

# Simple Summary

On Aave V3, E-mode requires multiple considerations, including mitigating tail risks to protocols, optimizing user experience, and allowing on-chain liquidity to remain robust. E-mode, in particular, unlocks capital efficiency with specific risk tradeoffs that we will discuss below. Here we describe the main factors we consider in calculating E-mode recommendations.

This is an extension and follow-up to our initial [E-mode methodology post](#).

## Conditions for Inclusion

Our conditions aim to quantify the following risks:

- LST-to-Base asset liquidity (and liquidity changes under duress)
- Protocol-specific risks (e.g., withdraw queue considerations)
- LST-to-Base asset short-term and long-term correlation (and correlation changes under duress)
- Arbitrager profitability calculations

Given the LST E-mode pool LT (Liquidation Threshold) and pool LB (Liquidation Bonus), a potential candidate X should satisfy the following conditions.

- Divergences between the market rate and smart contract conversion rate of LST / BASE must be upper-bounded by 1 - LT.
- For Ethereum, we consider divergences in the spread between market rate and smart contract conversion rate.
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- Have a buffer between historically realized divergences with potential future divergences.
- Have 30-day historical pairwise liquidity condition, which is as follows:
- Take 10% of the supply cap of the smaller/less liquid asset
- Ensure that slippage of the trading volume above will result in less than the LB (Liquidation Bonus) of the pool.
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## Supply Cap Summary

We consider the following factors to compute hypothetical “e-mode only supply caps.” The supply cap should consider liquidity in both abnormal dislocations and normal price variance.

- (abnormal) maximum amount able to be liquidated within a 1-LT drop over a time range

if the current liquidity is halved, with no additional liquidity inflow

- (normal) 20x corresponding to a 1% price drop, bounded by 50% of the onchain circulating supply.

Gauntlet is exploring the relationship between insolvencies in LST-BASE dislocation events and increased revenue from higher capital efficiency. Because of this, we design our conservative caps to be 90% abnormal cap + 10% normal cap and our aggressive caps to be 50% abnormal cap + 50% normal cap

We discuss in greater detail in our Methodology section.

chain

asset

abnormal

normal

conservative

aggressive

LT  
LTV  
LB  
Optional Buffer  
ethereum  
WSTETH  
191000  
101000  
373900  
1105500  
93  
90  
2  
2  
ethereum  
CBETH  
6000  
4500  
14400  
48000  
93  
90  
2  
2  
ethereum  
RETH  
10900  
5000  
19810  
55450  
93  
90  
2  
2  
arbitrum  
WSTETH  
3300

1900

4620

9900

91

88

2

2

optimism

WSTETH

2800

1600

4020

8900

91

88

2

2

polygon

STMATIC

8500000

6000000

10150000

16750000

95

92.5

1

2

polygon

MATICX

2000000

1400000

3600000

10000000

95

92.5

1

2

avalanche

SAVAX

200000

135000

450000

1450000

93

90

1

2

#### Parameter Commentary

Our buffer represents a potential guard against max historical dislocation to account for unknown future dislocations. If the community wishes to implement this guard, the LT/LTV would be reduced by the buffer.

These supply caps theoretically are emode specific and do not cover non emode use cases. The two use cases have inherently different risks, which is why Gauntlet recommends considering emode specific caps to fully capture the increased capital efficiency of emode while maintaining appropriate levels of risk. One potential way to enable this increased capital efficiency would be to set LTV and LT for an LST at 0 in the standard reserve and have aggressive parameters in emode. We do not strongly recommend this approach at this time, but we wanted to start a conversation about this possibility.

LST pools are, in a sense, simpler than stablecoin pools since the main use case is to collateralize the LST and borrow the BASE. If the LST pool were analogous to stablecoin pools, we would only have LST and not the BASE in the pool. As such, we focus the analysis on LST-ETH positions. We will comment on LST collateralizing LST positions afterwards. Gauntlet's recommendations assume the Shanghai upgrade occurs without abnormal, unforeseen events, based on [our analysis here](#). In the event tail events occur, we will revise accordingly.

#### Borrow Cap Summary

We recommend using the borrow cap methodology outlined [here](#). We will revisit this methodology after the Shanghai upgrade. We will also revisit this methodology if there are changes in market demand and token utility changes.

## Methodology

The primary mechanism that ties an LST to its base asset (BASE) is its creation/redemption mechanism. Any abnormal dislocation between market price and redemption price will be arbitrated away if there is confidence in the redemption mechanism. (If LST trades under par, then traders can buy LST on market to redeem, vice versa, if LST trades over par, then traders can buy BASE to create the LST to market sell). Should there be doubts over the viability of the creation/redemption mechanism, then LST liquidity will dry up and begin to trade at a more significant discount.

Therefore, an LST should have a well defined, functioning redemption schedule or structure into BASE. For LSTs where the redemption mechanism is not live yet (such as WSTETH pre Shanghai upgrade), the redemption mechanism, if differing from overall unstaking, must be explicitly detailed. Most importantly, the LST should not have the ability to artificially burn or mint new LST without associated BASE (smart contract based manipulation).

Consider the spread between the smart contract exchange rate and market rate for an LST with a functional redemption system vs. an LST with a non live redemption mechanism.

STMATIC

CBETH

WSTETH

The market accounts for the tail probability of CBETH not being redeemable by trading at such a heavy discount to its exchange rate.

## Supply caps methodology

stETH pool size on Curve, stETH price

Recall our conditions from above - The supply cap should consider liquidity in both abnormal dislocations and normal price variance.

- (abnormal) maximum amount able to be liquidated within a 1-LT drop over a time range

if the current liquidity is halved, with no additional liquidity inflow

- (normal) 20x corresponding to a 1% price drop, bounded by 50% of the onchain circulating supply.

Our supply cap is primarily motivated from analyzing the relationship between liquidity and prices for LSTs. Our abnormal caps consider these relationships during abnormal price dislocations and high volatility; our normal caps consider them in normal price variance.

In sudden, abnormal dislocations, liquidity can dry to roughly 1/3 to 1/2 of the original liquidity, before extreme drops. Consider stETH during May 2022, in particular the “icepick” price dislocation on May 13. We’ve seen that these dislocations occur over the course of a couple hours, in which neither liquidity does not recover over the timeframe. This is also supported by the loss in 3pool liquidity during the USDC depeg events in March 2023. Again, these dislocations occur if there is loss of belief in the redemption mechanism, and are unlikely to manifest themselves in normal trading, given the arbitrage opportunities

stETH - ETH liquidity on Curve and price, May 2022

stETH - ETH liquidity on Curve and price, June 2022

We compute our abnormal caps by

- proxying a stableswap pool that is composed of half global liquidity for this LST - BASE pair
- simulating successive market swaps that correspond to incremental price changes ~ 0.3%, until the LST simulated price has dropped by 1 - LT

Our normal caps rely on the health of the arbitrage presented by belief in the functional redemption mechanism, which drives the quick reversion back to the smart contract exchange rate. Sufficient liquidity exists in these conditions to suggest a normal cap of 20x a 1% drop swap amount.

## Application notes and Assumptions

The lower bound for the LTV and LT of assets in any E-mode category should be the asset’s LTV and LT outside of E-mode.

Gauntlet suggests launching a unique E-mode pool for each LST-base asset pair in the future to maximize capital efficiency through optimized supply caps, borrow caps, and other risk parameterizations.

The current implementation of LST E-modes would contain multiple LST assets in the same pool. This could lead to an LST collateral and LST borrow scenario within an E-mode pool. Although the current borrow caps for these assets provide a buffer for price deviations between these LST assets, this could pose a risk to the system in the future. These low borrow caps have not been fully utilized, suggesting that users are not putting on these positions with high frequency, though this may change in the future.

## Additional Risks

We do want to be transparent that this approach necessarily assumes price correlations among the assets. When we are simulating depegging events for one asset, we assume price correlations still hold in the normal condition for the rest of the assets, which may not be valid under some extreme market conditions. For example, there could be a smart contract issue breaking the peg for multiple assets at the same time. In these scenarios, the protocol may face outsized risk that cannot be easily protected by risk parameters prior to the event occurring.

## Recommendation Options

While we explore many options and potential community preferences above, we aim to move forward with actionable next steps. Below are several options which we will start a Snapshot vote for.

### Poll 1: Emode and Borrow/Supply Cap settings

- Option 1: (Gauntlet conservative) - Include all LST-BASE assets in the same

pool with conservative risk preference outlined in table above. This is our current recommendation

- Option 2: (Gauntlet aggressive) - Include all LST-BASE assets in the same

pool with aggressive risk preference outlined in table above.

- Option 3: (Gauntlet conservative, confined assets) - Include a single

LST-BASE pair pools with conservative risk preference outlined in table above. This is not possible with the current pool configurator.

- Option 4: (Gauntlet aggressive, confined assets) - Include a single

LST-BASE pair pools with aggressive risk preference outlined in table above. This is Gauntlet's second preference

This is not possible with the current pool configurator.

- Option 5: (Gauntlet conservative, emode only) - Include all LST-BASE assets in the same

pool with conservative risk preference outlined in table above and also no borrowing power outside of emode (LT/LTV zero outside of emode).

- Option 6: (Gauntlet aggressive, emode only) - Include all LST-BASE assets in the same

pool with aggressive risk preference outlined in table above and also no borrowing power outside of emode (LT/LTV zero outside of emode).

- Option 7: Remove LST emode settings Not recommended, we are adding for completeness

We note the tradeoffs below to help inform a community decision:

- Options 1/2 likely has less user experience impact than the other options
- Options 5/6 has potentially less use case than Options 1/2, because in Options 5/6, those assets do not have borrowing power outside of e-mode
- Options 5/6 is potentially more straightforward from a risk perspective than Options 1/2 because the risks of the assets in non-emode are inherently different from the risks when they are used in e-mode
- Options 3/4 is potentially more straightforward than Options 1/2 from a risk perspective because each e-mode pool only contains 1 LST and the base token (which better isolates the risk of each respective LST)
- Practically, the implementation of Options 3 and 4 may be to freeze the current pools, and this would dictate how new e-mode pools are opened.
- This requires changes to the pool configurator code.
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We will follow up with more data (e.g., liquidations) but would value community feedback in the meantime.

## Poll 2: Optional LT Buffer

- Option 1: Include a buffer between the max depeg value and LT e-mode parameter
- Option 2: Do not include a buffer between the max depeg value and LT e-mode parameter This is our current recommendation

## Next Steps:

- Welcome feedback and questions from the community.
- Move to Snapshot vote with recommendations Options.
- Of course, we will wait until after the Shanghai upgrade to publish the AIP related to this proposal.