

Ethena's Reserve Fund

Ethena's [Reserve Fund](#) primarily serves as an additional margin of safety for USDe, providing capital to cover periods of negative funding and acting as a bidder of last resort in secondary markets. The appropriate sizing of the Reserve Fund has been a key consideration since before Ethena's public launch, with [early studies](#) centered on USDe's reliance on the profitability of the ETH basis trade and its resilience during negative funding periods. Historical data analysis allowed for estimates of drawdown duration and depth, helping to determine the necessary fund size to sustain such periods.

Evolution of USDe and Its Impact on the Reserve Fund

Since its launch, Ethena's vision for USDe has evolved, diversifying its collateral beyond ETH and LSTs to include BTC and, more recently, SOL. A significant shift in strategy has been the flexibility to move away from the basis trade when it is unprofitable, opting instead to allocate collateral to yield-bearing stable assets such as whitelisted RWAs. This change allows for dynamic adjustments, eliminating the need to maintain open hedging positions indefinitely during unfavorable market conditions.

Now, during periods of negative funding, hedging positions can be closed by selling the spot asset and unwinding the short perpetual position, with the proceeds reinvested into stable RWAs like USDtb. We suggest that this shift in approach redefines the focus of the Reserve Fund from sustaining prolonged negative funding to covering the costs associated with quickly closing unprofitable positions. This approach aligns with [LlamaRisk's v2 drawdown methodology](#), which we aim to contribute to and help enhance by detailing a more direct two-cost framework, dynamic funding rate estimations, and revised slippage assumptions.

Key Considerations for Reserve Fund Sizing

With this revised framework, we propose the Reserve Fund sizing to be driven by two primary costs:

1. **Slippage Costs** – The expense incurred when selling spot and unwinding hedging positions, which can be significant in volatile or illiquid markets.
2. **Negative Funding Costs** – The cost of keeping positions open while the transition to stable assets is executed.

A critical balance must be struck between these opposing forces:

- Closing positions over time increases funding costs but reduces slippage.
- Closing positions quickly minimizes funding costs but may result in higher slippage.

To simplify the analysis, we assume a 24-hour window to fully unwind positions in a severe downturn scenario, where Ethena determines that this immediate action is the optimal strategy to maintain USDe's full collateralization. Under this assumption, the Reserve Fund must be sufficient to cover both the expected negative funding costs for this period and the anticipated slippage losses from closing positions.

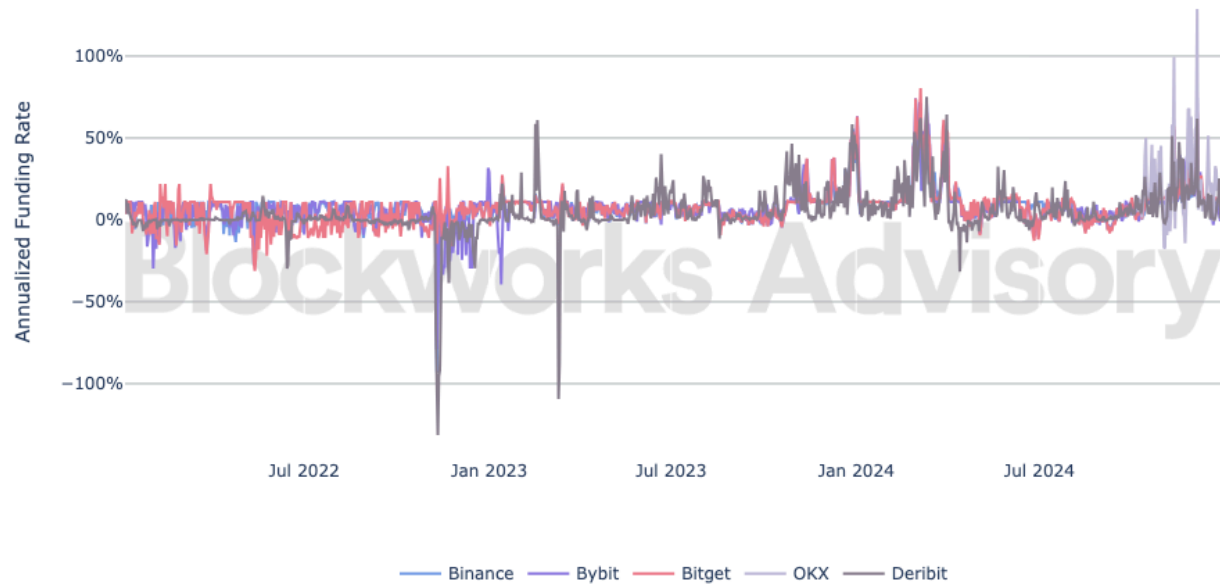
$RF = S + F$, where RF is the recommended Reserve Fund sizing, S is the estimated slippage costs to close all positions and F the negative funding costs incurred on all perps positions during 24 hours.

To maintain simplicity, we assume that costs like trading fees and operational expenses involved in buying RWA positions are negligible. While this represents an extreme hypothetical scenario and closing 100% of positions is unlikely to be necessary, ensuring that the Reserve Fund has sufficient capital to cover such an event not only guarantees USDe's full collateralization but also facilitates swift redemptions during periods of high demand. This proactive approach minimizes reliance on secondary market interventions, enhancing overall system resilience.

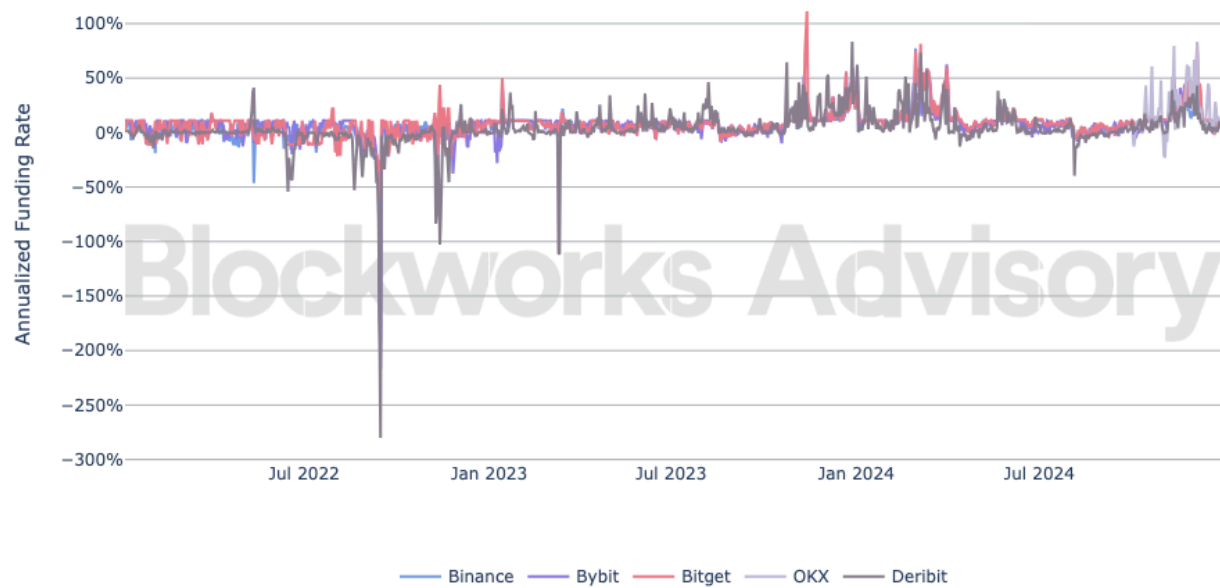
Funding Cost Estimation

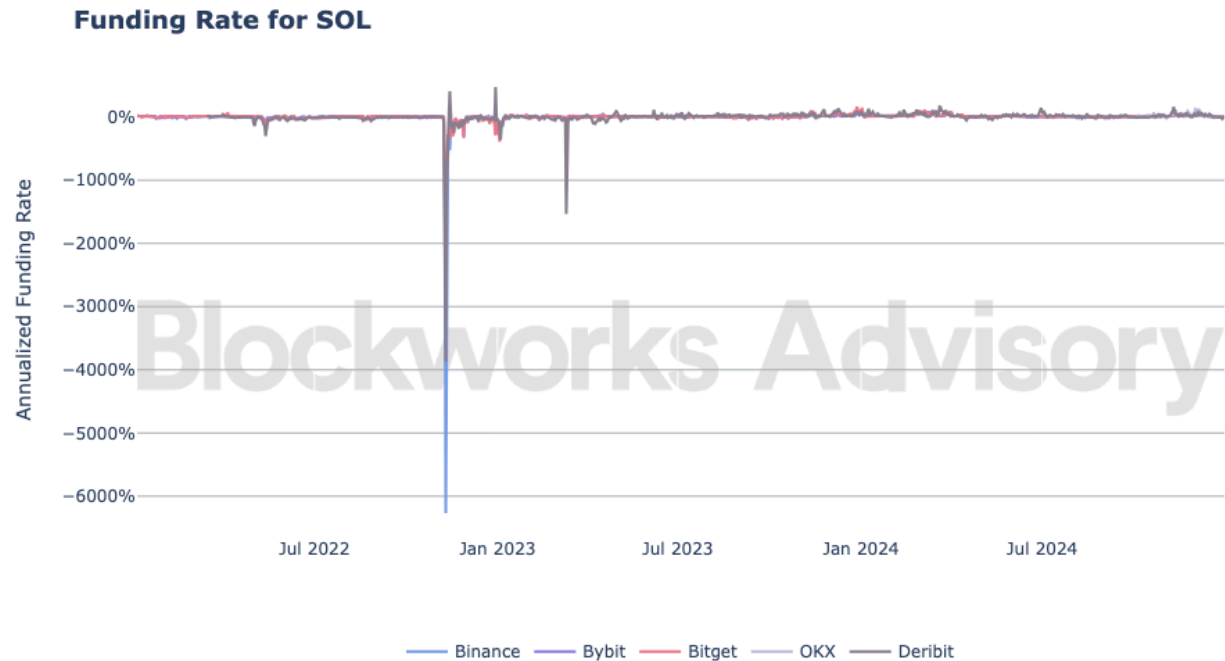
Funding rates are influenced by both the asset and the exchange. Generally, more volatile assets on lower-volume, less liquid exchanges tend to incur higher funding costs. In an extreme scenario, the total funding cost will depend on the proportion of USDe's circulating supply that is collateralized through hedging positions at that time, as well as the specific assets and exchanges comprising the collateral backing. The figures below present historical annualized funding rates for BTC, ETH, and SOL across the exchanges where Ethena currently holds positions.

Funding Rate for BTC

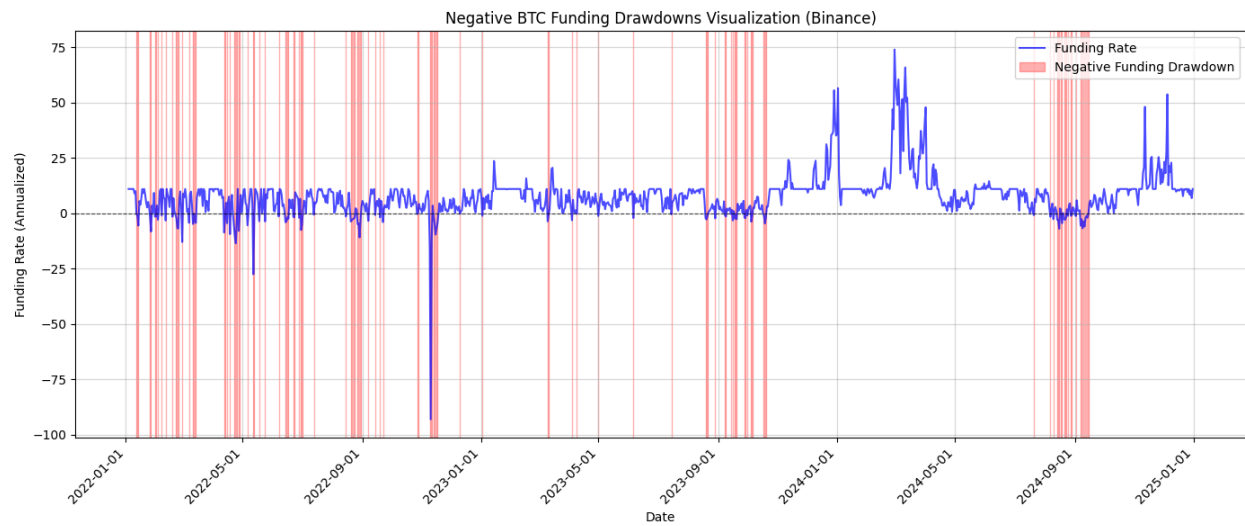


Funding Rate for ETH





To ensure the Reserve Fund can withstand a worst-case scenario, we analyze the historical funding rates of all assets across the exchanges where Ethena holds hedging positions, focusing on the tail end of the drawdown distribution.



We analyzed the 0.1% worst daily drawdowns for each asset across all exchanges where Ethena holds positions, using data since the beginning of 2022. The results are as follows:

Extreme funding drawdowns

0.1% daily percentile drawdowns for exchanges and assets


	BTC	ETH	SOL
Binance	-0.2354%	-0.5223%	-15.8595%
Bybit	-0.2044%	-0.5772%	-0.7166%
Bitget	-0.0835%	-0.1623%	-4.9415%
OKX ¹	-0.2354%	-0.5223%	-15.8595%
Deribit	-0.3565%	-0.7569%	-9.9856%

¹OKX values have been temporarily replicated from Binance due to limited availability of OKX's historical API funding data.

Blockworks Advisory

Data as of December 2024 | Source: Blockworks Advisory

Next, we factor in Ethena’s current hedging distribution. As of the time of writing, the allocation was as follows:

	 BINANCE 50%	 BYBIT 26%	 OKX 16%	 Deribit 2%	 Bitget 0%
 BTC 53%	\$1.73B	\$781.35M	\$578.59M	\$49.79M	\$0
 ETH 28%	\$860.6M	\$434.67M	\$283.68M	\$62.89M	\$0
 ETH LSTs 7%	\$230.18M	\$149.54M	\$0	\$0	\$5.19M
 SOL 1%	\$30.26M	\$0	\$0	\$0	\$0
 Liquid Stables  12%	\$72.42M	\$196.26M	\$68.07M	\$0.99M	\$0

The Reserve Fund would need to cover \$23M in funding costs for the 24-hour period during which the positions remain open.

The general formula can be expressed as follows:

$$F = \sum_{a \in A} \sum_{e \in E_a} D_a \times P_{a,e}$$

Where

F is the total funding rate estimation

A is the set of all collateral assets

E_a is the set of exchanges where Ethena holds positions for asset a

D_a is the worst daily drawdown for asset a (e.g. 0.1%)

$P_{a,e}$ is the position size for asset a on exchange e

This framework is especially valuable due to its adaptability—allowing for seamless updates as inputs evolve. As new exchanges or assets are integrated, the Reserve Fund requirements adjust accordingly without altering the underlying rationale. Additionally, shifts in collateral composition, such as an increased allocation to liquid stables or a higher proportion of ETH, are automatically reflected in the Reserve Fund’s requirements, ensuring that the risk profile is continuously aligned with Ethena’s evolving strategy.

Slippage Cost Estimation (WIP)

LlamaRisk already provided valuable data and insights on slippage, and so we aim to build upon that to further refine our estimates. Their initial analysis indicates that for trades under \$25M, slippage remains within the 0.5%-0.75% range, even in worst-case scenarios. However, this estimate may understate the true costs. Despite executing smaller trade sizes, closing all positions within a 24-hour window during severe drawdowns may not provide sufficient time for markets to rebalance. Additionally, market makers are likely to withdraw liquidity under such conditions, further exacerbating slippage and execution challenges.

Our goal within the Reserve Fund working group is to develop a more comprehensive approach to slippage estimation, considering both perpetual and spot positions, to better capture the potential risks and costs involved in extreme market scenarios.

The Reserve Fund working group will leverage Ethena’s historical trading data and work closely with the team to develop realistic stress scenario models and refine estimates. Our focus is on modeling the following critical aspects:

- **Estimating Combined Slippage:** Developing an optimal approach to model slippage when closing both spot and perpetual positions simultaneously, ensuring accurate cost projections.
- **Market Rebalancing Time:** Assessing the expected time required for the market to recover after a significant sell-off and determining its impact on the overall timeline for fully closing positions.
- **Systematic Selling Impact:** Evaluating the effects of setting a maximum order size to minimize slippage, including market makers' responses to repeated order execution, potential liquidity withdrawal, and the resulting impact on additional slippage and execution efficiency.