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Insuring the Cost of Carry: Funding-Rate Cover on Perpetual Futures, Binance 2019–2026 and Hyperliquid 2023–2026

Open Interest research desk · Working paper, not peer reviewed · Data through Nov 17, 2026

ABSTRACT. Perpetual futures charge a funding rate that can move a leveraged position's carry from a few percent a year to more than 100% within weeks. We study a 30-day parametric layer that pays when the average funding a position pays crosses a cap: long cover pays on high funding, short cover on deeply negative funding. We price it out of sample with Open Interest's production engine, using the complete funding histories of Binance BTC, ETH and SOL (from September 2019) and Hyperliquid BTC, ETH and HYPE (from June 2023). Per $100 million of cover in force at the default cap, long cover would have written $3.59m–$4.51m of premium a year. Loss ratios ran from 7% to 28%, and the pooled long loss ratio was 18%. Short cover was cheap (rate on line 7%–27%) and almost never paid, except on SOL in November 2022, when shorts paid funding of about 180% a year for a month. Daily funding has an atom at the exchanges' 10.95% base rate (24% of Binance BTC days) and a heavy right tail, and the 30-day average is only weakly persistent ($\rho(30) \approx 0.35$). Both facts make the trailing-year burn cost a poor forecast: it overstated realized long claims by 3.1× on average, on top of a 1.8× risk loading. We document the pricing frontier and size the market against Hyperliquid open interest.

KEYWORDS perpetual futures · funding rate · parametric insurance · basis trade · Wang transform · out-of-sample pricing

1. Introduction

A perpetual future tracks its underlying through a periodic funding payment between longs and shorts (Shiller, 1993; He et al., 2022; Ackerer et al., 2024). When the contract trades above the index, longs pay shorts. Exchanges add an interest component that pins the rate at a base of 0.01% per eight hours, or 10.95% a year, whenever the premium is small. For a leveraged long, or the short leg of a cash-and-carry trade, funding is the cost of carry. It can jump tenfold in a speculative month and stay there long enough to wipe out a carry trade's annual return.

The product we study turns that exposure into a 30-day contract. A long-cover buyer is paid if the average annualized funding over the period exceeds a cap K, linearly up to $K + 10$ points. A short-cover buyer is paid in the same way on the negated rate, because shorts pay when funding is negative. Settlement takes the mean of hourly rates over the period, so no claim is filed. We ask how the production engine would have priced this cover since perpetual funding data became available, what it would have earned and paid, and how well it would have served buyers.

On data: BitMEX funding goes back to 2016, but its public API refused our requests from a US address, so the earliest complete public record we could use is Binance USDⓈ-M from September 2019. Adding BitMEX 2016–2019 is a natural extension.

2. Contract and pricing

Let $\bar{R}$ be the period's mean funding, annualized in percent, taken with sign +1 for long cover and −1 for short cover. The payout per $1 of notional is $X = \min(\max(\bar{R} - K, 0), 10)/100 \times 30/365$, with limit $L = 0.822\%$. The four caps are the current 30-day average plus {0, ½, 1, 1½} standard deviations of trailing 30-day averages. The premium is

$$P = (E^{Wang}_{0.5}[X] + 0.15 \cdot \tau \cdot L) / (1 + 0.15 \cdot \tau) \quad (1)$$

The expectation is taken over the empirical distribution of payouts across every rolling 30-day window of the trailing 365 days (weight 23/24) plus one stress month (weight 1/24). The stress month is the lesser of the worst day and the worst 30-day average plus three standard deviations of the cost actually paid. Companion Paper No. 1 sets out the method in full. Underwriters reserve $L - P$ per policy.

3. Data and the shape of funding

We download every funding print: eight-hourly for Binance (7,881 BTC prints) and hourly for Hyperliquid (30,322 BTC prints). We aggregate them to daily annualized means. Table 1 describes the six series.

Table 1. Daily funding, annualized percent. "At base" counts days within 0.25 points of 10.95%.

Market	From	Days	Mean	Median	SD	Min day	Max day	Max 30-day	Min 30-day	At base	Negative	ρ(30)
Binance BTC	Sep 2019	2,626	11.4	8.2	20.6	-139	187	93.7	-16.0	24%	12%	0.35
Binance ETH	Nov 2019	2,548	13.6	8.5	26.8	-193	292	118.9	-21.6	23%	12%	0.38
Binance SOL	Sep 2020	2,257	3.7	6.7	63.7	-1709	292	117.0	-179.8	22%	29%	0.05
Hyperliquid BTC	Jun 2023	1,260	14.2	10.9	18.8	-40	224	69.6	-10.9	20%	11%	0.21
Hyperliquid ETH	Jun 2023	1,260	14.3	10.7	18.3	-38	107	55.5	-3.6	19%	12%	0.23
Hyperliquid HYPE	Dec 2024	713	19.8	10.9	28.1	-63	226	107.2	3.4	16%	4%	0.24

Three features stand out. First, there is an **atom at the base rate**: about a fifth to a quarter of days sit at 10.95%, where the interest component dominates and the premium is near zero (Figure 3). Second, the **right tail is heavy**, with daily prints above 100% and 30-day averages up to 119% (ETH, January 2021). Third, **persistence is weak** compared with lending rates. The 30-day autocorrelation is 0.35 for Binance BTC, against 0.66 for the USDC borrow index. Funding spikes are sharp and short. SOL is the outlier: November 2022 (FTX) produced a single day at -1709%, and its negative skew means SOL shorts, not longs, carried the extreme tail.



Figure 1. 30-day average funding on Binance USDⓈ-M perpetuals, annualized. The dashed line is the 10.95% base rate.

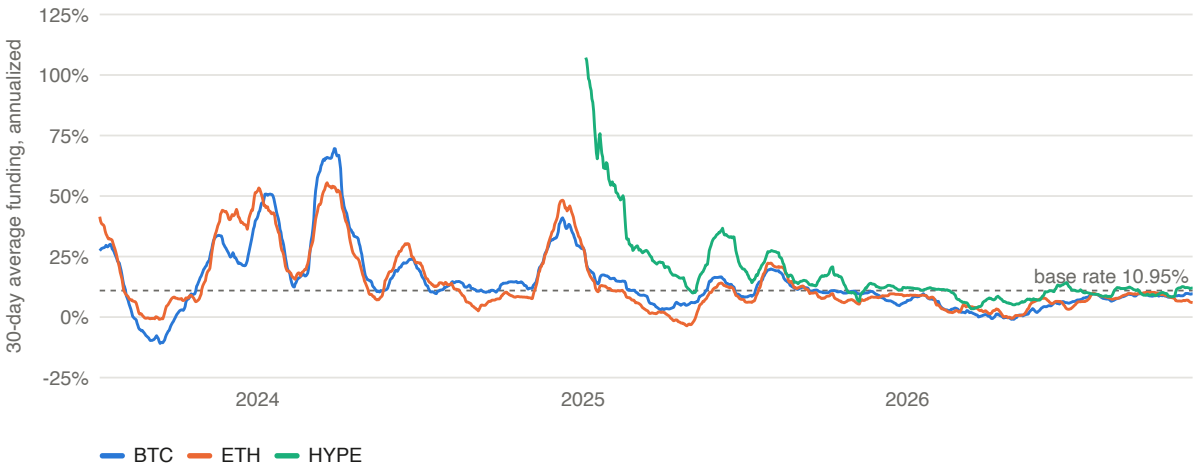

Figure 2. 30-day average funding on Hyperliquid, annualized. Since 2025 funding has mostly sat at or below the base rate, with short bursts.

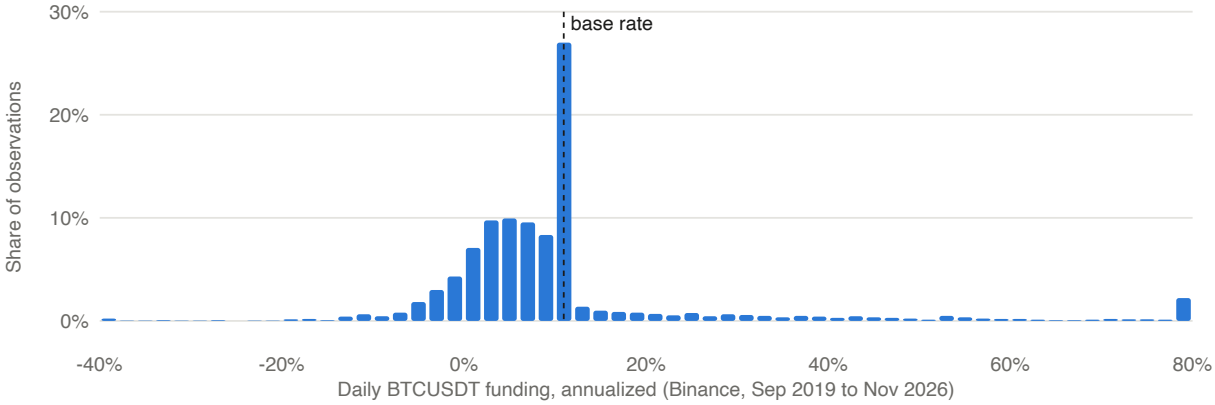

Figure 3. Distribution of daily BTCUSDT funding on Binance, clipped to [−40%, 80%]. The spike at the base rate holds 24% of days.

Table 2. The worst non-overlapping 30-day periods for each side.

Market	Worst for longs (30-day average funding)	Worst for shorts (30-day average funding, negated)
Binance BTC	Jan 2021: 94% · Dec 2020: 73% · Jan 2020: 59%	Mar 2020: 16% · Jun 2021: 4% · Apr 2026: 4%
Binance ETH	Jan 2021: 119% · Dec 2020: 94% · Jan 2020: 83%	Aug 2022: 22% · Jan 2026: 4% · Nov 2022: 3%
Binance SOL	Jan 2021: 117% · Mar 2021: 65% · Feb 2024: 52%	Nov 2022: 180% · Dec 2020: 118% · Nov 2020: 27%
Hyperliquid BTC	Feb 2024: 70% · Dec 2023: 51% · Nov 2024: 41%	Aug 2023: 11% · Mar 2026: 1% · Jul 2023: 0%
Hyperliquid ETH	Feb 2024: 56% · Dec 2023: 53% · Nov 2024: 48%	Mar 2025: 4% · Aug 2023: 1% · Mar 2026: 1%
Hyperliquid HYPE	Dec 2024: 107% · May 2025: 37% · Feb 2025: 28%	Feb 2026: -3% · Apr 2026: -6% · Oct 2025: -7%

4. Backtest design

Every day, from one year after each series starts until 30 days before its end, we sell a cohort of cover priced only on the preceding 365 days. We use the unchanged production functions `capLevels` and `quoteRateCap`. Each cohort is 1/30 of a constant $100 million of cover in force per market and side. We hold notional constant here because no free source of per-coin open-interest history exists for these venues. Section 7 rescales the results to Hyperliquid's actual open interest. There are 2,232 Binance BTC cohorts (September 2020 – October 2026) and 866 Hyperliquid BTC and ETH cohorts (June 2024 – October 2026).

5. Results

Table 3. Default cap (K1), per $100 million of cover in force. The last column gives the loss-ratio range across all four caps.

Market	Side	Cohorts	Rate on line	Premium/yr	Claims/yr	Loss ratio	Cohorts paid	Avg capital	Return on capital	LR, K0–K3
Binance BTC	Long	2,232	35.9%	$3.59m	$1.01m	28%	25%	$0.53m	490%	17%–45%
Binance BTC	Short	2,232	9.4%	$0.94m	$0.02m	3%	2%	$0.74m	123%	2%–6%
Binance ETH	Long	2,154	37.1%	$3.71m	$0.87m	23%	23%	$0.52m	549%	16%–41%
Binance ETH	Short	2,154	11.9%	$1.19m	$0.19m	16%	5%	$0.72m	137%	14%–18%
Binance SOL	Long	1,863	35.3%	$3.53m	$0.46m	13%	16%	$0.53m	579%	9%–33%
Binance SOL	Short	1,863	26.6%	$2.66m	$0.74m	28%	11%	$0.60m	317%	25%–34%
Hyperliquid BTC	Long	866	45.1%	$4.51m	$0.63m	14%	17%	$0.45m	858%	0%–27%
Hyperliquid BTC	Short	866	9.7%	$0.97m	$0.00m	0%	0%	$0.74m	130%	0%–1%
Hyperliquid ETH	Long	866	43.7%	$4.37m	$0.98m	23%	18%	$0.46m	732%	5%–32%
Hyperliquid ETH	Short	866	10.8%	$1.08m	$0.00m	0%	0%	$0.73m	148%	0%–5%
Hyperliquid HYPE	Long	319	43.6%	$4.36m	$0.31m	7%	25%	$0.46m	873%	0%–19%
Hyperliquid HYPE	Short	319	7.1%	$0.71m	$0.00m	0%	0%	$0.76m	93%	0%–0%
All long books				**$24.06m**	**$4.26m**	**18%**				
All short books				**$7.54m**	**$0.96m**	**13%**				

Return on capital = annual underwriting result / average reserved capital (limit minus premium on cover in force), excluding yield on reserves. Pooled rows add premiums and claims across books with different sample periods.

5.1 Long cover

Long cover is the product's core: a leveraged long or a basis trader's short leg wants protection against a funding blow-out. At the default cap it triggered in 16–25% of cohorts and was priced at 35–45% of the limit. Binance BTC long had a loss ratio of 28%, with a 90% block-bootstrap interval of 16%–45%. The worst cohorts paid the full limit, about ten times their premium. By year of sale, the BTC long book lost money only in late 2020 (loss ratio 101%), when the first mania hit a book priced on a calm trailing year. Its closest call after that was 2023 (78%), and every other year ran below 35% (Figure 5). By the 2024 mania, the 2021 spikes had left the trailing window, but premiums were high enough again from late 2023's run-up.

5.2 Short cover

Short cover pays when funding goes deeply negative, which happens in capitulations. On BTC and ETH that was rare and shallow: the worst BTC short month (March 2020) averaged 16%. On BTC, ETH and HYPE, short cover was priced at 7–12% of the limit, almost all of it from the stress month, and on Hyperliquid it never paid (SOL short cover was priced at 27%). SOL is the exception that justifies the product. From Nov 7, 2022, SOL shorts paid an average of 180% a year for 30 days. Short cover there had a loss ratio of 28% (90% interval 13%–53%). That episode also shows the limit of a 10-point layer: it covered 10 of the roughly 180 points the shorts actually paid.

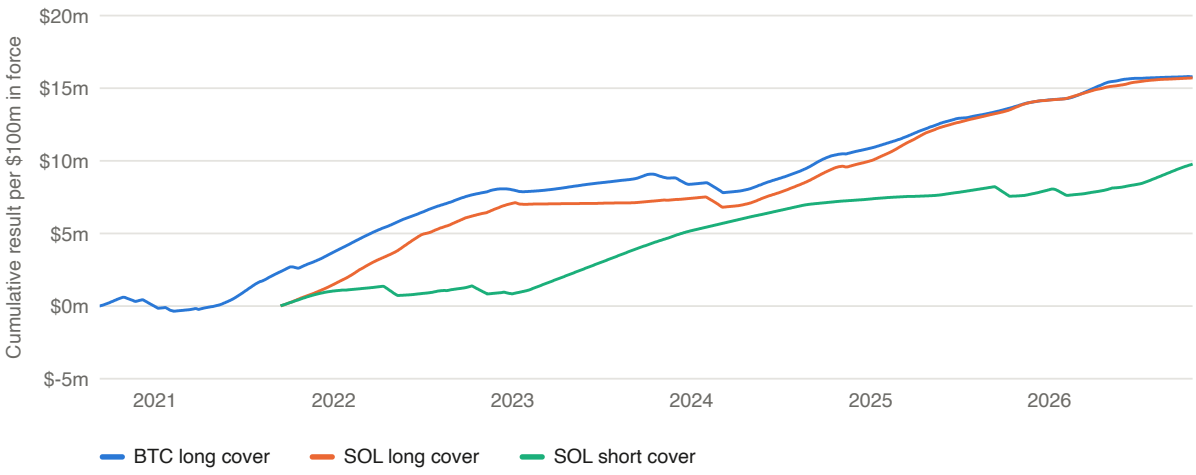

Figure 5. Cumulative underwriting result per $100 million in force, default cap. The step down in SOL short cover is November 2022.

6. Why the price is high, and the frontier

Averaged across the six long books, the premium was 40.1% of the limit, the trailing-year burn cost 22.3%, and realized payout 7.1%. That is a 1.80× loading on a burn cost that itself overstated claims 3.14×.

Table 4. Default cap: premium, trailing-year burn cost and realized payout, each as a share of the limit. Ratios are omitted where the denominator is below 0.1% of the limit.

Market	Side	Premium	Burn cost	Realized	Loading (premium/burn)	Bias (burn/realized)
Binance BTC	Long	35.9%	18.9%	10.1%	1.9×	1.9×
Binance BTC	Short	9.4%	0.9%	0.2%	10.9×	3.6×
Binance ETH	Long	37.1%	20.0%	8.7%	1.9×	2.3×
Binance ETH	Short	11.9%	1.9%	1.9%	6.2×	1.0×
Binance SOL	Long	35.3%	19.2%	4.6%	1.8×	4.2×
Binance SOL	Short	26.6%	10.2%	7.4%	2.6×	1.4×
Hyperliquid BTC	Long	45.1%	25.7%	6.3%	1.8×	4.1×
Hyperliquid BTC	Short	9.7%	0.6%	0.0%	16.1×	no material claims
Hyperliquid ETH	Long	43.7%	25.0%	9.8%	1.8×	2.5×
Hyperliquid ETH	Short	10.8%	0.5%	0.0%	22.5×	no material claims
Hyperliquid HYPE	Long	43.6%	24.7%	3.1%	1.8×	8.1×
Hyperliquid HYPE	Short	7.1%	0.0%	0.0%	stress only	no material claims

Funding behaves like lending rates in one way and differently in another. As with lending, a spike inflates the burn cost for a full year while caps re-anchor to a calmer current average: the "spike hangover" (Figure 4). The difference is weak persistence. With ρ(30) near 0.2–0.4, the cap anchored on the current 30-day average carries little information about the next 30 days. So the conditional burn cost, which applies historical 30-day changes to today's level, helps long cover only slightly. It makes short cover far more expensive, because 30-day changes in funding are large in both directions.

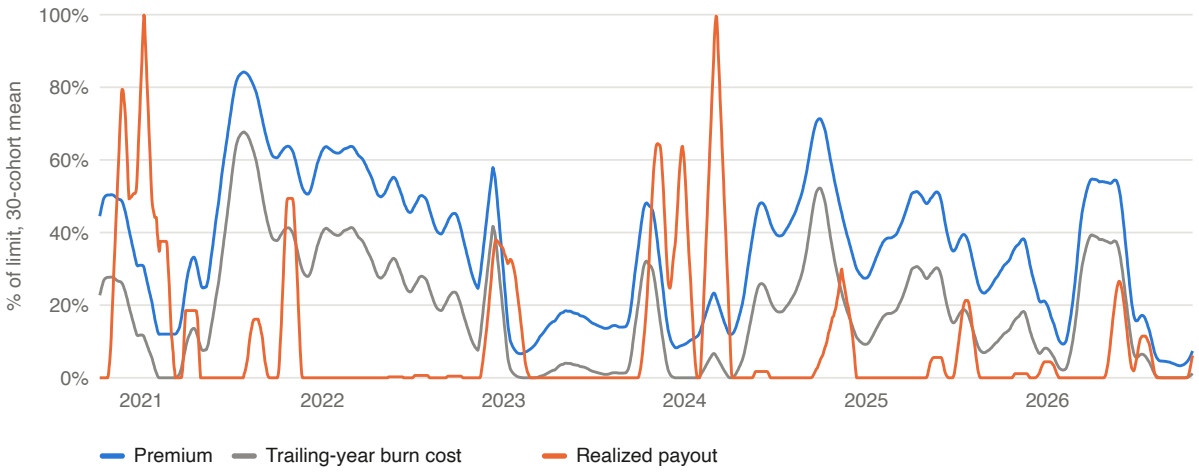

Figure 4. Binance BTC long cover, default cap: premium, trailing-year burn cost and realized payout as shares of the limit, 30-cohort means.

Table 5. Default-cap loss ratio under alternative pricing. P: λ and stress weight lowered (P1: 0.25, 1/48; P2: 0.1, 1/96, 10% cost of capital). C: conditional burn cost (C0: production loadings; C1: P1 loadings).

Market	Side	Production	P1	P2	C0	C1	Rate on line, P2
Binance BTC	Long	28%	37%	45%	34%	49%	22.5%
Binance BTC	Short	3%	5%	9%	1%	2%	2.7%
Binance ETH	Long	23%	31%	37%	30%	44%	23.6%
Binance ETH	Short	16%	30%	48%	8%	12%	3.9%
Binance SOL	Long	13%	17%	20%	15%	22%	22.6%
Binance SOL	Short	28%	42%	55%	22%	31%	13.5%
Hyperliquid BTC	Long	14%	18%	21%	20%	28%	29.7%
Hyperliquid BTC	Short	0%	0%	0%	0%	0%	2.4%
Hyperliquid ETH	Long	23%	29%	34%	27%	38%	28.9%
Hyperliquid ETH	Short	0%	0%	0%	0%	0%	2.5%
Hyperliquid HYPE	Long	7%	9%	11%	13%	21%	28.7%
Hyperliquid HYPE	Short	0%	0%	0%	0%	0%	1.5%

Lighter loadings matter much more for short cover, where the stress month is most of the price. For BTC and ETH short cover the light variant P2 cuts the rate on line to about 2–4%. For long cover even P2 leaves the loss ratio at 11–45%, because the burn-cost bias is untouched.

Table 6. Pricing frontier: every premium multiplied by a common factor (fitted in sample; indicative only).

Book	Factor	Rate on line	Loss ratio	Return on capital	Worst drawdown per $100m	Drawdown in years of premium	Losing years
Binance BTC long	1.00×	35.9%	28%	490%	$1,275k	0.35	1 of 7
Binance BTC long	0.50×	18.0%	56%	116%	$1,657k	0.92	2 of 7
Binance BTC long	0.35×	12.6%	81%	34%	$1,802k	1.43	2 of 7
Binance BTC long	0.25×	9.0%	113%	-15%	$2,108k	2.35	3 of 7
Binance BTC long	0.15×	5.4%	188%	-61%	$3,353k	6.22	5 of 7
Binance SOL short	1.00×	26.6%	28%	317%	$659k	0.25	1 of 6
Binance SOL short	0.50×	13.3%	56%	82%	$1,267k	0.95	2 of 6
Binance SOL short	0.35×	9.3%	80%	25%	$1,488k	1.60	2 of 6
Binance SOL short	0.25×	6.6%	112%	-10%	$1,636k	2.46	3 of 6

For BTC long cover, a factor of about 0.50× brings the loss ratio above 50%. Even then, cover costs 18.0% of the limit for a layer that pays in roughly a quarter of months. SOL short cover reaches a 56% loss ratio at 0.5×, but with two losing years out of six because its claims sit in one month. Below about 0.3×, both books lose money over the full sample. Hyperliquid's long books, priced off the 2024 mania, would bear a lower factor than Binance BTC. A recalibration should therefore be per market and per side, not one global factor.

7. Buyers and market size

For a long paying funding on $1 of notional, rolling the default cap raised the mean 30-day carry from 0.902% to 1.114% (about 2.6% a year). It cut the standard deviation from 123 bp to 112 bp per 30 days and the worst cohort from 7.70% to 7.08%. The hedge works but is thin. Because the layer is 10 points wide and funding manias run 50–100 points above base, a buyer worried about the tail needs a higher cap or stacked layers, not more notional at the default cap.

To size the market we combine Hyperliquid's protocol-wide open interest history (DefiLlama) with today's per-coin shares (BTC 37%, ETH 16%, HYPE 19% of $6644m total). We assume 5% of open interest buys cover on each side.

Table 7. Hyperliquid, θ = 5% of open interest per side, default cap, production pricing. Average open interest is over each backtest period.

Coin	Avg OI	Cover per side	Long premium/yr	Long claims/yr	Short premium/yr	Short claims/yr	Capital, both sides
BTC	$1552m	$78m	$3.50m	$0.49m	$0.75m	$0.00m	$0.93m
ETH	$676m	$34m	$1.48m	$0.33m	$0.37m	$0.00m	$0.40m
HYPE	$895m	$45m	$1.95m	$0.14m	$0.32m	$0.00m	$0.55m

Per-coin open-interest history is approximated by protocol-wide history times today's coin share, which misstates coin-level changes. HYPE has only 319 cohorts.

8. Relation to other instruments

Funding cover is not an option on price. It pays on the cost of holding a position, not on the direction of the underlying. A basis trader who is long spot and short the perpetual is hurt by deeply negative funding, which is short cover's trigger, while price moves leave them unaffected. Funding swaps and fixed-rate funding products (yield tokenizers, for example) lock in the whole rate path. A cap keeps the floating rate and only clips the tail, which is why it is cheap in calm regimes and expensive after manias. Prediction-market contracts on "funding above *x*" would pay a fixed amount, whereas the layer pays in proportion to how far funding overshoots.

9. Limitations

Venue mismatch. The product settles on Hyperliquid funding, while most of our history is Binance. The two share the base-rate convention but differ in premium-index construction. **Few independent spikes.** About three mania episodes (early 2020, late 2020 to early 2021, early 2024) and one capitulation that mattered for shorts (SOL, November 2022) drive most claims. **Constant notional.** Demand for long cover rises in manias, exactly when it would be most expensive and most likely to pay. **Regime change.** Hyperliquid funding has stayed close to the base rate since 2025. A model fitted on 2020–2024 manias may keep overpricing, or a new mania may arrive. **Equity perps.** The `xyz:` equity markets use half the base rate and have too short a history to test.

10. Conclusion

Funding-rate cover is well defined, collateralizable and settles without disputes. Out of sample, the production engine priced it conservatively: no book ran short of capital, and the pooled long loss ratio was 18%. The data point to three changes. First, cut the loading on short cover, where the stress month is most of the price. Second, correct the burn-cost bias on long cover with a per-market experience factor. Third, offer higher caps or stacked layers so buyers can reach the 30–100 point tail where funding actually hurts. The SOL short episode is the strongest case for the product: one month cost shorts more than a year of base-rate carry, and no on-chain instrument protected against it.

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