SOL as Collateral on Ethena - Funding Rates

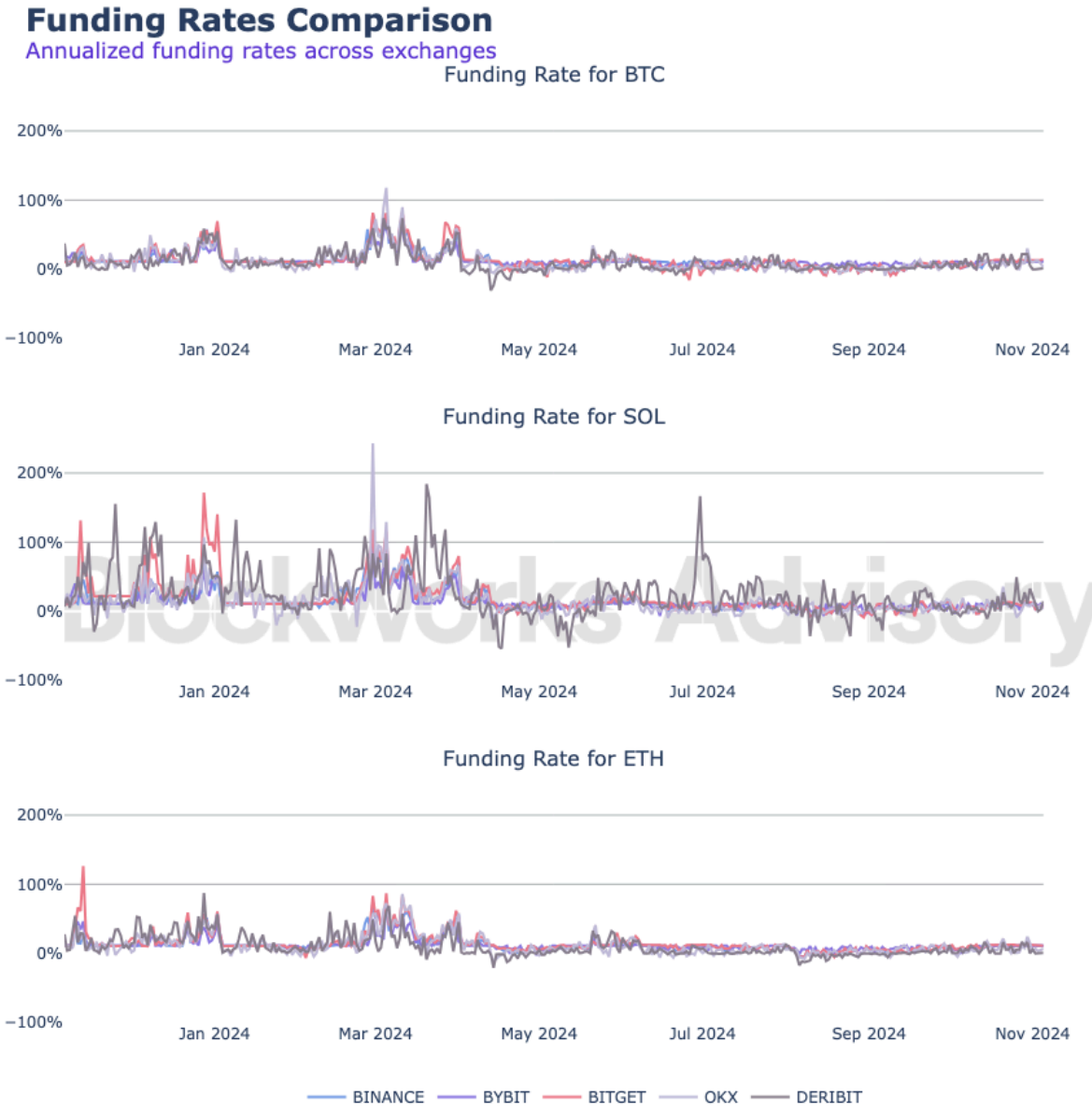
As highlighted by several members of the Risk Committee, additional analysis is required to refine our strategy for positioning USDe with SOL as collateral. Key areas for further evaluation include:

- Liquidity and Open Interest: Analyzing liquidity and open interest across exchanges to ensure sufficient depth for effective risk management.
- Funding Rates: A comprehensive review of funding rates across exchanges, which will be a focal point of this analysis.
- LST Suitability: Already addressed by LlamaRisk.
- Exit and Rebalancing Strategies: Developing clear exit and rebalancing strategies, aligned with existing collateral assets, to guide the unwinding of perpetual short positions in response to negative carry exposure.

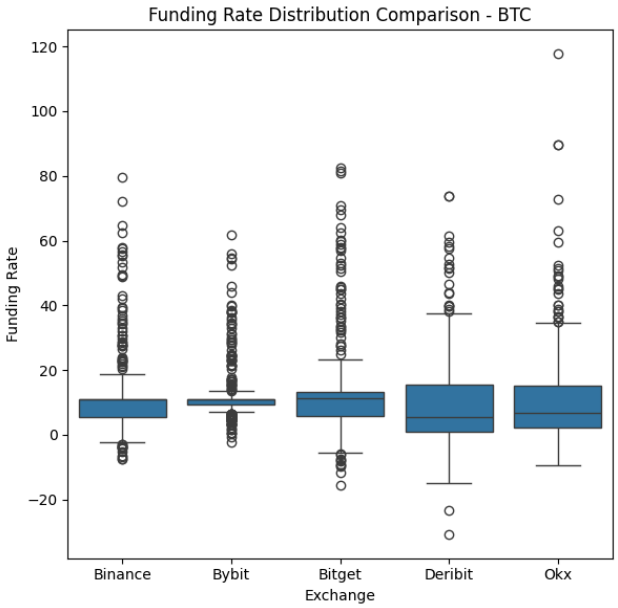
The exit strategy analysis will require a broad approach, encompassing all assets used as collateral. The funding rate analysis will be expanded on this contribution to provide a more detailed perspective on its impact across exchanges.

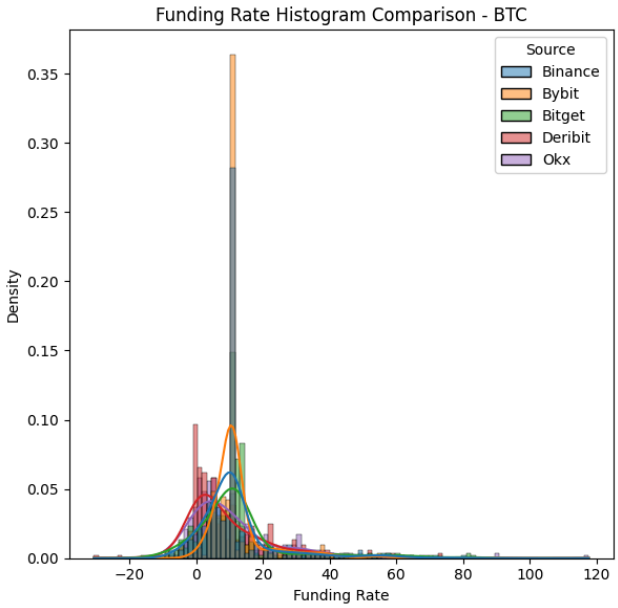
Funding rates distribution analysis

For this funding rate analysis, we selected the contract with the highest open interest on each exchange. The charts below show the historical funding rates over one year for each exchange for BTC, ETH and SOL.



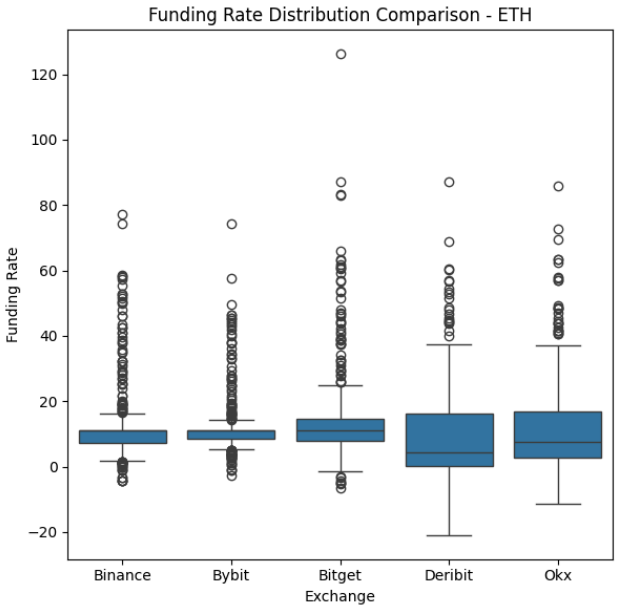
It is evident that SOL funding rates exhibit significantly higher volatility compared to BTC and ETH, particularly on exchanges like Deribit, OKX and Bitget during certain periods. Below we show the distribution for each exchange's funding rate for both the existing collateral assets and for SOL.

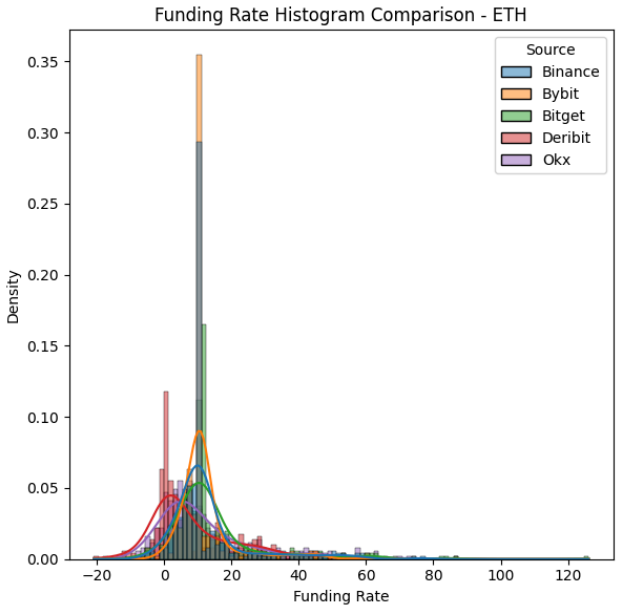




Summary Statistics for BTC:

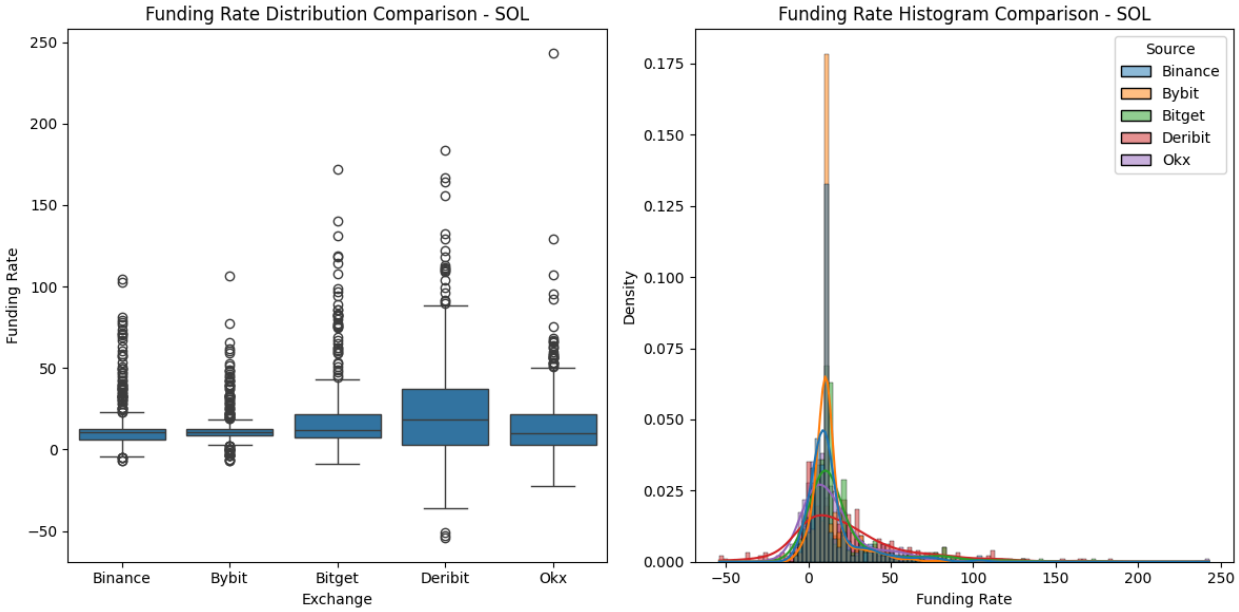
	mean	median	std	kurtosis	skewness
Binance	11.894126	10.950000	12.304648	7.568577	2.451698
Bybit	12.617003	10.950000	8.939483	8.267099	2.648419
Bitget	13.125041	11.141625	15.045451	5.692596	2.178551
Deribit	9.884043	5.475000	13.959127	3.822221	1.651381
Okx	11.472070	6.843750	15.161237	10.478499	2.583899





Summary Statistics for ETH:

	mean	median	std	kurtosis	skewness
Binance	13.045837	10.950000	12.262446	6.503744	2.416927
Bybit	12.478752	10.950000	9.287738	9.950093	2.804536
Bitget	14.950639	11.196375	15.186769	11.904005	2.946746
Deribit	9.807430	4.489500	14.815828	3.419932	1.653512
Okx	12.037520	7.665000	14.873551	3.753105	1.788241



Summary Statistics for SOL:

	mean	median	std	kurtosis	skewness
Binance	14.540674	10.950000	16.987584	6.777536	2.437226
Bybit	13.613595	10.950000	12.519066	12.049541	2.818488
Bitget	19.841639	11.880750	25.187783	7.898190	2.611439
Deribit	24.805364	18.387788	34.118523	3.245040	1.444090
Okx	16.045041	9.855000	22.986458	27.363075	3.733550

Across exchanges, BTC and ETH funding rates tend to have similar mean and median values. For BTC, most exchanges show a mean around 10-13, and for ETH, it ranges from 10 to around 15, suggesting generally stable funding rates with some consistency. SOL has higher mean funding rates, especially on exchanges like Bitget and Deribit, where it reaches 19.8 and 24.8, respectively. The median is often lower than the mean, indicating right-skewed distributions, meaning there are frequent extreme positive funding rate values.

The standard deviation (volatility) is relatively lower for BTC and ETH across exchanges, with values mostly between 8-15, reflecting more predictable funding rates. SOL shows a notably higher standard deviation across all exchanges, especially on Deribit and Bitget, where it's 34.1

and 25.2, respectively. This indicates that SOL funding rates are significantly more volatile, with wider swings around the mean.

Both BTC and ETH exhibit kurtosis values that are moderately high, with spikes on some exchanges (e.g., Bybit for ETH, which has kurtosis around 9.95), indicating that there are occasional extreme funding rate values. SOL's kurtosis is particularly high on OKX (27.4) and Bybit (12.0), showing heavy tails and more frequent extreme funding rate events. This suggests that SOL experiences higher peaks and troughs compared to BTC and ETH, leading to more occasional, extreme funding rate events.

For both BTC and ETH, skewness values generally range between 1.6 and 2.8, suggesting distributions with slight right skewness — some positive extreme values, but not overly dominant. SOL shows even higher skewness, especially on OKX (3.7) and Bybit (2.8), which confirms a significant positive skew. This means that SOL funding rates tend to have frequent, larger upward deviations compared to BTC and ETH, with more pronounced positive outliers.

While these findings are generally favorable for using SOL as collateral in Ethena, we recommend starting conservatively with a selective choice of exchanges for opening these positions. SOL differs from BTC and ETH significantly, with higher mean values and much more volatility in funding rates across exchanges. The elevated standard deviations, high kurtosis, and skewness indicate that SOL's funding rate distributions have heavier tails and higher likelihood of extreme values, especially on Deribit and OKX. This could reflect lower market depth or more aggressive trading dynamics for SOL.

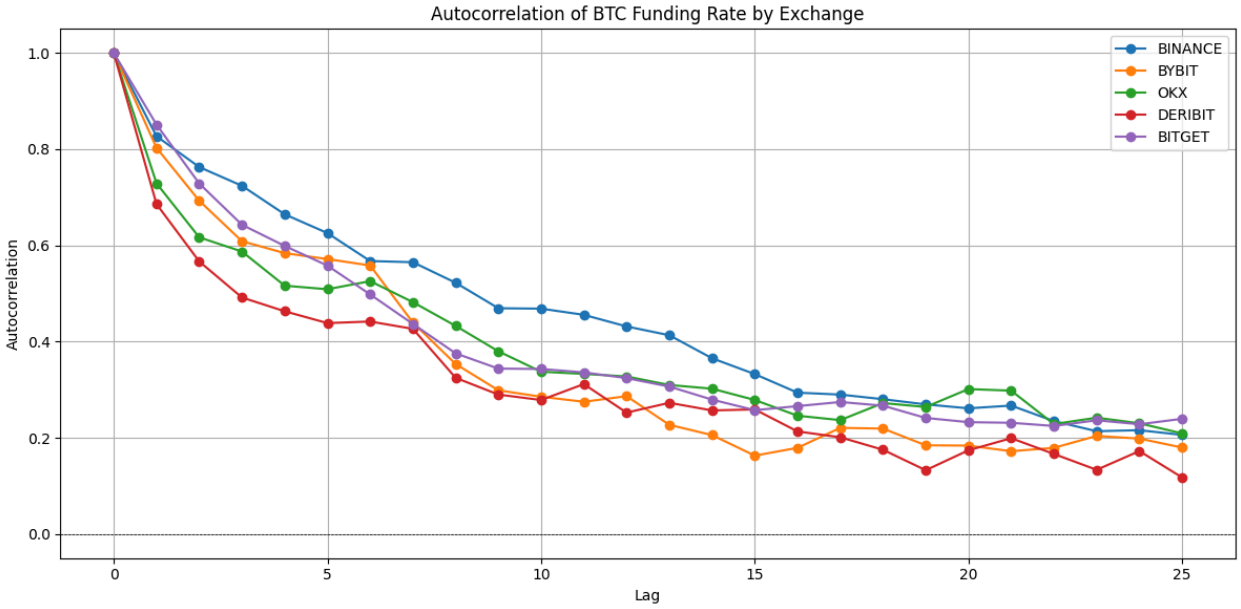
Based on this analysis, the recommendation is to begin with Binance and Bybit. Both Bybit and Binance show moderate standard deviations (12.5 and 17.0, respectively) and exhibit reasonably balanced funding rate distributions. The kurtosis on Bybit (12.0) suggests fewer extreme outliers compared to Deribit and OKX, and Binance has more stable averages relative to SOL's distribution on other exchanges. With these exchanges, we are likely to encounter less dramatic downside volatility.

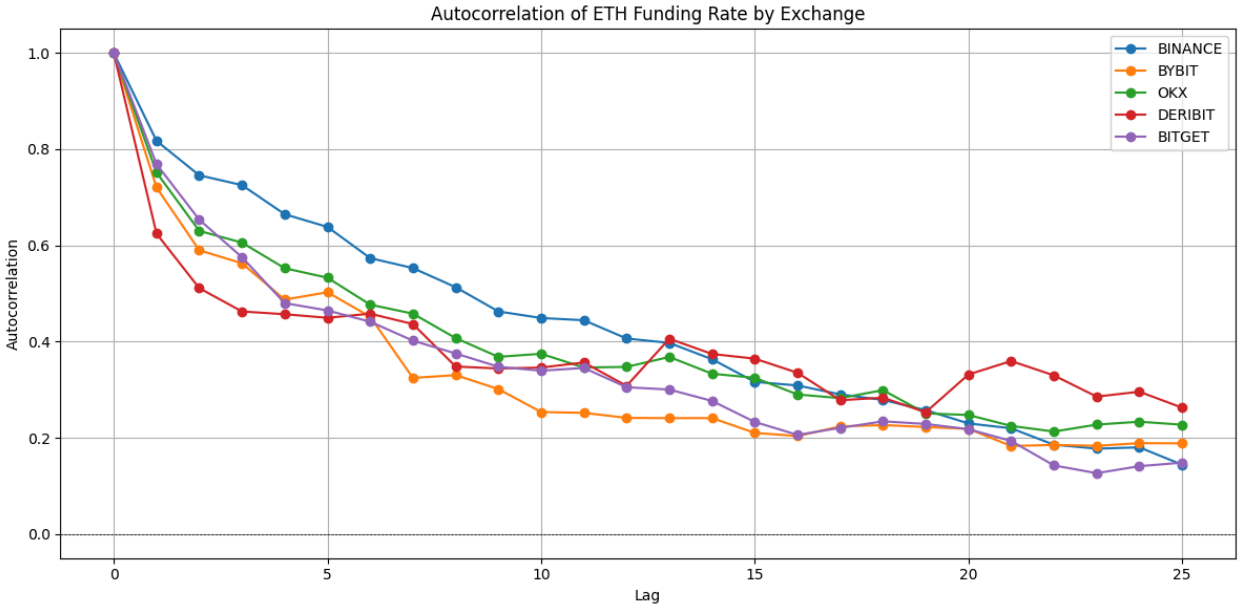
Bitget could be a secondary option. Bitget has a high mean and median funding rate (19.8 and 11.9) and a slightly lower standard deviation than Deribit and OKX. This suggests Bitget offers relatively higher rates with somewhat less severe fluctuations. The skew is positive (2.6), which indicates there are fewer extreme negative rates compared to exchanges with stronger negative tendencies. Bitget's relatively balanced skew and moderate volatility make it a viable option as we're looking for a balance between stable funding rates and potential positive funding benefits. However, it's slightly riskier than Binance and Bybit due to its higher standard deviation.

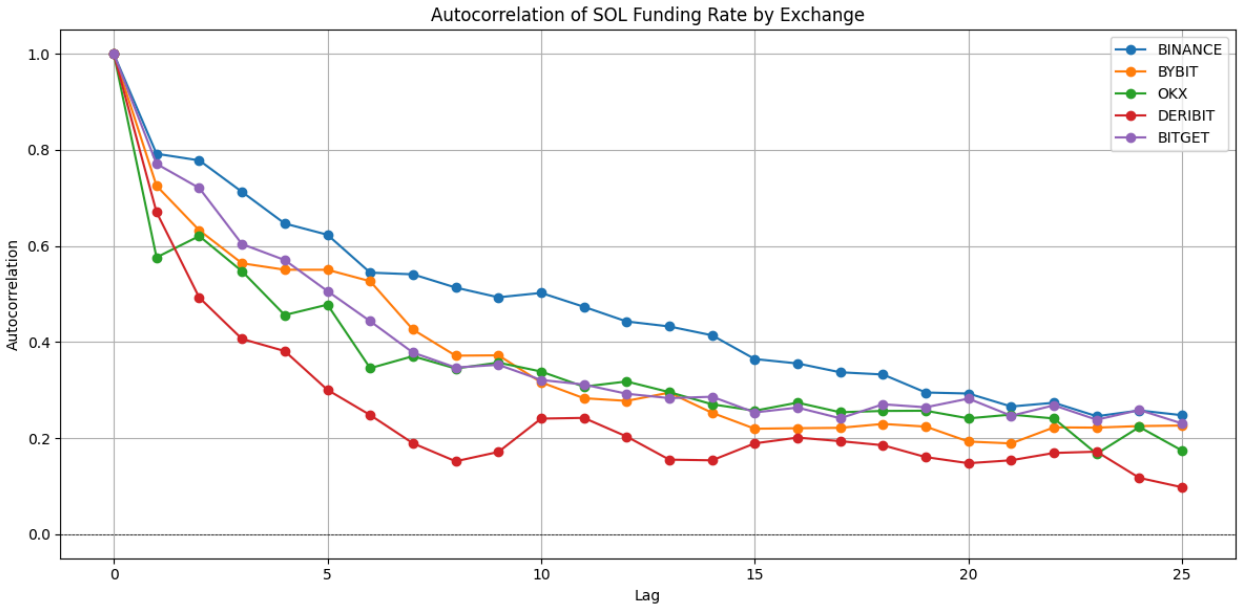
We would recommend avoiding Deribit and OKX for now. Both Deribit and OKX exhibit the highest standard deviations (34.1 and 22.9) and kurtosis (3.2 and 27.4), indicating a highly volatile and heavy-tailed distribution. OKX, in particular, shows extreme positive skewness, which could correspond to extreme negative events as well in differing market conditions.

Funding rates autocorrelation and extreme event analysis

Furthermore, we analyzed the autocorrelation of funding rates and the duration of extreme events to provide additional support for this recommendation. The autocorrelation charts below display how the funding rate correlates with its own past values at various time lags (in days). Values near 1 indicate a strong relationship, while values close to 0 suggest little to no correlation.

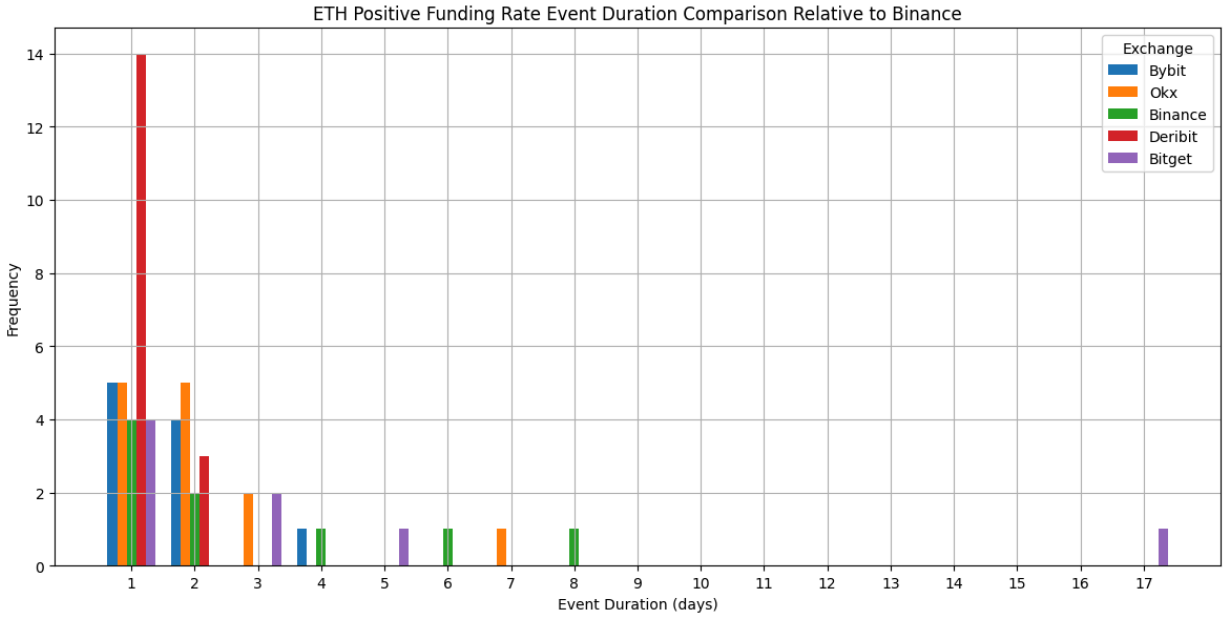


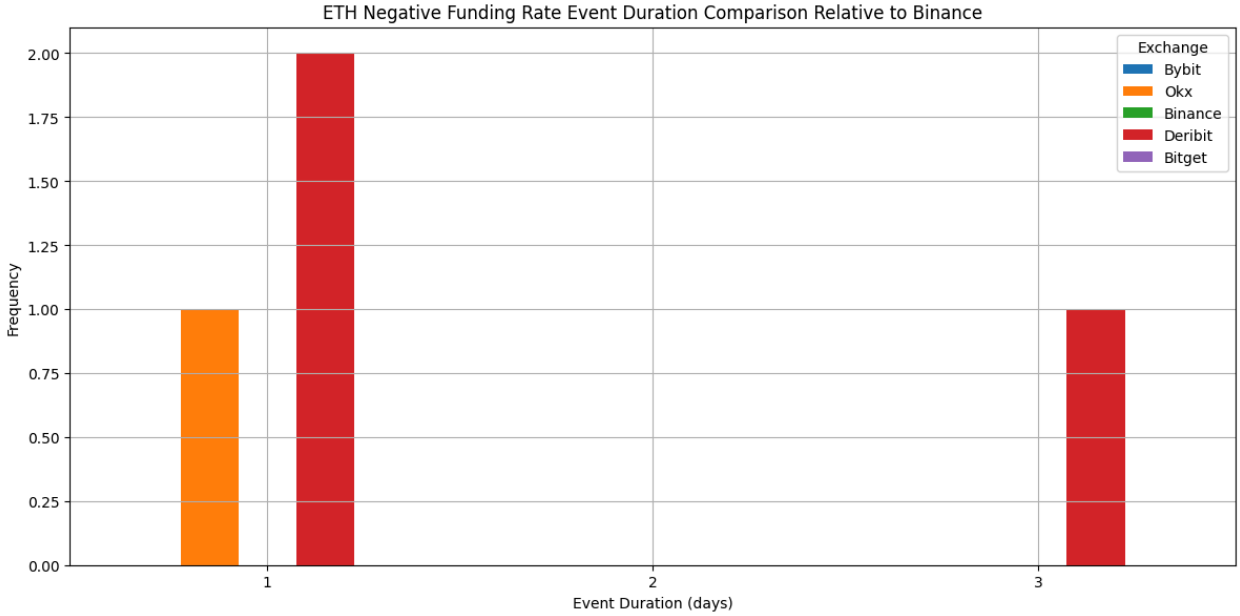




Both BTC and ETH funding rates exhibit relatively similar autocorrelation patterns across exchanges, with a gradual decline in autocorrelation as lag increases. Binance consistently shows higher autocorrelation over longer lags compared to other exchanges. This suggests that BTC and ETH funding rates on Binance are more stable over time, with recent values more predictive of near-term values. Other exchanges like Bybit, OKX, and Deribit show lower and faster-declining autocorrelation, which implies that BTC and ETH funding rates on these platforms may revert or fluctuate more quickly.

SOL's autocorrelation pattern is similar to BTC and ETH in terms of the general decline with lag, but it appears to show more variability, especially on Deribit and OKX. Deribit and OKX show a more pronounced drop in autocorrelation, indicating a higher rate of fluctuation or mean reversion for SOL funding rates on these exchanges. This could signal unpredictable or volatile funding rates, which might not sustain stability for extended periods. Binance again shows the most stable autocorrelation for SOL, suggesting that if SOL funding rates are favorable, they are more likely to remain stable on Binance than on other exchanges.


ETH Positive Funding Rate Event Duration Comparison Relative to Binance
Exchange
Bybit
Okx
Binance
Deribit
Bitget
Frequency
Event Duration (days)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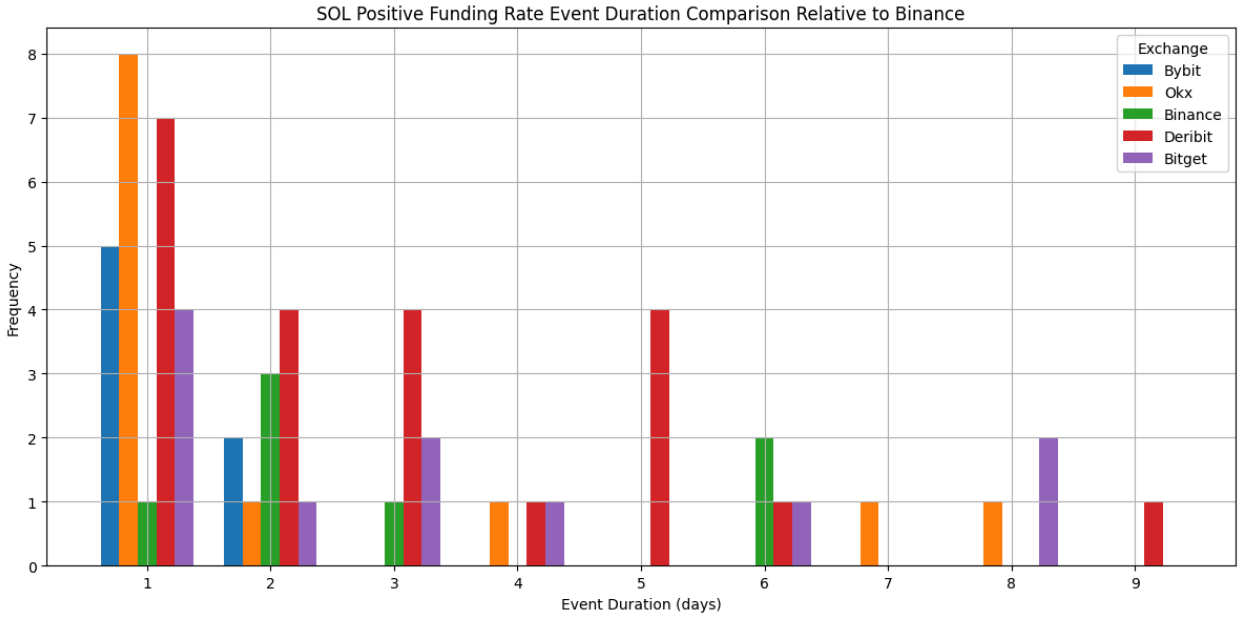

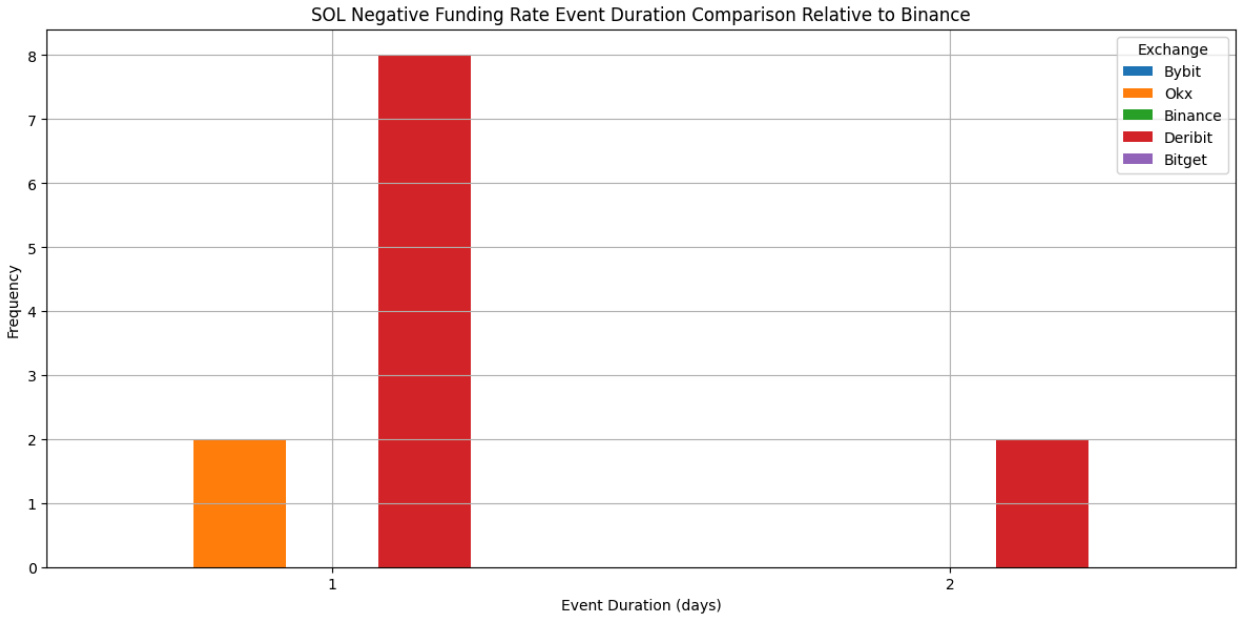

Across BTC, ETH, and SOL, positive funding rate events tend to be short, often lasting only 1-3 days, with a few instances extending up to 8-11 days on some exchanges. The positive funding rate durations are fairly distributed across all exchanges, suggesting similar stability and predictability for short positive rate events. While SOL also shows short positive funding rate events across exchanges, Binance and Bitget exhibit slightly longer positive durations, indicating these exchanges may offer more sustained positive rates. Deribit occasionally shows longer positive durations for SOL, but these are infrequent.

Negative funding rates are a key concern. SOL, in particular, exhibits more frequent and sometimes longer negative funding rate durations compared to BTC and ETH. Negative rate events are relatively rare for ETH and BTC and generally last only 1-3 days across most

exchanges, with only a few instances extending slightly longer. Negative funding rate events for SOL are more frequent and longer on Deribit (up to 8 consecutive days), which suggests a greater risk of sustained costs on this exchange. OKX and Bybit also show occasional negative funding rate events, but these are typically shorter (1-2 days).

Conclusion and Recommendations

The autocorrelation and extreme event duration analysis reinforce our initial findings from the distribution analysis, making Binance the clear first choice. Binance consistently displays the most stable autocorrelation patterns across BTC, ETH, and SOL, indicating lower variability and greater predictability in funding rates. Additionally, negative funding rate events for SOL on Binance are infrequent and brief, minimizing potential cost risks. Bybit and Bitget are solid secondary options, in that order. They provide moderate stability and relatively short negative funding rate durations for SOL, making them viable alternatives if additional collateral flexibility is needed. Therefore, we recommend starting with Binance and Bybit to ensure both risk diversification and adequate liquidity. In contrast, Deribit and OKX should be avoided for now. Both exchanges show high volatility in SOL funding rates, with sharp declines in autocorrelation and frequent, prolonged negative funding rate events. Unless there is a compelling reason, such as a significant improvement in funding rate stability, using SOL as collateral on Deribit and OKX is not recommended at this time.

This recommendation is contingent on a more comprehensive analysis of liquidity and open interest, as previously noted, particularly to determine the optimal maximum allocation to SOL and to each exchange. However, since Binance and Bybit are the leading centralized exchanges by SOL perpetuals volume and open interest, there should be no issue in moving forward with the recommendation. We suggest conservatively capping Ethena's portion of each exchange's open interest at 5%, maintaining caution and aligning with allocations for other assets. Further analysis can then assess whether confidence in additional exchanges can be increased and limits adjusted accordingly.