVL grows?

Proposal

In the following sections, we will outline the case and goals for dynamic risk parameters. The initial proposed scope will be small to control for the target metrics Gauntlet aims to improve. Those metrics are:

- Risk-adjusted yield for Depositors
- Capital efficiency for Borrowers
- Mitigate Depositor losses

Gauntlet will improve the metrics above without increasing the net insolvent value percentage or the slashing run percentage. See section 5.3 of our [Market Risk Assessment](#) for more details.

Illustrated in the examples below are the benefits from our parametrizations made during the V1 to V2 migration. Additionally, we dive into the adverse effects that recent market conditions have had on parameter recommendations yet to be changed.

Increasing Depositor yield - \$230M USD or 1.5% increase in annualized lender income

From parameter suggestions made in November 2020, Aave V2 safely increased borrow risk parameters for multiple assets from the V1 to V2 protocol. For example, increasing Loan-to-Value (LTV) and Liquidation Threshold for collateral assets like ETH, WBTC, USDC, and LINK afforded borrowers better health factors and increased demand.

The largest weekly average TVL (February 17-23) for Aave V1 was \$3.0B. In that week, accrued interest was approximately \$1.2M—for an annualized yield of 2.08% across all depositors.

For Aave V2, the largest weekly average TVL (May 10-17) has been approximately \$12.7B. This week alone generated \$8.6M or a 3.52% annualized yield. Conservative estimations that control for liquidity mining incentives still return a 2.5% annualized yield.

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Risk Parameters

Improving Borrower Capital Efficiency - Average WBTC, LINK, ETH collateralization ratios reduced between 34-50%

Data from user behavior from Aave V1 (from February 17th, 2021) to Aave V2 (from April 27th, 2021) reveals significantly

more aggressive collateralization ratios. The same adjustments to risk parameters that increase depositor yield allow borrowers to improve the capital efficiency of their positions. We do not assume that risk parameter changes exclusively drove increased borrow behavior. That said, attributing a small portion to improved health factors backed by stress tests via simulation is justifiable.

From V1 to V2, the average user utilizing WBTC as collateral saw a health factor reduction from 4.00 to 2.57 (36%). For LINK from 6.31 to 4.16 (34%) and ETH/WETH by 8.10 to 4.03 (50%).

Maximizing borrow behavior without sacrificing protocol safety is an essential optimization for protocol resiliency and against liquidation cascades.

Mitigating Depositor Losses - \$4M USD (1.3%) of total liquidation value between May 17-23, 2021

Detailed at length in our [report](#) (see Sections 6.3, namely 6.3.1 on page 22-23) is the risk of high liquidation bonus values. If the lowered liquidation bonus values suggested were implemented, Aave would have mitigated depositor losses while maintaining a low risk of insolvency. For example, our March liquidation bonus recommendations would have mitigated \$4M of losses for 590 distinct users from May 17-23.

Asset

Current Liquidation Bonus

Liquidation Bonus Recs. 2021-03-04

Mitigated Liquidation Value

WBTC

10%

7.5%

\$2.1M

LINK

10%

7.5%

\$1.1M

YFI

15%

12.5%

\$450K

CRV

15%

12.5%

\$90K

XSUSHI

15%

12.5%

\$100k

Expectations

- Risk Parameter Updates
- Exclusively for Aave V2 assets

- Supported Risk Parameters: Loan-To-Value, Liquidation Threshold, and Liquidation Bonus
- Market conditions will determine the frequency of updates. For that reason, no SLA will be preset.
- A [Risk DAO](#) may make the most sense to provide oversight and management of all risks associated with Aave. Gauntlet would be complementary to the Risk DAO to coordinate parameter changes. Gauntlet will proceed with the manual ARC to AIP process unless circumstances change.
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- Communications
- Risk parameter changes will follow the standards suggested for the [Aave Snapshot Space](#).
- Quarterly, Gauntlet will post a Snapshot vote to determine the preferred risk tolerance of the community. The outcome of this vote will determine the risk and capital efficiency tradeoffs Gauntlet will target.
- Monthly forum posts and participation on community calls with explanations of risk parameter changes and any anomalies observed.
- Risk Dashboard (refer to the next section)
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- Risk Dashboard (refer to the next section)
- Quarterly Risk Reviews will provide a detailed retrospective on market risk.
- Out of Scope
- Aave V1, AMM, and Polygon Markets
- In line with keeping the scope small, Gauntlet will not look to manage the following at the outset:
 - Enabling or disabling a currency for borrowing
 - Setting interest rate strategies
 - Configuring the caps (borrow caps, supply caps, exposure ceiling)
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Risk Dashboard

As part of this engagement, Gauntlet will build a Risk Dashboard and API for the community to provide key insights into risk and capital efficiency.

Please note, all numbers are for illustrative purposes only and do not reflect the current or possible future state of Aave V2.

The dashboard focuses on both the system-level risk in Aave V2 and the market risk on an individual collateral level. Our goal is to help convey our methodology to the community and provide visibility into why we are making specific parameter recommendations.

The dashboard will monitor all collateral assets in Aave V2. The two key metrics are Value at Risk (VaR)

and Borrow Usage

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Value at Risk

conveys capital at risk due to insolvencies and liquidations when markets are under duress (i.e., Black Thursday). The current VaR in the system breaks down by collateral type. We currently compute VaR (based on a measure of protocol insolvency) at the 95th percentile of our simulation runs assuming peak volatility in the past year. We do this using Aave's current parameters as well as after modifying the parameters to the Gauntlet Recommendations.

Borrow Usage

provides information about how aggressively depositors of collateral borrow against their supply. Borrow usage is a measure of capital efficiency and builds on [past work](#) for Aave. Defined on a per Asset level as:

where U is the utilization ratio of each user:

We aggregate this to a system level by taking a weighted sum of all the assets used as collateral.

To show Gauntlet's impact, we measure these using the current system parameters and expected results (based on our simulations) if Aave were to implement the parameter recommendations suggested.

Cost

Gauntlet charges a service fee that seeks to be commensurate with the value we add to protocols. In Aave's case, despite various exogenous factors, Gauntlet can be more confident in the expected impact of our proposal given our prior recommendations to the Aave Genesis team. Gauntlet also wants to provide a strong signal of our alignment with the protocol. For that reason, we propose a service fee denominated in stkAAVE with an additional linear vesting period of 6 months for half ($\frac{1}{2}$) of each quarterly payment. Multiple comments suggested a similar vesting structure in the [liquidity incentives proposal](#) thread. In addition, Gauntlet will deploy the [OpenZeppelin Token Vesting](#) contract to provide the community a revocable option should our impact or engagement be deemed unsatisfactory. At the start of every quarter for one year Gauntlet will request service fee payment via AIP.

The formula to calculate Gauntlet's service fee has four components:

1. An asset multiplier to track risk management complexity
2. A proxy for capital efficiency
3. A base fee
4. Aave price

The asset multiplier calculation is $\log(\text{Number of Assets}, 10)^*$. New assets on the protocol add complexity to risk management. While the market risk optimization problem does not grow linearly, consideration should be taken when onboarding assets. For example, xSUSHI has no real market data, and modeling requires taking staking yield into consideration.

The most straightforward proxy for capital efficiency is the total borrowed** for risk-managed assets—only V2 assets initially. Capital efficiency is realized by borrowing demand.

Gauntlet's risk management base fee is 10 basis points annually, derived from a conservative estimation of the impact from dynamic risk parameters. See examples above.

The USD price of AAVE. Whether the price should be fixed or calculated quarterly, different communities have different opinions on how this aligns incentives. We will defer to the preference of the community but will default to calculating quarterly.

Gauntlet quarterly service fee = $\log(\text{Number of Assets}, 10) * \text{Total \$ Borrow} * 2.5 \text{ basis points} / \text{AAVE price}$ (tables below calculated at \$312)

Gauntlet quarterly service fee denominated in AAVE

Growth and drawdown examples

*Log value is the minimum of the tier range except in the " ≤ 10 " column, where it is 10. For example Column "21-25" returns $\log(21, 10)$

** Rounded down to the nearest \$1B

*** When Total Borrow < \$3b, there is no basis point fee. The formula is $\log(\text{Number of Assets}, 10) * \$1,200,000 / 4$

About Gauntlet

[Gauntlet](#) is a simulation platform for market risk management and protocol optimization. Our prior work most relevant to Aave, includes assessments for [Compound](#), [MakerDAO](#), [Liquity](#), and of course [Aave](#). Gauntlet's continuous parameter optimization work includes [Balancer](#), [SushiSwap](#), [Vesper](#), and [Acala](#).

Thanks to [@tarun](#), [@wfu](#), [@shaan](#), [@jmo](#) and many [others](#) for assistance on this ARC.