General Overview

Liquidity Staking Derivatives (LSDs) comprise a substantial portion of the total market capitalization across all significant deployments, garnering increased attention and activity. Distinct from other tokens, LSDs grant the right to claim the underlying chain's native token, classifying them as D

erivatives rather than staking T

okens. This characteristic sets them apart in risk management, as establishing risk parameters for independent tokens is not feasible. Assessing market capitalization and volatility proves ineffective, as these metrics primarily derive from the underlying asset. However, since LSDs offer a claim to tokens, their value is less than that of the underlying token, resulting in slightly greater associated risk. This risk arises from two main factors:

1. Counterparty risk: the risks associated with ensuring redeemability by the issuing protocol
2. Liquidity risk: redeeming an LSD for the underlying token is not instantaneous, leading to secondary market liquidity concerns in cases of immediate token swaps (liquidation)

Our methodology for establishing LSD risk parameters considers these factors and quantifies them to account for the associated risks.

Application

The primary use of LSDs on Aave is to increase leverage for Native Token to LSD positions. Although there are other applications for LSDs, such as collateralizing to borrow other assets and borrowing LSDs, these uses are significantly smaller in scale compared to LSD to Native Token positions. Consequently, we identify the primary use case for optimization as LSD to Native Token positions.

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The graph above illustrates an approximation of the percentage of underlying token borrows due to the challenge of accurately deriving data from multi-collateral positions.

Deployment

Asset

Supplied

Native Token Borrowed against

Other Assets Borrowed against

Borrowed

Oracle (Smart Contract/Market Price)

Ethereum (V2+V3)

wstETH

$2,448M

$746M

$359M

$2.1M

Market

Ethereum

cbETH

$122M

$88M

$5M

$0.6M

Market

Ethereum

rETH

$20M

$0.6M

$1.4M

$2.8M

Smart Contract

Arbitrum

wstETH

$11M

$3.6M

$3.2M

$0.2M

Market

Optimism

wstETH

$14M

$2.7M

$3.8M

$0.7M

Market

Polygon

stMATIC

$20M

$6.2M

$4.5M

0

Smart Contract

Polygon

MaticX

$17M

$14M

$550K

0

Smart Contract

Avalanche

sAVAX

$29M

$25M

$200k

0

Smart Contract

E-Mode vs. Non E-Mode Loan-to-Value (LTV) Setting

To optimize the primary use case for LSDs, we aim to enhance parameters for the prevalent scenario of borrowing the underlying asset. The primary consideration revolves around E-Mode parameter settings. Borrowing the underlying asset outside of E-Mode will be subject to more restrictive LTV settings, thus promoting safety. As risk management is a continuous process, we will monitor LSD positions and provide recommendations if we detect changes in usage.

While LTV and Liquidation Threshold (LT) are set separately for E-Mode and Non E-Mode, we optimize E-Mode borrowing based on actual supply and borrowing caps.

Counterparty Risk

As the value of LSDs derives from the claim to the underlying tokens, exposure to the staking protocol that issues them presents risk compared to simply holding the underlying token. Although this risk is apparent, it is an external consideration that the community must determine, specifically, the level of confidence Aave DAO has in a particular staking protocol. This consideration primarily influences the setting of price oracles and the resulting supply cap for an LSD, which limits exposure. When setting LSD parameters, we do not account for counter-party risk. Instead, we establish an upper limit for supply caps, which should be enforced even if counter-party risk allows for greater exposure.

Oracles and Price Divergence

Liquidity Staked Derivatives (LSDs) exhibit a unique characteristic whereby the claimable amount of the underlying asset grows continuously as staking rewards accrue, with slashing events being relatively rare and insignificant. Consequently, liquidating LSD/underlying asset positions does not pose a material risk if Aave treats the price of an LSD as equal to the claimable underlying tokens. In the absence of counter-party risk, this should manifest in two ways:

1. Configuring the price oracle to directly quote from the staking protocol's smart contract, as demonstrated with rETH on Ethereum and sAVAX on Avalanche.
2. Establishing a high Loan-to-Value (LT) ratio for the E-Mode category, given its primary utility for LSD collateral against borrowing the underlying asset.

However, if a significant counter-party risk exists, wherein the underlying tokens cannot be redeemed against the LSDs, the smart contract price may become inaccurate. In such cases, utilizing price oracles quoting secondary market prices is advisable. Two approaches can be considered when accounting for counter-party risk through market-based price oracles:

1. Include all LSDs within the same E-Mode category as the underlying asset

. Here, the LT of the E-Mode category should be derived from the most extreme price changes of the riskier LSD against the underlying asset. * Advantage

: Riskier LSDs can be supplied with the highest leverage on borrowing for their risk level.

- Disadvantage

: Safer LSDs can only be supplied with lower leverage, accommodating the riskier LSDs' risk.

1. Advantage

: Riskier LSDs can be supplied with the highest leverage on borrowing for their risk level.

1. Disadvantage

: Safer LSDs can only be supplied with lower leverage, accommodating the riskier LSDs' risk.

1. Exclude LSDs with significant counter-party risk from the E-Mode category

. In this case, the LT of the E-Mode category will approach 100%, as rationalized earlier. * Advantage

: Safer LSDs can be supplied with the highest leverage on borrowing for their risk level.

- Disadvantage

: Riskier LSDs can only be supplied with lower leverage based on their price correlation with other assets, not just their underlying token as they are not in E-Mode.

1. Advantage

: Safer LSDs can be supplied with the highest leverage on borrowing for their risk level.

1. Disadvantage

: Riskier LSDs can only be supplied with lower leverage based on their price correlation with other assets, not just their underlying token as they are not in E-Mode.

For instance, in an E-Mode category with cbETH, stETH, and rETH, given the current oracle settings (rETH from the smart contract, wstETH, and cbETH market prices), the LT of the E-Mode category could be up to 97%, accounting for 150% of the largest daily change in price. There is no rationale for referencing the total price divergence between the asset's market price and the smart contract price, as only one variable determines liquidation.

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Supply Cap Methodology

Supply caps are established to limit bad debt arising from extreme liquidations, taking into account available market liquidity. The impact of such scenarios primarily stems from the following:

1. Usage, i.e., the amount supplied against borrowing the underlying asset.
2. Counter-party risk, as previously discussed.

Two primary scenarios are distinguished when running simulations for supply caps:

1. For LSDs with calculated price feed (e.g., MaticX), only the positions of LSD collateral against non-underlying asset borrows are considered, as no risk exists in the LSD/underlying asset positions. In this case, it is still recommended to set an upper bound on the supply cap at 50% of the total circulating supply of the LSD to prevent extreme counter-party exposure, even when no explicit risk is identified.
2. For LSDs bearing counter-party risk, for which oracles are calculated with market price, a depeg scenario including E-Mode positions is simulated (e.g., cbETH).

Supply Cap Recommendations Based on Current LT Settings

The following supply cap recommendations are calculated using the current

oracle configurations and LT settings:

Ethereum

wstETH and cbETH both have market price oracles, so we simulate a depeg scenario that includes emode positions using the supply cap methodology.

wstETH

wstETh supply can be raised by 2.7, yielding a cap of 390K wstETH

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wstETH_caps

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cbETH

cbETH supply should not be raised given current on-chain liquidity.

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Polygon

stMATIC and MaticX use a calculated oracle, so we exclude e-mode positions and simulate a Matic crash, to calculate losses caused by collateralizing LSDs and borrowing assets other than Matic.

We see no VaR increase when increasing the Non-E-Mode supply 5x under the current LT settings.