Amberdata Crypto Market Review 2025 and 2026 Outlook: Six Regimes, One Story

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The market that entered October is not the market that exited.

On October 10, 2025, $15.3 billion in Bitcoin positions were liquidated in 48 hours, the largest deleveraging event in crypto history. Order book depth collapsed 40% and hasn't recovered. The carry trade compressed from 15% to 5%. Open interest fell 43% from peak. The stress test is complete. What matters now is understanding what it revealed.

This report segments 2025 into six market regimes because treating the year as a single market misses everything. The same Bitcoin delivered +21.5% in one regime and -20.4% in another. The same on-chain metrics that called every prior cycle top stayed silent. MVRV peaked at 2.52, well below the 3.5+ euphoria threshold. Either the model broke, or the cycle isn't finished.

My conviction is bullish, but conviction without humility is dangerous. ETF holders sit on an aggregate cost basis near $80,000, creating institutional support absent in prior cycles. Whales and sharks accumulated over 120,000 BTC while retail capitulated. ETF flows now move 12x the daily mining supply, replacing the halving as the dominant price driver. Regulatory transformation has accelerated institutional adoption faster than anyone predicted. These are structural tailwinds, but uncertainty remains, and we acknowledge it.

None of this analysis would exist without the engineers and data teams at Amberdata. They work behind the scenes delivering institutional-grade coverage across 1,000+ centralized and decentralized exchanges, 500,000+ trading pairs, and 13+ years of historical data. This report is built on their work.

The market has changed. The frameworks for understanding it must change too. The 14 sections that follow explain why, and what comes next.

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About This Report

The Amberdata Crypto Market Review 2025 and 2026 Outlook: Six Regimes, One Story provides institutional-grade analysis of Bitcoin and digital asset markets. The report covers the complete 2025 calendar year (January 1 to December 31) across 14 sections.

Analytical Framework

The analysis is structured around six market regimes identified through the interaction of price action, leverage positioning, institutional flows, and liquidity conditions. This regime-based approach enables readers to contextualize any metric within its proper market phase, because the same reading means different things during Policy Euphoria versus Fragile Recovery.

How to Use This Report

This report is designed to serve multiple use cases.

For a high-level overview, start with Section 1, which presents the complete 2025 story in a single dashboard with key metrics, regime performance, and the year's defining events.

For targeted analysis, each section is designed to stand alone. Every section opens with Key Takeaways summarizing the core findings, followed by detailed analysis with supporting charts. Cross-references guide readers to related sections for deeper context.

For 2026 positioning, Section 14 synthesizes the full analysis into scenario frameworks with probability-weighted outcomes, key watchlist indicators, and the catalysts that could trigger regime changes.

For methodology and data definitions, the appendix provides complete documentation of data sources, calculations, and threshold interpretations used throughout.

Data Sources

All data is sourced from Amberdata's institutional data infrastructure, covering spot and derivatives markets, on-chain analytics, ETF flows, DeFi activity, and stablecoin supply. Complete methodology documentation is provided in the appendix.

A Note on Uncertainty

This report presents analysis, not predictions. Where we express conviction, we acknowledge the assumptions underlying that view. Where the data is ambiguous, we present competing interpretations. Markets humble forecasters; our goal is to provide the evidence base for readers to form their own informed views.

The Year Bitcoin Grew Up: 2025 in One Dashboard

Six regimes, $29B in ETF capital, and the largest crash in history - here's your year-at-a-glance

KEY TAKEAWAYS

- **Six regimes, not one market.** 2025 had six distinct phases with returns ranging (R) from +21.5% (R3) to -20.4% (R6). Treating the year as a single bull or bear market misses the story entirely.
- **October's $19B all-crypto liquidation was historic.** The largest deleveraging event in crypto history. OI collapsed 43.5% from a $56.6B peak. The market structure that entered October is not the market structure that exited.
- **ETFs now drive price discovery.** $29.3B in net flows YTD across 228 inflow days. Institutional capital has fundamentally changed market structure. The carry trade that powered H1 (+15.3% peak basis) has collapsed to marginal (+5.2% current).
- **The year ends in fragile recovery.** Current price ~$88,000 (-7.3% YTD). Drawdown -29.7% from ATH. OI subdued at $32.0B. Carry trade marginal. The market awaits catalysts for the next regime transition.

Here's 2025 in a single dashboard: six market regimes, $29.3 billion in institutional ETF capital, and the largest deleveraging event in crypto history.

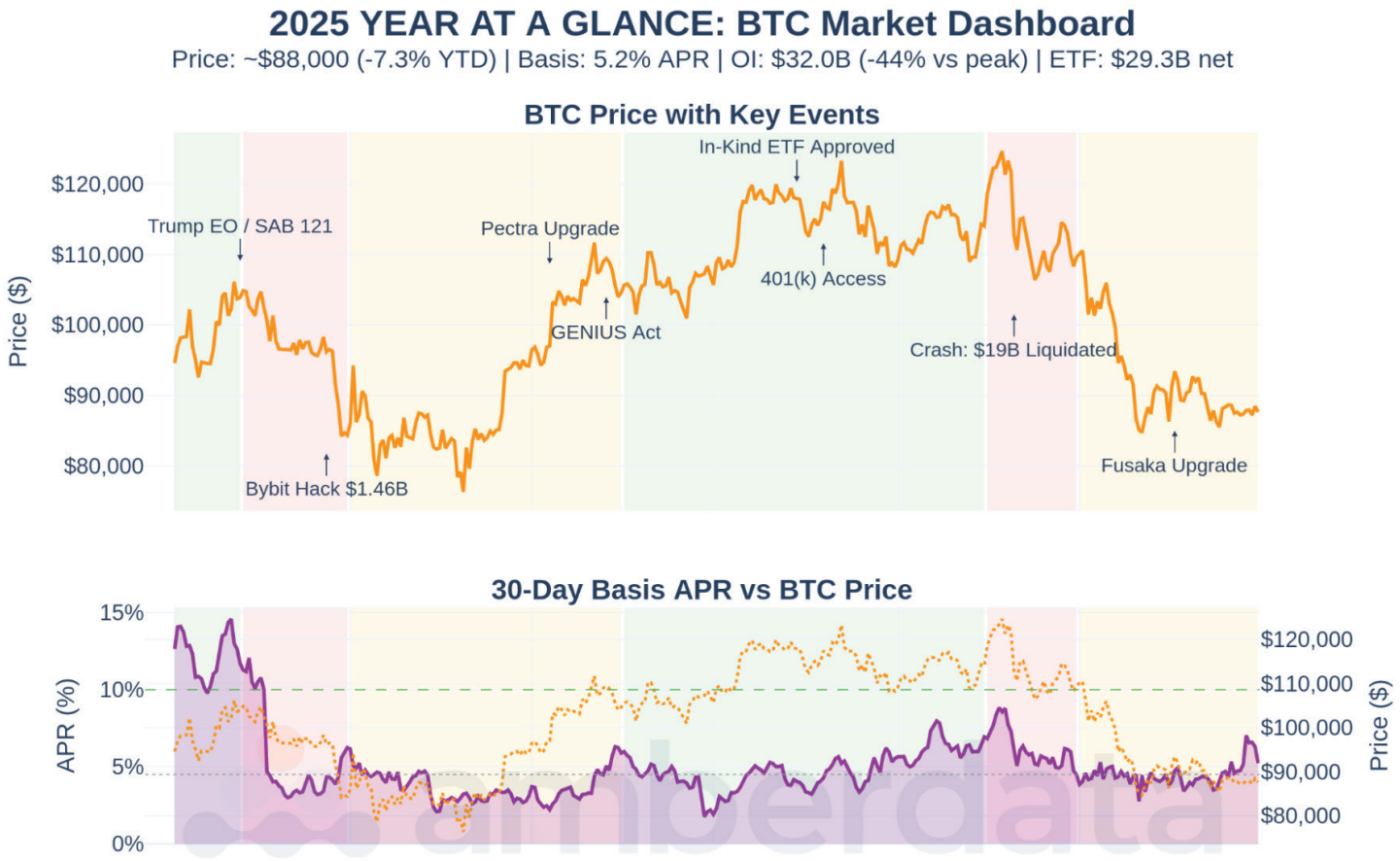
Bitcoin ended the year at $88,000, down 7.3% YTD after a 32% maximum drawdown. The headline return masks extreme regime dispersion - from +21.5% in Infrastructure Build (R3) to -20.4% in Fragile Recovery (R6). Everything that follows in the Amberdata Crypto Market Review 2025 is the evidence behind these numbers.

Why This Dashboard Matters. The dashboard approach serves institutional readers who need the full picture before diving into details. Rather than burying conclusions in hundreds of pages of analysis, this executive summary presents the complete picture upfront. Each metric on the dashboard has a dedicated section in the full report. The subsequent 13 sections provide the forensic detail behind each metric. Read this section for the overview; read the full report for the evidence.

What Makes 2025 Different. This was not a typical crypto year. The market experienced its first full year with spot ETFs, absorbed $29B in institutional capital, survived a $19B all-crypto liquidation cascade, and established regulatory frameworks that fundamentally changed the market structure. The infrastructure stress test is complete. What remains is understanding what it revealed.

The Year at a Glance

The Hero Dashboard. The dashboard captures every dimension of 2025's market dynamics in a single view: price action across six regimes, carry trade economics that shifted from excellent to marginal, leverage that built to $56.6B before collapsing 43.5%, and institutional flows that totaled $29.3B despite October's volatility.



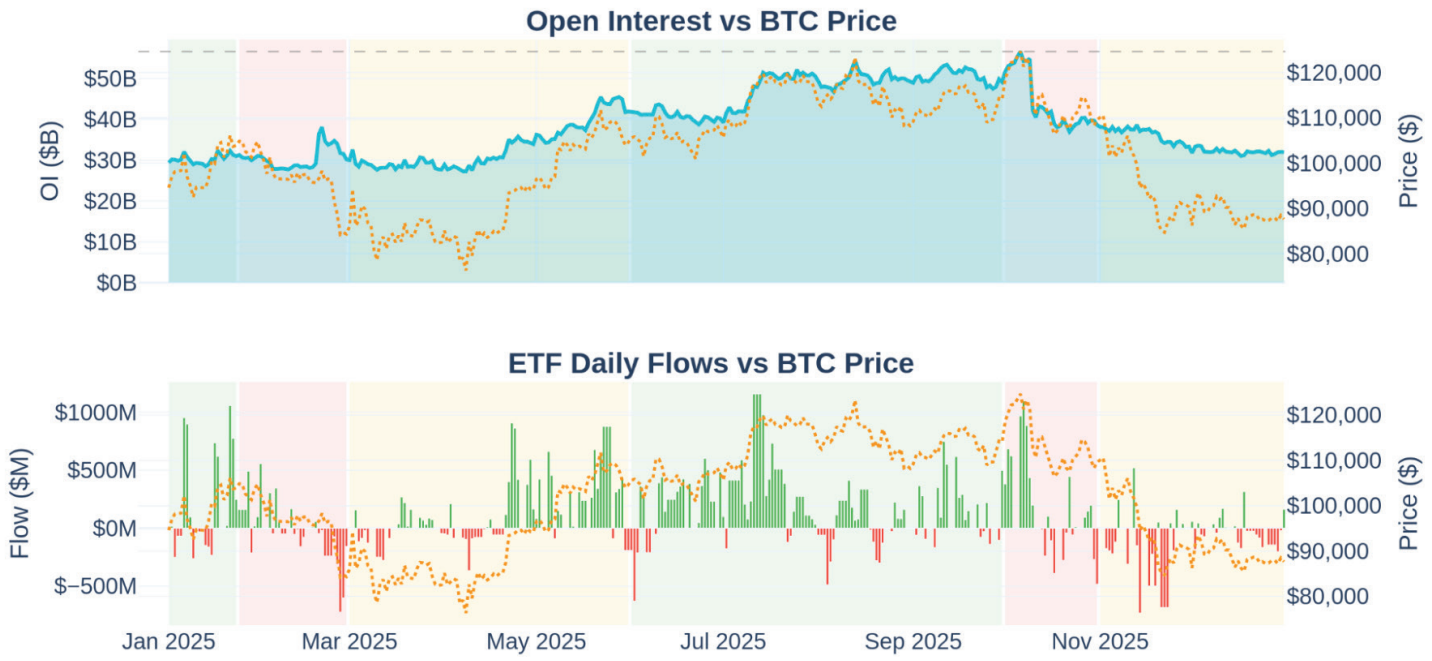


Figure 1.1: Year at a Glance Dashboard - The complete 2025 story in one view. Price with regime shading, basis APR evolution, OI trajectory, and cumulative ETF flows.

-7.3%

YTD return masks extreme regime dispersion. Best regime (R3): +21.5%. Worst regime (R6): -20.4%. A 42 percentage point swing within the same calendar year.

Price Summary. The following metrics capture the full price trajectory for 2025:

Start: $95,000
High: $125,000 (Oct 6)
Low: $76,000 (Apr 8)
Current: ~$88,000
Change: -7.3% YTD
Range: $49,000 (51%)
Notes: Max drawdown -32.0% on Nov 22; current drawdown -29.7%

The Price Trajectory. The price trajectory tells a story of phases rather than trends. January's policy euphoria drove prices higher on optimism around the new administration's crypto-friendly stance. February's Bybit hack triggered correction as security concerns resurfaced. March through May saw the year's strongest recovery (+21.5%) as the market absorbed legacy distributions and regulatory clarity emerged. Summer's institutional expansion set up September's peak as ETF inflows accelerated and new access channels opened. October's tariff announcement triggered the cascade that would define Q4. November and December have been about fragile recovery, with the market consolidating at lower levels while awaiting catalysts for the next move.

Regime Performance: The Dispersion Story

The Framework. The six-regime framework is the analytical foundation of the entire Amberdata Crypto Market Review 2025. Each regime represents distinct market conditions with different drivers, risks, and opportunities. Understanding these regimes transforms how you interpret every data point in this report.

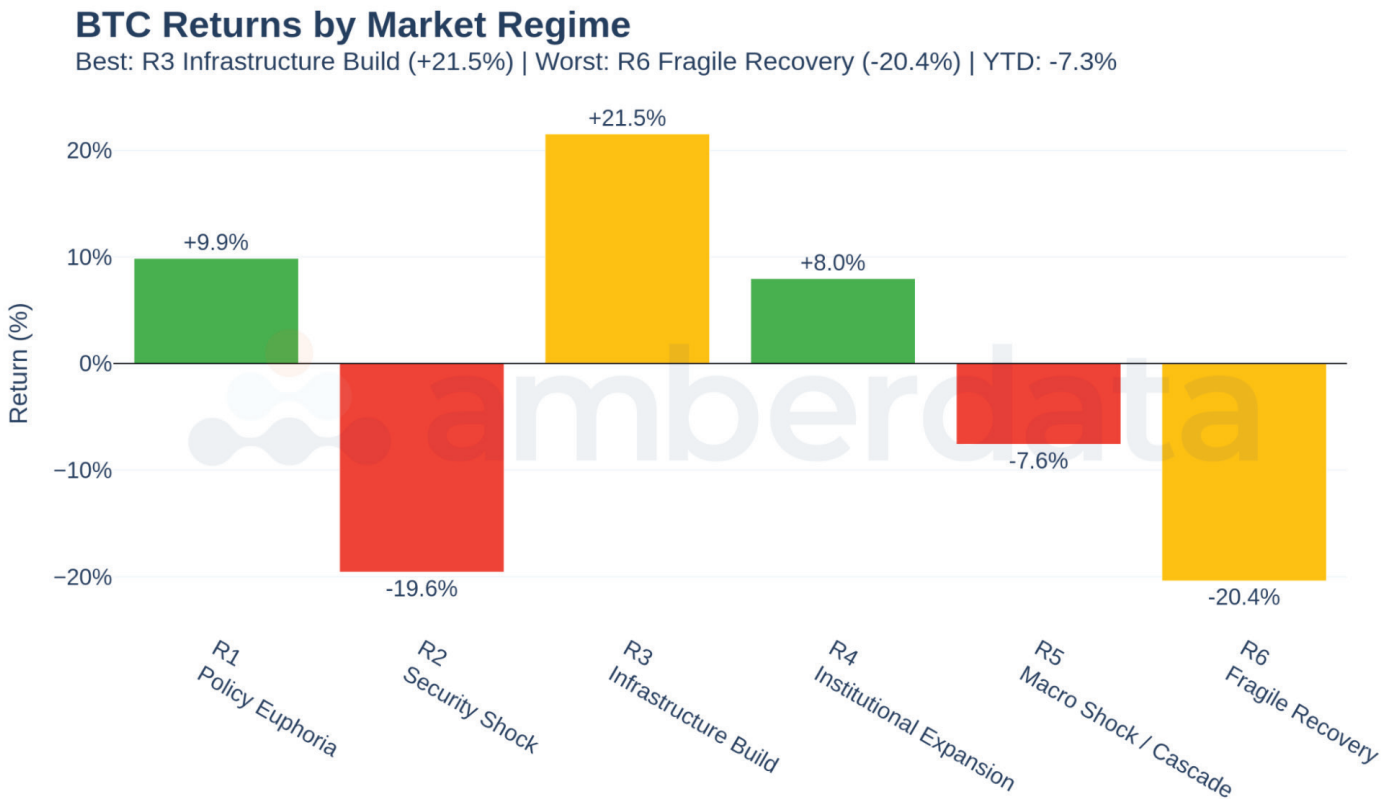


Figure 1.2: Regime Performance Table - Returns, basis, and ETF flows by regime. Note the extreme dispersion and how carry trade attractiveness varied dramatically across phases.

Regime 1 - Policy Euphoria (Jan 1-23). +9.9% return, 12.7% basis APR, +$4.16B ETF flows. Trump executive order and SAB 121 rescission created maximum optimism. Carry trade was excellent at 12.7% basis - the year's peak conditions. This was the window when institutional strategies generated their best returns.

Regime 2 - Security Shock (Feb). -19.6% return, 5.5% basis APR, -$0.51B ETF flows. Bybit's $1.46B hack triggered a flight to safety. The only regime with net ETF outflows. Basis compressed as risk appetite declined sharply. The hack served as a reminder that operational security remains the industry's Achilles heel.

Regime 3 - Infrastructure Build (Mar-May). +21.5% return, 3.7% basis APR, +$9.42B ETF flows. The year's best performer. Mt. Gox and FTX distributions absorbed smoothly - supply that the market had feared for years was finally digested. GENIUS Act passed. Ethereum Pectra upgrade completed. Steady accumulation without excessive leverage created healthy market structure.

Regime 4 - Institutional Expansion (Jun-Sep). +8.0% return, 4.8% basis APR, +$15.16B ETF flows. The largest ETF accumulation regime by far. In-kind redemptions approved, dramatically improving capital efficiency. 401(k) access enabled, opening the $40 trillion retirement market. Peak OI of $56.6B built during this phase - the leverage accumulation that set risk conditions for October.

Regime 5 - Macro Shock / Cascade (Oct). -7.6% return, 6.2% basis APR, +$4.39B ETF flows. Despite the crash, ETF flows remained positive (arbitrage rebalancing). Tariff announcement triggered cascade. $19B in all-crypto liquidations over 48 hours. OI collapsed 43.5%. This was the stress test that 2025 will be remembered for.

Regime 6 - Fragile Recovery (Nov-Dec). -20.4% return, 4.5% basis APR. The aftermath. OI subdued at $32.0B. Order book depth has not recovered - market makers remember. The market is awaiting catalysts for the next regime transition.

The same asset delivered +21.5% and -20.4% returns within the same calendar year. Regime identification matters more than general market outlook.

SO WHAT?

Understanding which regime the market is in provides context for interpreting current data and anticipating how the market might respond to catalysts. The framework established here is the analytical spine of the entire Amberdata Crypto Market Review 2025. Every metric in subsequent sections is contextualized within these six phases.

Carry Trade: From Excellent to Marginal

The Dominant Strategy. The carry trade - long spot via ETF, short futures - was the dominant institutional strategy of 2025. Its economics shifted dramatically across the year, and understanding this shift is essential for interpreting ETF flow data.

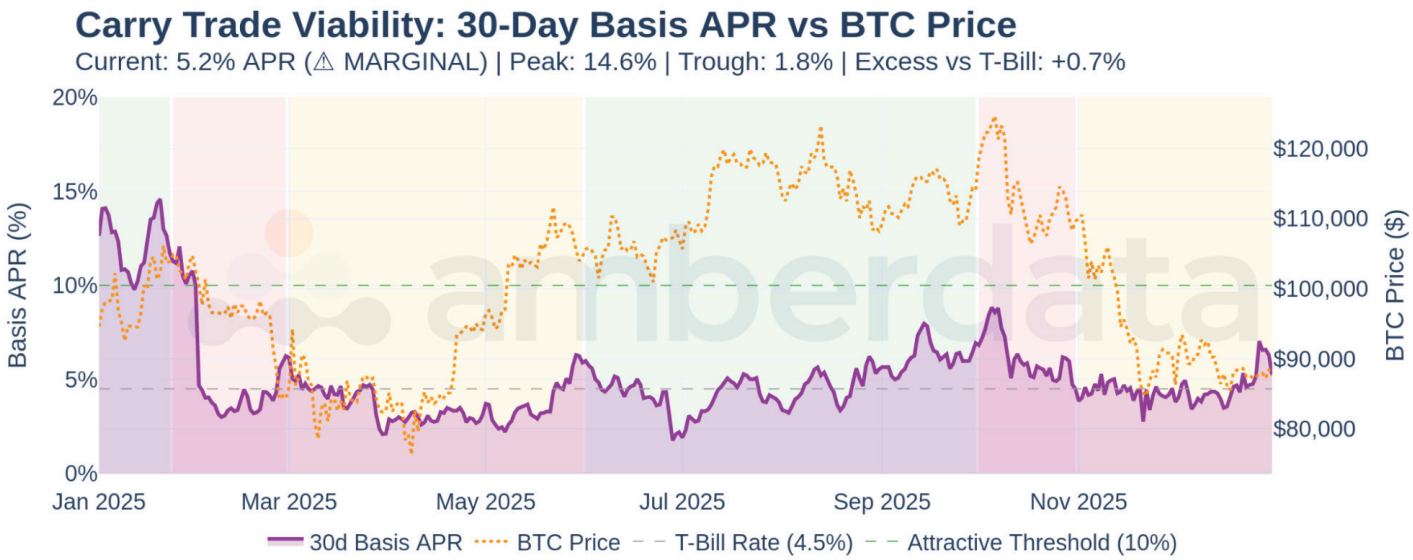


Figure 1.3: Carry Trade Summary - 30-day basis APR evolution with regime shading. Note the 14.6% peak in January versus the current 5.2% - a compression that reflects changed market dynamics.

Current Status: Marginal. 30-day basis APR at 5.2% versus 4.5% T-bill rate offers only 0.7% excess return. Insufficient compensation for operational complexity. Capital that was deployed in this trade has largely exited.

Year Summary. The carry trade economics across 2025:

Average: 5.1% APR
High: 14.6% (Jan 20)
Low: 1.8% (Jun 28)
Days above 10%: 29 (8% of year)
Days below 5%: 233 (64% of year)

The Narrow Window. The carry trade was attractive for only 29 days (8% of the year), all concentrated in Regime 1's policy euphoria. For the remaining 336 days, basis offered insufficient return to justify institutional deployment. The October cascade that drove basis from 6.2% to near the current 5.2% represented the unwind of carry positions accumulated during R1 and R4. This mechanical selling pressure amplified the crash - a dynamic that explains why ETF outflows during the cascade were concentrated in specific products rather than broad-based.

Return and Drawdown: The Risk Reality

Beyond the Headline. The -7.3% YTD return understates the volatility experienced during the year. For risk managers, the drawdown profile tells the real story.

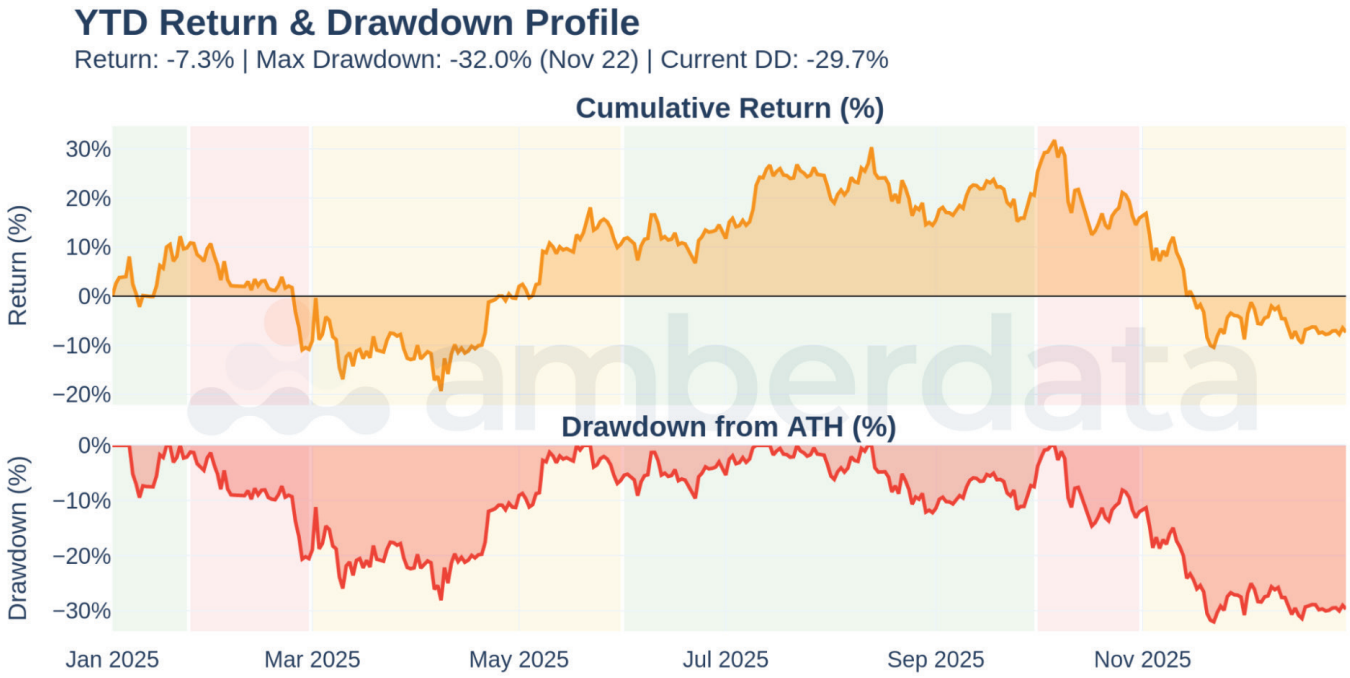


Figure 1.4: Return and Drawdown - Cumulative return and drawdown from ATH. The October cascade drove max drawdown to -32.0% before partial recovery.

-32.0%

Maximum drawdown on November 22. The path from peak ($125,000) to trough ($85,000) took 47 days. Recovery to current levels still leaves a -29.7% drawdown from ATH.

Recovery Arithmetic. The drawdown arithmetic creates challenging recovery dynamics. A 32% drawdown requires a 47% gain to recover - this asymmetry is why risk management matters more than return optimization. With the current price at $88,000 and prior ATH at $125,000, the market needs +42% to reclaim highs. At historical average monthly returns, this could take 6-12 months assuming no further drawdowns - a sobering timeline for investors who entered at the top.

ETF Flows: Institutional Participation

The Clearest Signal. ETF flows represent the clearest signal of institutional participation. Despite October's volatility, cumulative flows remained strongly positive - a fact that challenges the capitulation narrative.

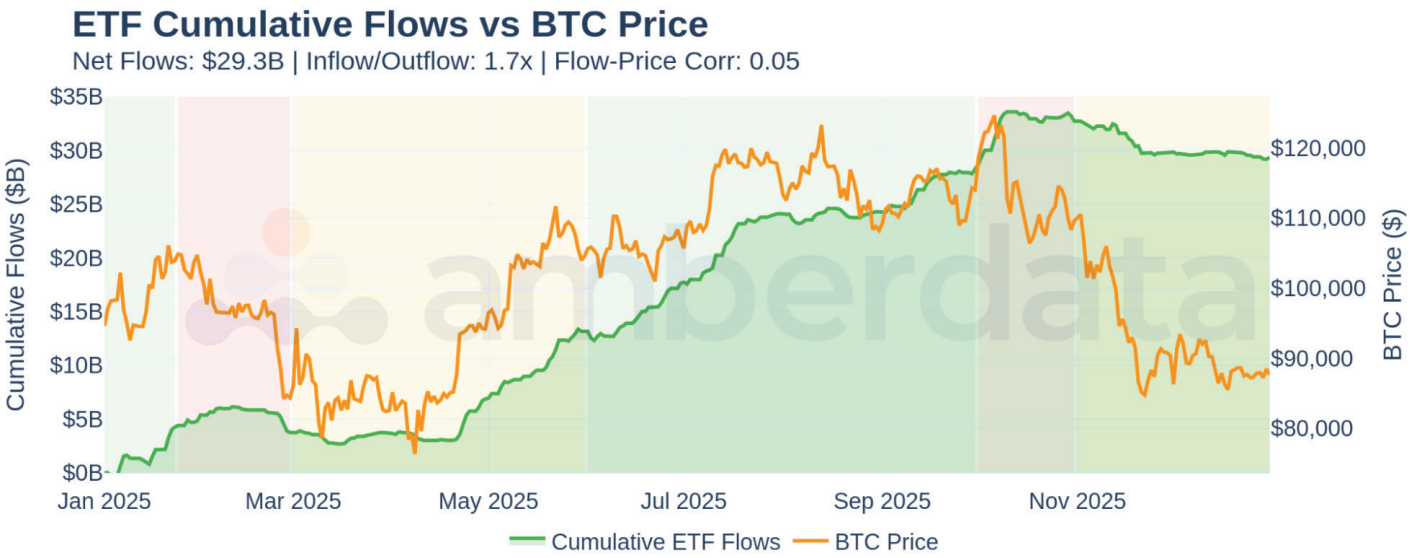


Figure 1.5: ETF Flows Summary - Cumulative ETF flows versus price. Note how flows remained positive even during October's crash - arbitrage rebalancing rather than capitulation.

Flow Summary. ETF flow metrics for 2025:

Net YTD: $29.34B
Inflow Days: 228
Outflow Days: 136
Ratio: 1.7x (inflows to outflows)
High: $1,157M (Jul 11)
Low: -$731M (Nov 14)

Persistent Accumulation. The 228 inflow days versus 136 outflow days (1.7x ratio) demonstrates persistent institutional accumulation throughout the year. Even during R5's cascade, net ETF flows were positive at $4.39B - counter to the narrative of an institutional exodus. The outflows were concentrated in specific arbitrage-focused products, not broad capitulation. This distinction matters for understanding market structure.

Flow-Price Decorrelation. Flow-price correlation was only 0.05 for the year, indicating that ETF flows are not reliable short-term price predictors. Institutions accumulate on different timeframes than retail, often buying weakness and selling strength. This decorrelation is actually healthy - it suggests flows represent fundamental allocations rather than momentum chasing. For traders expecting flows to predict price, this data is sobering. For long-term investors, it is reassuring.

Open Interest: The Leverage Story

Measuring System Leverage. Open interest measures the leverage in the system. Its trajectory through 2025 tells the story of accumulation and violent unwind - and provides the clearest warning signal for the October cascade.

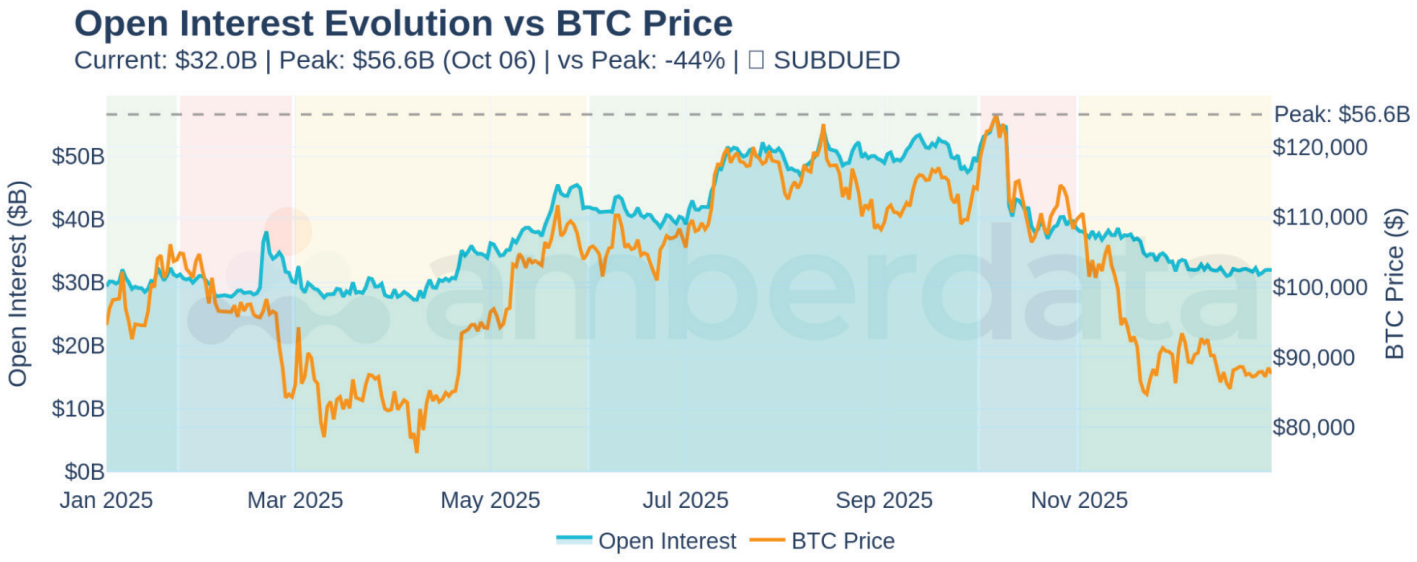


Figure 1.6: Open Interest Summary - OI evolution with regime shading. Peak at $56.6B in October immediately preceded the cascade. Current $32.0B represents substantial deleveraging.

Current Status: Subdued. Open interest metrics:

Current: $32.0B
High: $56.6B (Oct 6)
Change: -43.5% from peak
Average: $38.6B YTD

OI by Regime. Average open interest varied significantly across regimes:

R1: $30.3B
R2: $30.5B
R3: $33.2B
R4: $47.3B
R5: $44.1B
R6: $34.2B

The Buildup and Collapse. R4's average OI of $47.3B represents the leverage accumulation that set up October. When the tariff trigger hit, $24.6B in OI ($56.6B peak to $32.0B current) was destroyed through liquidations and voluntary deleveraging. The market is now substantially deleveraged - a healthier foundation but also lower speculative intensity. This matters because leverage drives both opportunity and risk.

The Leverage-Basis Relationship. The OI trajectory also reveals the relationship between leverage and basis. When OI was highest (R4), basis was moderate (4.8%) as the crowded long positioning compressed futures premiums. When OI collapsed (R5-R6), basis initially spiked (6.2% in R5) before settling at current marginal levels (5.2%).

SO WHAT?

Current subdued OI ($32.0B) means lower cascade risk but also lower potential for leveraged moves. The next accumulation phase - when OI rebuilds toward $40-50B - will signal renewed speculative interest and increased opportunity alongside increased risk. Watch OI as a leading indicator for regime transitions.

The Six Regimes Framework

The Analytical Spine. The regime framework established here serves as the analytical spine for the entire Amberdata Crypto Market Review 2025. Every subsequent section contextualizes data within these six phases. This is not arbitrary categorization - each regime represents genuinely different market conditions.

The Six Market Regimes of 2025

YTD Return: -7.3% | Max DD: -32.0% | ETF: $29.3B | Peak Basis: 14.6%

Regime	Name	Period	Days	Return	Avg Basis	ETF Flows	Signal
R1	Policy Euphoria	01-01 → 01-23	23	+9.9%	12.3%	$+4.16B	Risk-On
R2	Security Shock	01-24 → 02-28	36	-19.6%	5.5%	$-0.72B	Risk-Off
R3	Infrastructure Build	03-01 → 05-31	92	+21.5%	3.7%	$+10.89B	Accumulation
R4	Institutional Expansion	06-01 → 09-30	122	+8.0%	4.8%	$+21.64B	Risk-On
R5	Macro Shock / Cascade	10-01 → 10-31	31	-7.6%	6.2%	$+4.39B	Capitulation
R6	Fragile Recovery	11-01 → 12-31	61	-20.4%	4.5%	$-5.08B	Cautious

Figure 1.7: Six Regimes Summary Table - Complete regime reference with dates, triggers, returns, basis, and ETF flows. This framework applies throughout the full report.

Why Regimes Matter. The six regimes are not arbitrary divisions - each represents distinct market conditions with identifiable triggers, characteristic metrics, and different risk profiles. R1's policy euphoria created leverage. R2's security shock tested resilience. R3's infrastructure build enabled healthy accumulation. R4's institutional expansion created fragility. R5's macro shock triggered cascade. R6's fragile recovery awaits resolution.

Current Position and Transition Signals. Understanding which regime the market currently occupies (R6: Fragile Recovery) and what signals would indicate transition to a new regime enables proactive positioning rather than reactive response. The signals to watch: basis recovery above 6%, depth restoration to pre-crash levels, consistent ETF inflows above $500M weekly, and catalyst events like Fed cuts or 401(k) platform launches. When multiple signals align, regime transition becomes likely.

THE BOTTOM LINE

The dashboard tells the meta-story: crypto in 2025 was not about retail speculation - it was about institutional infrastructure being stress-tested in real time. The market absorbed $29.3B in ETF flows, survived its largest deleveraging event ($19B all-crypto liquidations), and established regulatory frameworks (SAB 121 rescission, GENIUS Act, in-kind ETFs, 401(k) access) that position 2026 for continued institutional adoption. The year ends in fragile recovery, awaiting catalysts. The full Amberdata Crypto Market Review 2025 unpacks each dimension across 14 sections. What follows is the evidence behind every line on this dashboard.

The Volatility Framework: How to Read Crypto's Stress Signals

A regime-based approach to detecting market stress before it becomes obvious

KEY TAKEAWAYS

- **Volatility regimes preceded every major move.** R4's 30% volatility (year's lowest) came immediately before October's cascade. R3's 54% volatility occurred during the year's best-performing period. Low volatility doesn't mean low risk.
- **October was a two-stage event.** Stage 1: Macro trigger (tariff announcement) caused orderly selling over 6 hours. Stage 2: Leverage cascade amplified the move into $15.3B of BTC liquidations concentrated in 48 hours.
- **Flow-Leverage-Liquidity triangulation explains major moves**. October's cascade involved all three: ETF outflows (Flow), $15.3B BTC liquidations (Leverage), and 40% depth collapse (Liquidity). Each dimension amplified the others.
- **Funding persistence is a leading indicator.** 14+ consecutive days of elevated funding (R4's 6.1% average) preceded October's crash. Extended one-sided positioning creates the conditions for violent reversals.

On October 10, Bitcoin fell 6.84%. Unremarkable by crypto standards. But in the same 48 hours, $15.3 billion in BTC positions were liquidated - the largest forced deleveraging event in crypto history. The price move didn't warn you. The volatility framework did.

This section establishes the analytical framework that explains every major move in 2025: the interaction between volatility regimes, leverage accumulation, and liquidity conditions. Understanding this framework transforms hindsight analysis into forward-looking risk assessment.

The Framework Components. The framework consists of four components: volatility regime identification (what type of market are we in), the Flow-Leverage-Liquidity triangulation (what forces are driving the market), stress indicators (daily range and volume patterns), and leading indicators (funding persistence). Together, these components provide a comprehensive view of market structure that goes beyond price alone.

Volatility Regimes: The Foundation

Regime Indicator, Not Just Risk Measure. Volatility is a regime indicator. Different volatility levels correspond to different market behaviors, positioning patterns, and response characteristics.

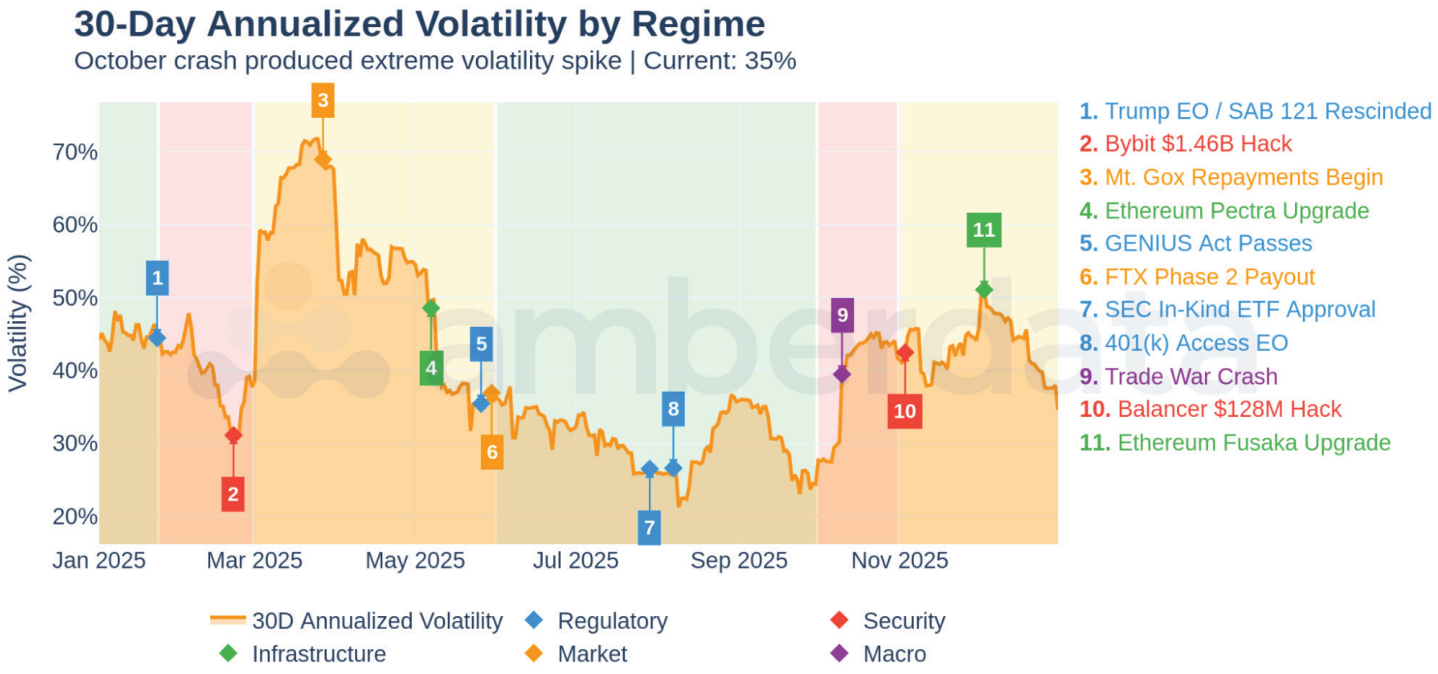


Figure 2.1: Volatility Regime Map - 30-day annualized volatility by regime. Note R4's 30% (lowest) immediately before October's cascade. Low volatility often precedes high volatility events.

Volatility by Regime. 30-day annualized volatility across 2025's six regimes:

R1 Policy Euphoria: 45%
R2 Security Shock: 39%
R3 Infrastructure Build: 54%
R4 Institutional Expansion: 30%
R5 Macro Shock: 39%
R6 Fragile Recovery: 43%

The Counterintuitive Pattern. R3's 54% volatility (highest) occurred during the year's best-performing regime (+21.5% return). R4's 30% volatility (lowest) immediately preceded October's cascade. R5's 39% volatility during the crash was lower than R3's calm accumulation phase.

The Explanation. Volatility measures historical price movement, not future risk. R3's high volatility reflected price discovery during recovery. R4's low volatility masked leverage accumulation. The disparity between realized volatility and structural fragility created the setup for October.

Risk Management Implications. For risk managers, this means volatility-based position sizing is insufficient. Low historical volatility can mask high structural risk. The solution: supplement volatility with leverage metrics (OI relative to depth), flow indicators (ETF/stablecoin trends), and sentiment signals (funding persistence). R4 showed benign volatility but dangerous leverage.

The regime classification provides actionable context. High-volatility regimes (R3: 54%) often accompany healthy price discovery and don't necessarily indicate stress. Low-volatility regimes (R4: 30%) can mask building fragility. The volatility number matters less than the regime context: where are we in the cycle, what's the leverage profile, how is liquidity behaving?

SO WHAT?

Low volatility is not safety. It often indicates compressed positioning awaiting a catalyst. Monitor leverage accumulation during low-volatility periods - that's when the next crisis builds.

The October Crash: Anatomy of a Two-Stage Event

Two Phases, One Cascade. October's crash wasn't a single event - it was two distinct phases that fed each other.

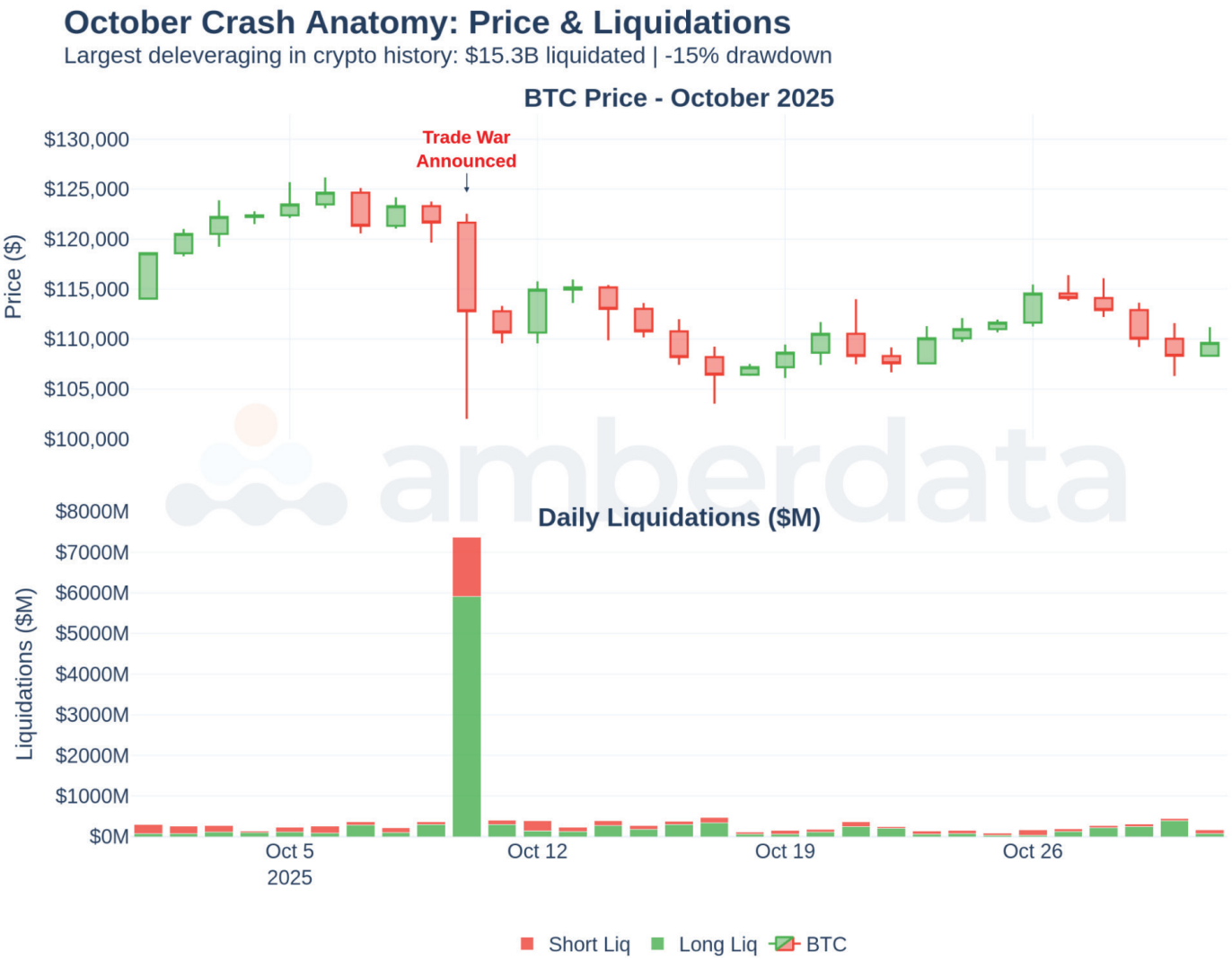


Figure 2.2: October Crash Anatomy - Price action with liquidation overlay. Stage 1 (macro trigger) was orderly. Stage 2 (leverage cascade) was violent. 70% of liquidations were longs.

$15.3B

Total BTC liquidations in October. Long liquidations: $10.7B (70%). Short liquidations: $4.5B (30%). The market was overwhelmingly positioned long.

Stage 1: Macro Trigger (Hours 0-6). October 10, tariff announcement. Risk-off sentiment spread across global markets. Spot selling was orderly - large but not catastrophic. Price declined from $119,000 toward $112,000. This phase looked like a normal market correction.

Stage 2: Leverage Cascade (Hours 6-48). Liquidations triggered liquidations. As prices fell through key levels, margin calls forced position closure. Forced selling pushed prices lower, triggering more liquidations. The feedback loop accelerated. Price fell from $112,000 to a $106,000 trough - the final 5% took 40 minutes.

Risk Management Distinction. The distinction matters for risk management. Stage 1 was survivable with normal hedges. Stage 2 required pre-positioned protection or cash reserves. By the time Stage 2 began, it was too late to react.

The cascade mechanics explain the asymmetric liquidation split: 70% longs versus 30% shorts. The market entered October overwhelmingly positioned long. Carry traders held long spot, short futures. Speculators held leveraged longs. When the cascade began, longs were forced sellers. The concentration of long exposure created the conditions for concentrated long liquidations.

Future Risk Assessment. For future risk assessment: monitor positioning concentration before major events. When one side of the market exceeds 60-65% of open interest, the setup for a violent reversal exists. The trigger is unpredictable; the vulnerability is measurable.

The October Timeline Template. The October timeline provides a template for future cascade analysis:

Hour 0: Macro trigger (tariff announcement)
Hours 0-6: Orderly selling, normal market function
Hours 6-12: Liquidation acceleration begins, basis compresses
Hours 12-48: Full cascade mode, feedback loop active, liquidity evaporates
Hour 48+: Cascade exhaustion, stabilization begins

Understanding this timeline helps distinguish normal corrections from cascade conditions.

Flow-Leverage-Liquidity Triangulation

The Three Dimensions. Every major market move in 2025 can be explained through the interaction of three dimensions: Flows (capital entering or leaving), Leverage (positioning and margin), and Liquidity (market depth and execution quality).

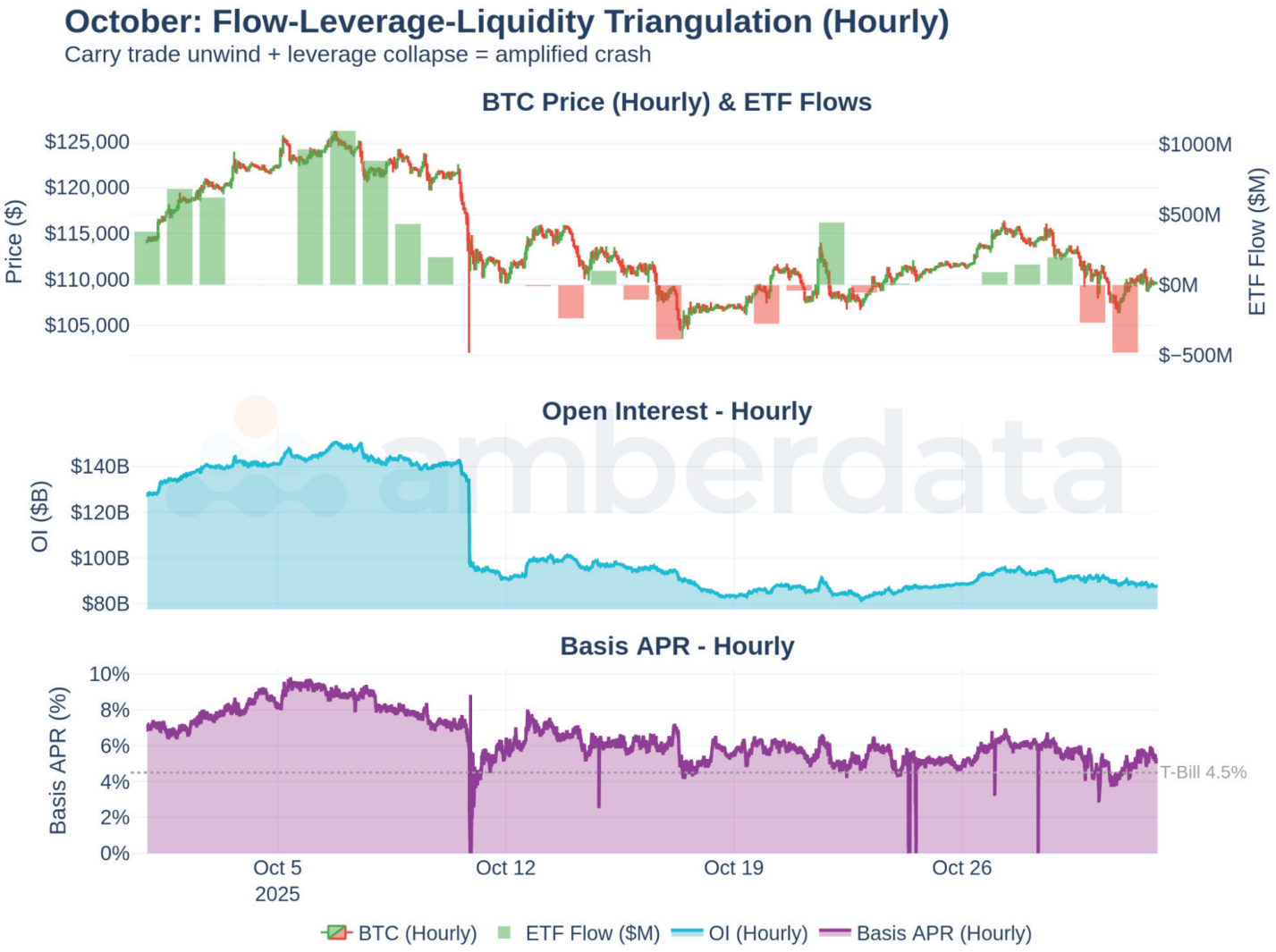


Figure 2.3: Flow-Leverage-Liquidity Triangulation - Three-panel view of October: ETF flows, OI collapse, and basis compression. All three dimensions deteriorated simultaneously.

October Through the FLL Lens. How each dimension behaved during the cascade:

Flows. ETF outflows accelerated as arbitrageurs unwound basis trades. Institutional selling added to retail panic. Capital fled the ecosystem.

Leverage. Open interest collapsed 35% as $15.3B in BTC positions were liquidated. The leverage that took months to build unwound in hours.

Liquidity. Basis compressed from 6.9% to 4.5%. Market makers withdrew depth (40% collapse in 48 hours). Execution quality deteriorated as spreads widened.

October's cascade involved all three dimensions deteriorating simultaneously. Flows triggered leverage unwinds, leverage exhausted liquidity, thin liquidity amplified further selling.

Why October Was Severe. The triangulation reveals why October was so severe: all three dimensions deteriorated simultaneously, each amplifying the others. Outflows triggered liquidations, liquidations exhausted liquidity, thin liquidity caused slippage that triggered more liquidations. The feedback loop was self-reinforcing.

Contrast with R2. In contrast, R2's Bybit shock showed deterioration in only one dimension (leverage via forced Bybit liquidations). Flows and liquidity held relatively stable. The market absorbed the shock within weeks because the feedback loop didn't fully engage. Single-dimension stress is survivable; three-dimension stress is catastrophic.

Practical Application. For practical application: track all three FLL dimensions simultaneously. When any single dimension shows stress, increase attention. When two dimensions deteriorate together, raise hedges. When all three begin simultaneous deterioration, assume the worst case and act immediately.

The FLL framework also works in reverse for identifying accumulation opportunities. When all three dimensions improve simultaneously (inflows building, leverage reasonable, liquidity deepening), conditions favor accumulation. R3 showed this pattern: steady ETF inflows, moderate funding, and improving depth supported +21.5% returns.

Daily Range and Volume: Stress Detection

Real-Time Stress Indicator. Daily range (high minus low divided by close) combined with volume provides a real-time stress indicator. High range plus high volume indicates capitulation or major repositioning.

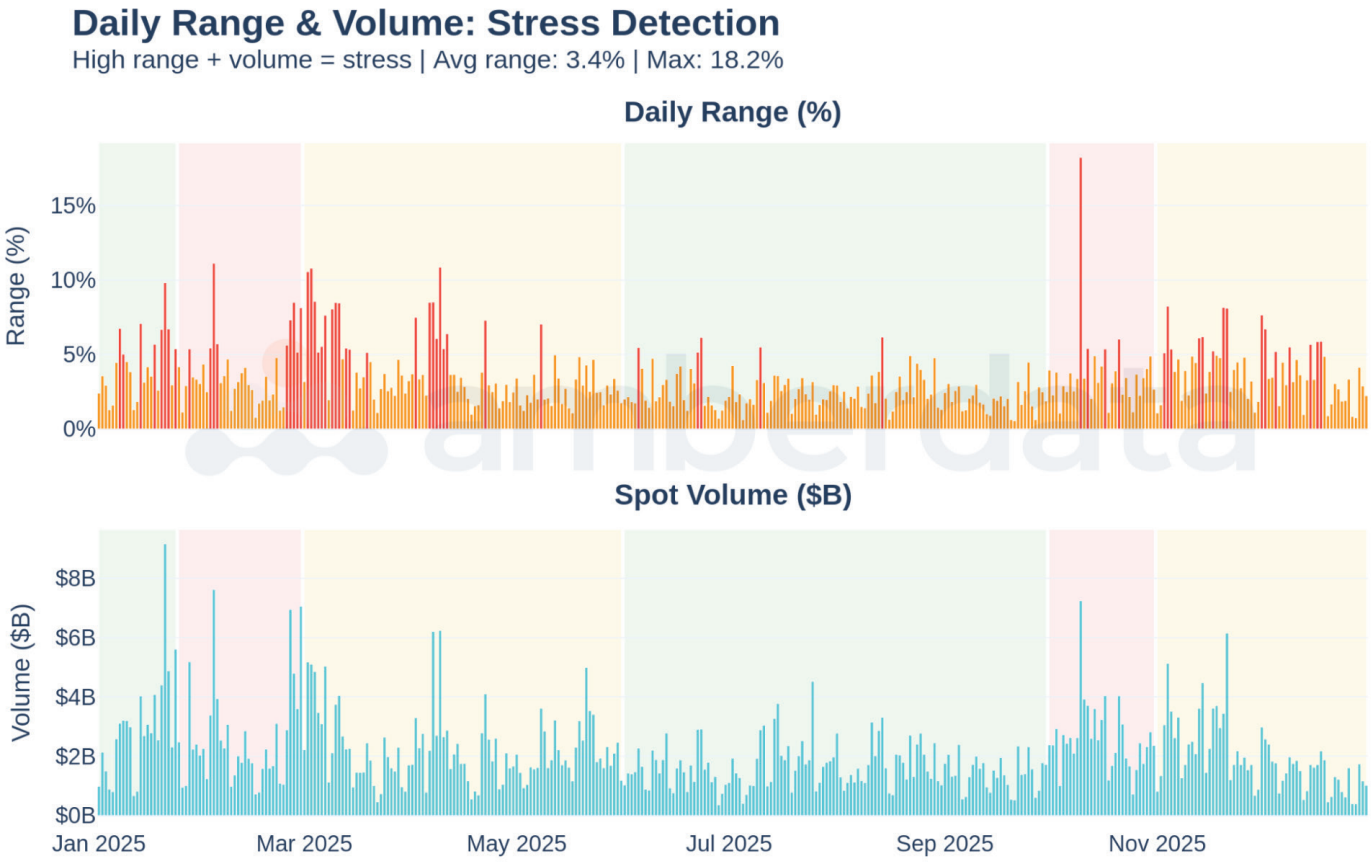


Figure 2.4: Daily Range & Volume - Daily range percentage and spot volume by regime. October's extreme ranges coincided with record volumes - the signature of capitulation.

Range by Regime. Average daily range across 2025's regimes:

- **R1:** 4.2%
- **R2:** 3.9%
- **R3:** 3.8%
- **R4:** 2.4%
- **R5:** 3.8%
- **R6:** 3.8%

R4's 2.4% average range (lowest) reflected the calm before October. When range spikes above 5% with elevated volume, stress is present.

The Combination Matters. The combination matters more than either metric alone. High range with low volume suggests thin markets. High volume with low range suggests orderly repositioning. High range with high volume indicates forced selling - the capitulation signature that marked October's bottom.

October's Stress Signature. October's stress signature was unmistakable: range spiked above 8% on multiple days while volume exceeded $50B daily. This combination indicates capitulation - forced selling regardless of price. When you see this pattern, the immediate price direction is typically down, but the medium-term setup often marks a local bottom as forced sellers exhaust.

Practical Filter. Practical application: when daily range exceeds 2x the recent average AND volume exceeds 2x the recent average, stress conditions exist. This simple filter would have flagged October 10-12 as capitulation and suggested caution during the peak stress. It would not have predicted the exact bottom, but it would have identified the capitulation phase.

Funding Rate Persistence: The Leading Indicator

Cost of Leverage. Funding rates reflect the cost of holding leveraged positions. Persistently positive funding (longs pay shorts) indicates crowded long positioning. Extended periods of one-sided funding often precede reversals.

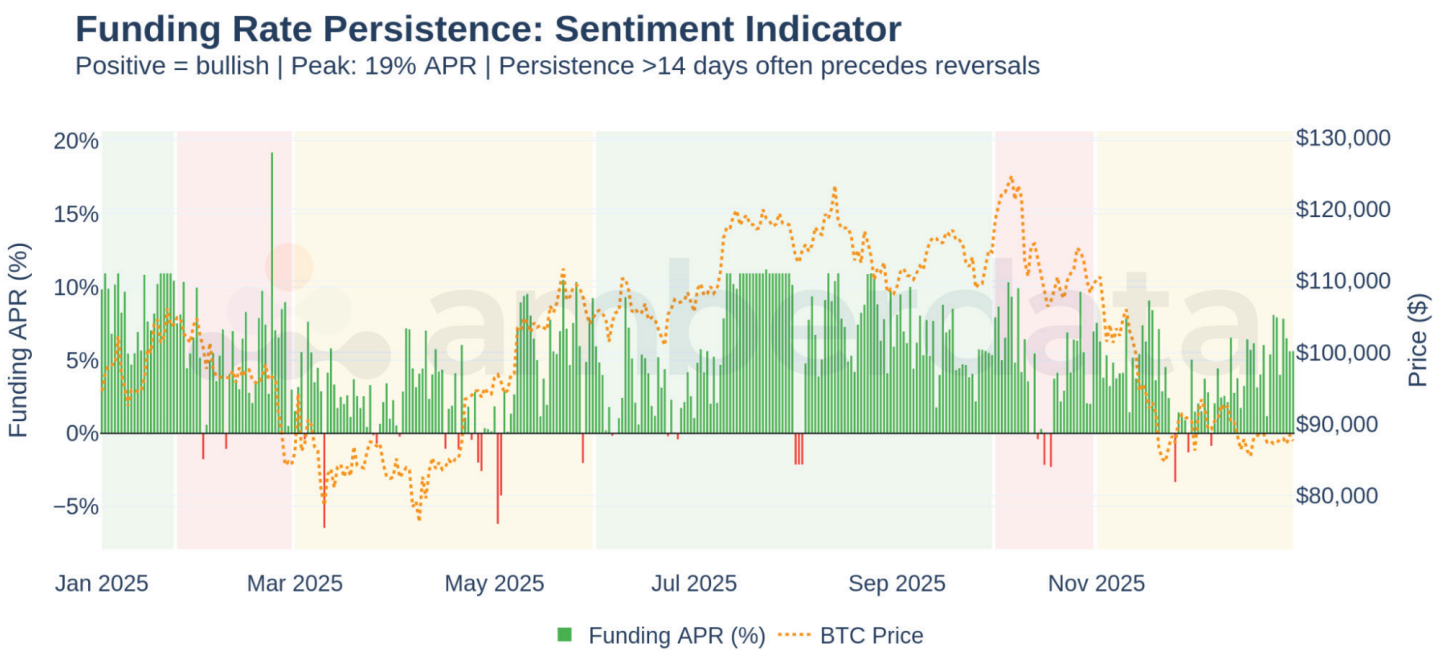


Figure 2.5: Funding Rate Persistence - Annualized funding rate by regime.
R1's 8.8% and R4's 6.1% represented crowded long positioning that set up subsequent selloffs.

Funding by Regime. Average annualized funding rate across 2025:

- **R1:** 8.8%
- **R2:** 5.7%
- **R3:** 3.3%
- **R4:** 6.1%
- **R5:** 4.6%
- **R6:** 4.1%

The pattern is informative: elevated funding (R1, R4) preceded the two major selloffs (R2, R5).

The Warning Signal. R4's 6.1% average funding with 14+ consecutive days of positive readings was the clearest warning signal before October. When funding persists positively for extended periods, longs are paying for the privilege of being crowded into the same trade. The eventual unwinding is violent because everyone exits simultaneously.

Bidirectional Indicator. The funding persistence mechanism works both ways. Extended negative funding (shorts paying longs) indicates crowded short positioning, which sets up short squeezes. In 2025, persistent positive funding dominated, reflecting the overall bullish bias that built leverage for October's long liquidation cascade.

Current Conditions. Current R6 funding averaging 4.1% represents normalized conditions - neither extreme bullishness nor bearishness. This balanced funding is actually positive for market stability: it indicates that speculators are not crowded on either side. The absence of funding persistence in R6 reduces cascade risk, even as other fragilities persist.

SO WHAT?

Monitor funding persistence as a leading indicator. 14+ consecutive days of elevated positive (or negative) funding suggests crowded positioning that will eventually reverse. The longer the persistence, the more violent the eventual unwind.

The 2025 Events Timeline

Event Categories. Major events clustered into distinct categories, each triggering different market responses.

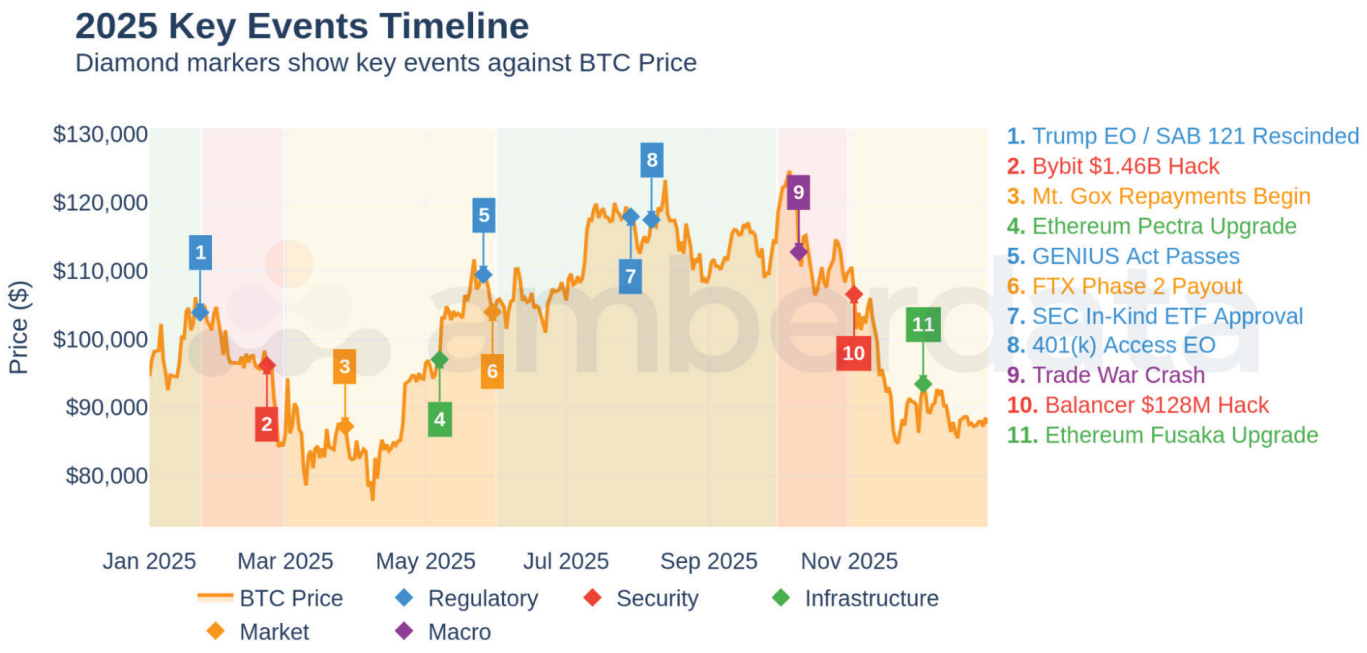


Figure 2.6: 2025 Key Events Timeline - Events mapped to price with category coding. Note the concentration of regulatory events (blue) and the macro event (purple) in October.

Event Distribution. Events by category:

Regulatory: 5 events (Trump EO, SAB 121 rescission, GENIUS Act, in-kind ETF approval, 401(k) access)
Security: 2 events (Bybit $1.46B hack, Balancer $128M hack)
Infrastructure: 2 events (Ethereum Pectra and Fusaka upgrades)
Market: 2 events (Mt. Gox and FTX distributions)
Macro: 1 event (Trade war announcement)

The Year's Pattern. The year was defined by regulatory tailwinds (H1) absorbing security shocks (February) until a single macro trigger (October) overwhelmed the positive momentum. The concentration of regulatory progress in H1 built the leverage that October's macro shock unwound.

Lesson for 2026. The lesson for 2026: regulatory tailwinds create optimism that accumulates leverage. Security shocks test resilience but are typically absorbed. Macro shocks, when they hit accumulated leverage, create cascades. Watch for the combination of positive sentiment, elevated leverage, and potential macro triggers - that's when the framework becomes the most valuable.

Current 2026 Risk Assessment. Current 2026 risk assessment: regulatory tailwind continues (401(k) implementation, potential additional ETF products). Leverage is subdued (R6 conditions). Macro risks remain (trade policy uncertainty, Fed policy, geopolitical). The setup is different from pre-October 2025 - lower leverage means lower cascade risk - but macro triggers could still drive significant moves.

THE BOTTOM LINE

The volatility framework transforms hindsight analysis into forward-looking risk assessment. Track volatility regimes (low volatility often precedes high volatility events), apply FLL triangulation (watch for simultaneous deterioration across flows, leverage, and liquidity), and monitor funding persistence (14+ days of one-sided funding precedes reversals). October's crash was detectable through this framework. The same tools apply to 2026.

Application to 2026. Current conditions (R6 Fragile Recovery): volatility at 43% (elevated but not extreme), funding at 4.1% (balanced, no persistence), leverage subdued (OI 40% below peak), liquidity impaired (depth below pre-crash). The framework suggests cautious positioning until FLL dimensions improve simultaneously. Watch for: basis recovery above 6%, depth recovery to pre-crash levels, funding stabilization, and consistent ETF inflows.

This framework builds on (S1)'s regime definitions and provides the analytical foundation for understanding how stress conditions evolve. The volatility-leverage-liquidity interaction established here explains why October's cascade was so severe and provides early warning signals for similar events.

From here, (S3) applies this framework to examine each of 2025's six regimes in forensic detail. (S5) uses the FLL triangulation to analyze carry trade mechanics, and (S6) examines how liquidity conditions evolved through each stress event. The cascade dynamics introduced here recur throughout the report.

The Six Market Regimes of 2025: A Forensic Analysis

From Policy Euphoria to Fragile Recovery - what triggered each phase and what it means for 2026

KEY TAKEAWAYS

- **Each regime has a distinct trigger.** R1: Policy (Trump EO). R2: Security (Bybit hack). R3: Regulatory clarity (GENIUS Act). R4: ETF expansion (in-kind redemptions). R5: Macro shock (tariffs). R6: Aftermath. Understanding triggers enables anticipation.
- **Each regime has a distinct signature.** OI, funding, basis, and flows behave differently in each regime. R1: building leverage, high basis. R4: peak leverage, crowded funding. R5: liquidation cascade. R6: subdued positioning.
- **Regime 5 was the pivot.** October's $15.3B BTC liquidation cascade (17% of annual total) changed market structure permanently. Depth hasn't recovered. Leverage remains subdued. The market that entered R6 is structurally different.
- **Regime 6 remains unresolved.** The market awaits catalysts. ETF flows are mixed (-$3.4B in R6). Carry trade is unattractive (4.4% basis). Position for fragility until regime change signals emerge.

January opened with Trump's executive order and 12.7% basis APR. By October, $15.3 billion in BTC positions had been liquidated across 48 hours. By December, the market sat in fragile recovery, awaiting catalysts. These weren't random moves - they were six distinct regimes, each with identifiable triggers and signatures.

The Analytical Spine. This section establishes the regime framework that serves as the spine of the entire Amberdata Crypto Market Review 2025. Every subsequent analysis contextualizes data within these regimes - because the same metric means different things in Policy Euphoria versus Fragile Recovery.

Three Phases. The six regimes divide naturally into three phases: Early Year Optimism (R1-R2) saw policy euphoria met by security shock. Mid-Year Build (R3-R4) represented accumulation and institutional expansion. Late Year Crisis (R5-R6) delivered the cascade and its aftermath. Each phase set up the next; understanding the sequence reveals the year's structural narrative.

Strategic Positioning. For institutional investors, regime identification enables strategic positioning. R1 conditions suggest taking profits on leverage-driven rallies. R3 conditions favor accumulation. R4 conditions demand hedging despite positive returns. R5 conditions require pre-positioned protection (it's too late once the cascade begins). R6 conditions call for patience and selective positioning. The framework enables action even without precise market timing.

Each regime section below examines: the trigger that initiated the regime, the Flow-Leverage-Liquidity signature that characterized it, the carry trade conditions (a key metric for institutional participants), key events within the regime, and quantitative metrics. This consistent structure enables comparison across regimes and identification of patterns that inform 2026 positioning.

Regime 1: Policy Euphoria (January 1-23)

Maximum Optimism. The year began with maximum optimism. Trump's inauguration and pro-crypto executive orders created a policy tailwind that drove aggressive positioning.

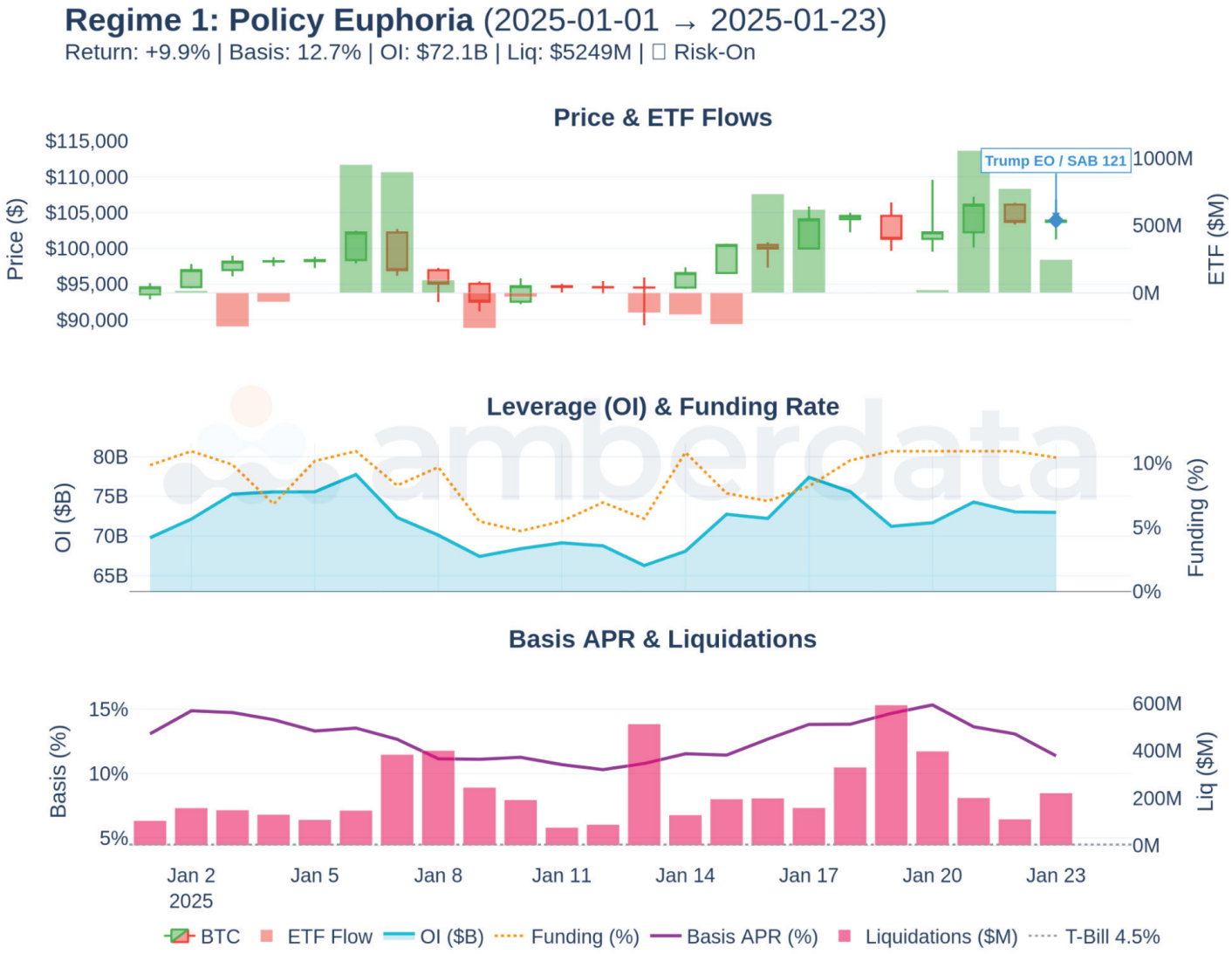


Figure 3.1: Regime 1: Policy Euphoria - Price, ETF flows, OI, and basis during R1. Note the building leverage (OI rising) and elevated basis (12.7% average) - the signature of euphoric positioning.

Trigger. January 23: Trump executive order affirming self-custody rights, staking, mining. Same day: SEC rescinds SAB 121, enabling banks to custody crypto.

Flow-Leverage-Liquidity. The three dimensions during R1:

Flows: Strong ETF inflows, stablecoin issuance rising.
Leverage: Building rapidly - OI $72.1B average, funding 8.8% APR.
Liquidity: Improving - depth increasing, spreads tightening.

Carry Trade Status: Excellent. Basis APR averaged 12.7% - the best conditions of the year. Term structure showed healthy contango. Institutional carry traders loaded positions during this window.

Regime Metrics. Key performance indicators for R1:

Return: +9.9%
Days: 23
OI: $72.1B avg
Funding: 8.8% APR
Liquidations: $5.2B

R1 set the stage for everything that followed. The leverage accumulated during these 23 days took months to unwind. The carry traders who entered during R1's attractive basis would eventually amplify October's cascade when forced to exit.

Key Warning from R1. High basis and building leverage in a short period creates fragility. 12.7% basis APR attracted capital rapidly. But rapid accumulation means crowded positioning. When conditions change, the crowded positions unwind together. R1's euphoria planted the seeds for R2's correction.

The transition from R1 to R2 was abrupt. The Bybit hack on February 21 instantly shifted market psychology. But the leverage that R1 built didn't disappear - it simply began unwinding over R2's 36 days. The $7.9B in R2 liquidations represents the cost of R1's euphoric positioning.

Regime 2: Security Shock (January 24 – February 28)

Testing Resilience. The Bybit hack - $1.46 billion stolen, the largest in crypto history - introduced a security shock that tested the market's resilience.

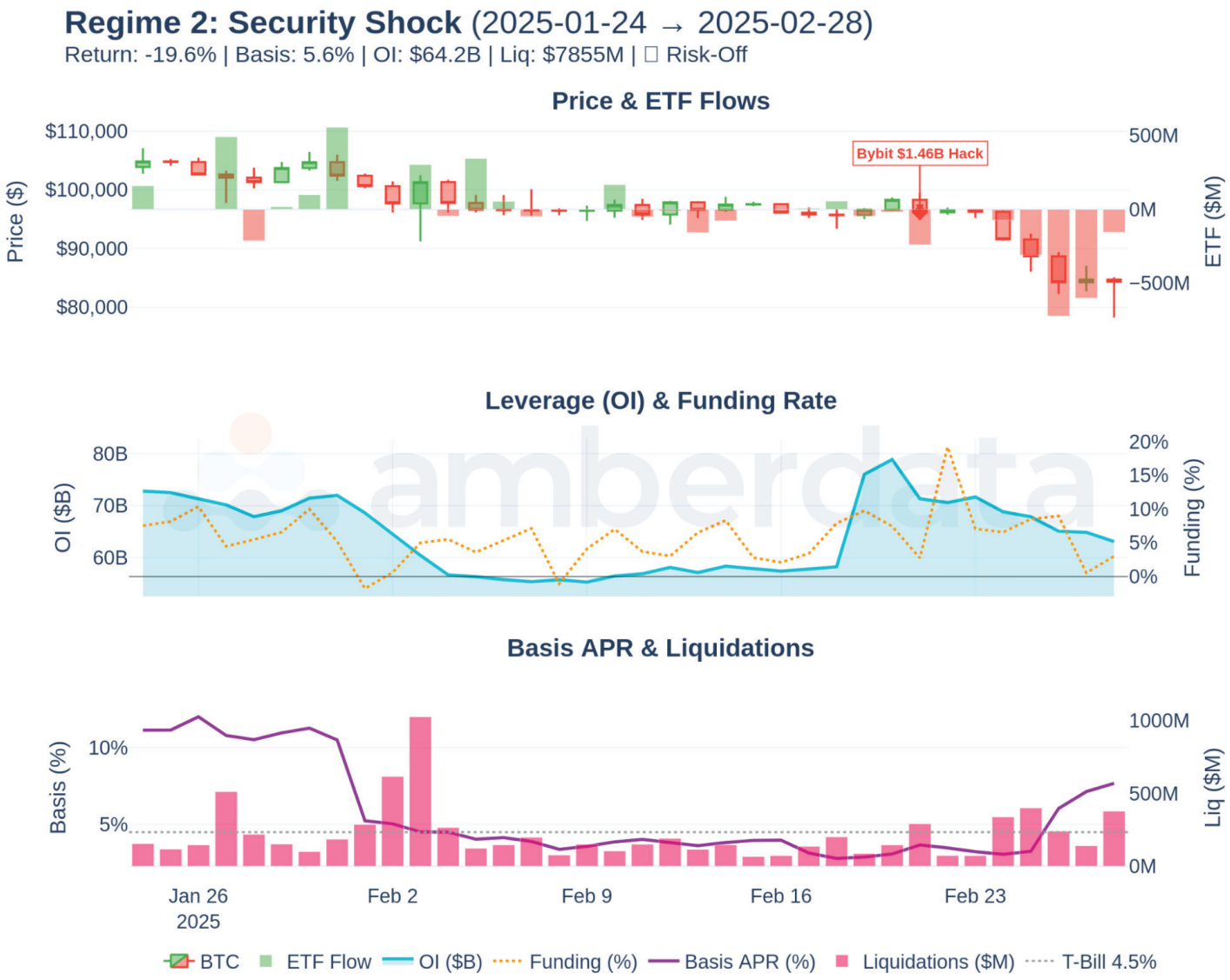


Figure 3.2: Regime 2: Security Shock - R2's price action showing the sharp decline post-Bybit hack. Basis compressed, funding normalized, OI declined as positions unwound.

Trigger. February 21: Bybit loses $1.46B to Lazarus Group malware. Mostly ETH stolen. Largest hack in crypto history.

Flow-Leverage-Liquidity. The three dimensions during R2:

Flows: Outflows spike as users withdraw to self-custody.
Leverage: Forced unwind - Bybit positions liquidated, contagion fears spread.
Liquidity: Deteriorates - depth thins, spreads widen.

Carry Trade Status: Reduced. Basis compressed to 5.6% average. Term structure flattened. The easy money of R1 was gone.

Regime Metrics. Key performance indicators for R2:

Return: -19.6%
Days: 36
OI: $64.2B avg
Funding: 5.7% APR
Liquidations: $7.9B

R2 demonstrated that security events create immediate but often temporary shocks. The market absorbed the Bybit hack within weeks, setting up the recovery phase that followed.

Paradoxical Acceleration. The Bybit response also accelerated regulatory developments. The hack highlighted custodial risks, pushing institutions toward regulated ETF products. Paradoxically, the security crisis may have accelerated institutional adoption by demonstrating the value of regulated wrappers.

Security events create immediate shocks but often accelerate long-term institutional adoption by demonstrating the value of regulated products over direct custody.

$1.46B

Bybit hack losses - the largest security breach in crypto history. Lazarus Group attribution.
The shock was absorbed, but it reset positioning and demonstrated ongoing security vulnerabilities.

Regime 3: Infrastructure Build (March 1 - May 31)

Best Performer. The year's best-performing regime. Regulatory clarity, orderly distributions, and infrastructure upgrades created conditions for sustained accumulation.

Figure 3.3: Regime 3: Infrastructure Build - R3's steady recovery. Note the orderly price appreciation without the leverage excess of R1.

Trigger. March 27: Mt. Gox repayments begin. May 7: Ethereum Pectra upgrade. May 26: GENIUS Act passes (first US stablecoin framework). May 30: FTX Phase 2 payout.

Flow-Leverage-Liquidity. The three dimensions during R3:

Flows: Steady recovery - distributions absorbed smoothly, ETF returns.
Leverage: Gradual rebuild - OI $70.4B average, funding normalizes to 3.3%.
Liquidity: Improving - depth rebuilds, spreads tighten.

Carry Trade Status: Good but Not Exceptional. Basis stabilized at 3.6% average. Term structure returned to healthy contango. Less attractive than R1, but sustainable.

Regime Metrics. Key performance indicators for R3:

Return: +21.5%
Days: 92
OI: $70.4B avg
ETF Inflows: $9.4B
Liquidations: $16.9B

R3's +21.5% return with moderate leverage (3.3% funding) represents the healthiest regime of the year. Price appreciation was driven by fundamental accumulation rather than leveraged speculation. This is the regime type institutional investors should hope for in 2026.

What Made R3 Work. Clear catalysts (regulatory milestones), manageable distributions (Mt. Gox/FTX absorbed smoothly), and moderate positioning (funding normalized). The combination allowed sustainable appreciation without building the fragility that triggers cascades.

R3 lasted 92 days - the longest regime of 2025. Extended accumulation phases allow institutions to build positions without moving markets. Short euphoric phases (like R1's 23 days) force rapid positioning that creates crowding. The lesson: prefer longer, steadier regimes over short explosive ones.

SO WHAT?

R3's character - steady accumulation, moderate leverage, fundamental drivers - represents healthy market conditions. When these conditions return in 2026, they signal sustainable appreciation rather than fragile leverage-driven rallies.

The transition from R3 to R4 was gradual. As regulatory milestones accumulated (GENIUS Act, ETF approvals), optimism built. Leverage began rising. Basis started recovering. The healthy R3 environment slowly morphed into R4's leverage accumulation phase. The transition was invisible in real-time because each day looked similar to the previous - only the cumulative change mattered.

Regime 4: Institutional Expansion (June 1 – September 30)

The Buildup. The buildup phase set the stage for October. Institutional infrastructure expanded while leverage accumulated to dangerous levels.

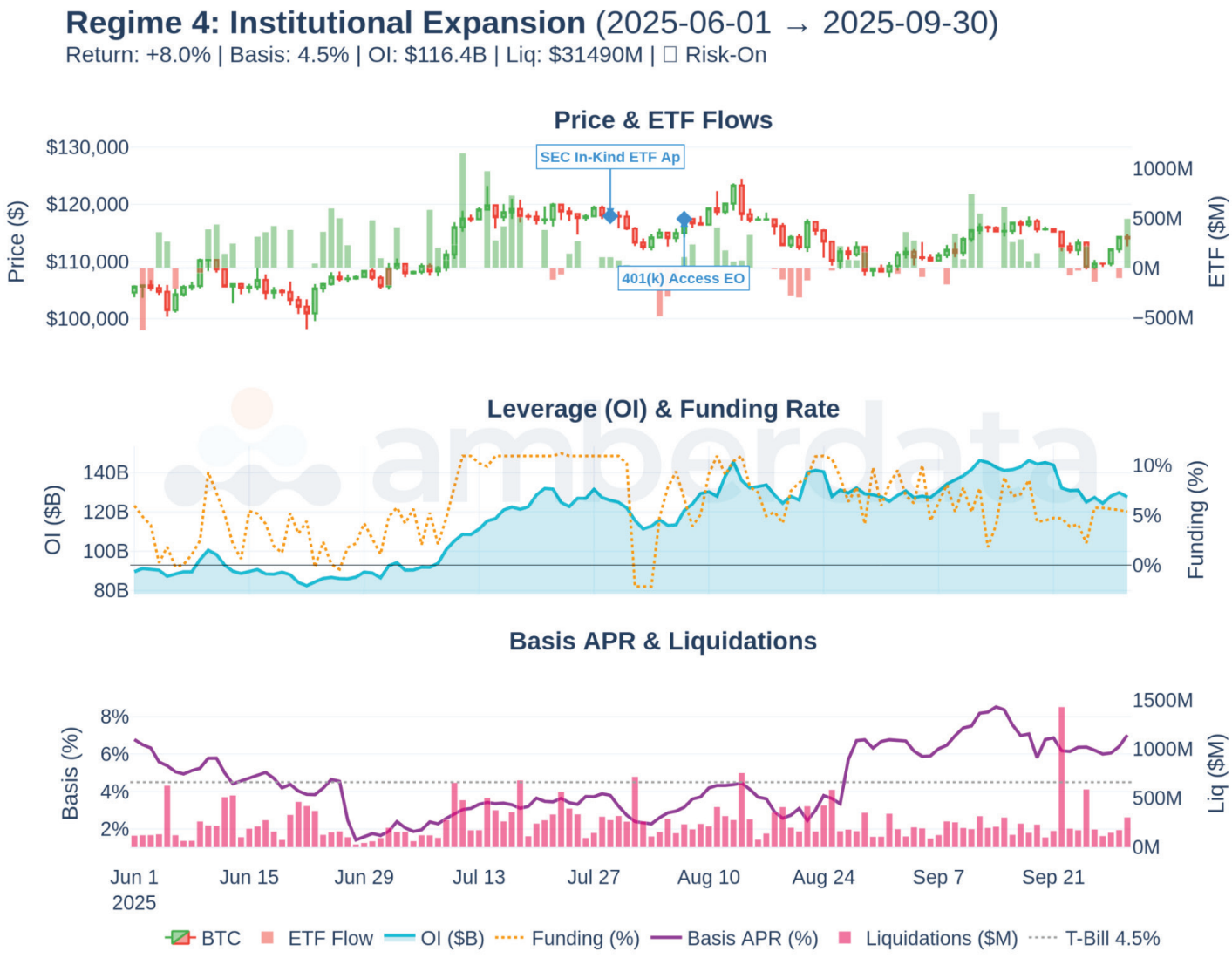


Figure 3.4: Regime 4: Institutional Expansion - R4's gradual build. Note the divergence: OI rising while volatility compressed to 30% (year's lowest). This divergence was the warning sign.

Trigger. June: SEC approves in-kind ETF redemptions (eliminating NAV premiums). September: 401(k) crypto access enabled.

Flow-Leverage-Liquidity. The three dimensions during R4:

Flows: Accelerating - ETF inflows strong at $15.2B, stablecoins rising.
Leverage: Building to extremes - OI at yearly highs, funding 6.1% with 14+ consecutive positive days.
Liquidity: Best of year on surface, but depth not keeping pace with OI growth.

Carry Trade Status: Apparently Excellent. Basis peaked at 8.5%. Term structure showed steep contango. But warning signs emerged: funding persistence exceeded 14 days, OI/price divergence starting.

Regime Metrics. Key performance indicators for R4:

Return: +8.0%
Days: 122
Peak OI: $116.4B
ETF Inflows: $15.2B
Liquidations: $31.5B (35% of year)

R4's 30% volatility was the calm before the storm. The lowest volatility of the year immediately preceded the largest liquidation event in crypto history.

R4 is where the October cascade was built. Carry traders loaded positions at an attractive basis. Speculators built leverage on funding that seemed sustainable. The 14+ days of positive funding persistence was the clearest warning signal - extended one-sided positioning always ends the same way.

Real but Overshadowed. The institutional infrastructure expansion during R4 was real and valuable: in-kind redemptions improved ETF efficiency, 401(k) access opened new demand channels. But these positives were overshadowed by the leverage accumulation that institutional infrastructure enabled. More efficient access meant faster leverage buildup.

R4's 122-day duration created complacency. Four months of steady gains (only +8.0% but consistent) convinced participants that conditions were stable. Volatility compressed to 30%. Risk models showed benign readings. But the leverage metrics told a different story: OI peaked at $116.4B while depth didn't keep pace. The setup was dangerous regardless of historical volatility.

122 Days

R4's duration - the longest regime of 2025. Four months of steady gains compressed volatility to 30% while leverage accumulated to dangerous levels. Duration created complacency.

SO WHAT?

Extended low-volatility periods during leverage accumulation are the most dangerous setup. R4's 122 days of 30% volatility masked $116.4B in OI buildup. When risk models rely on realized volatility, they miss the structural fragility that leverage metrics reveal.

Regime 5: Macro Shock / Cascade (October 1-31)

The Pivot Point. The pivot point of 2025. A single macro trigger catalyzed the largest deleveraging event in crypto history.

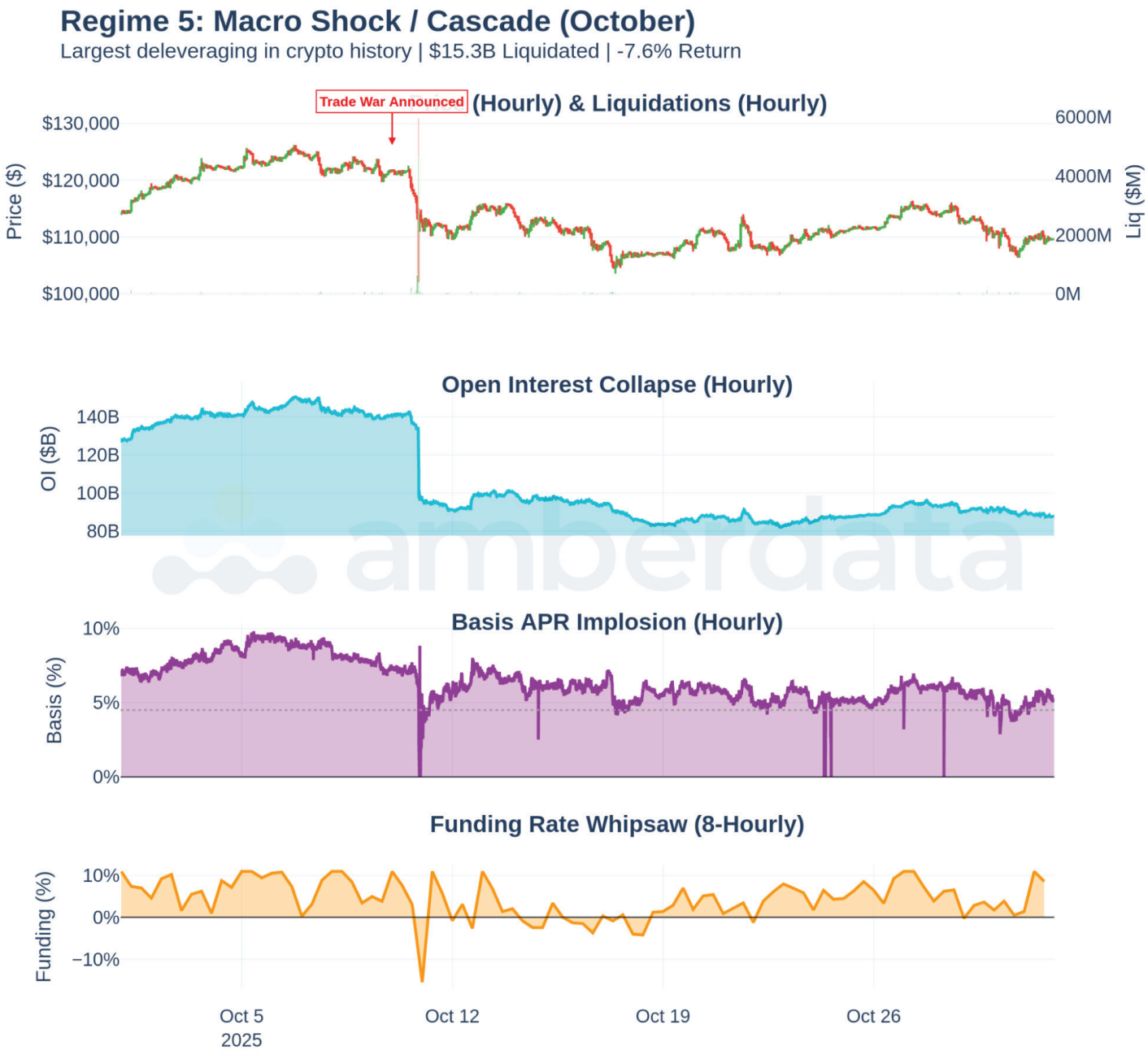


Figure 3.5: Regime 5: Macro Shock / Cascade - October's two-stage crash. Stage 1 (Oct 10, macro trigger) was orderly. Stage 2 (Oct 10-12, leverage cascade) was violent. Note the liquidation spike concentrated in 48 hours.

Trigger. October 10: Trump announces 100% China tariffs. Global risk-off. Crypto caught in the crossfire.

Flow-Leverage-Liquidity. The three dimensions during R5:

Flows: Massive outflows - ETF redemptions spike, exchange withdrawals accelerate.
Leverage: Catastrophic unwind - $15.3B in BTC liquidated, OI collapsed 35%.
Liquidity: Collapse - depth dropped 40% in 48 hours, spreads exploded.

Carry Trade Status: Unviable. Basis collapsed from 6.9% to 4.5%. Term structure briefly inverted (backwardation - fear). Carry traders forced to exit at the worst possible moment.

Regime Metrics. Key performance indicators for R5:

Return: -7.6%
Days: 31
Liquidations: $15.3B (17% of year)
OI Change: -35%
Basis Collapse: 2.4%

$15.3B

October liquidations of BTC. 70% longs ($10.7B). 30% shorts ($4.5B). The market was overwhelmingly positioned one way. October corrected that imbalance violently.

Self-Reinforcing Cascade. The cascade mechanism was self-reinforcing. Tariff news triggered risk-off selling. Basis compression put carry traders underwater. Forced carry unwinds added selling pressure. Liquidations triggered liquidations. Liquidity withdrawal created slippage. The feedback loop ran for 48 hours before exhausting itself.

Structural Damage. The 35% OI collapse in R5 represented structural damage, not just position adjustment. Market makers who provided liquidity withdrew. Arbitrageurs who maintained basis relationships exited. The infrastructure that supported orderly price discovery was impaired. This explains why R6's recovery has been so slow - the market participants who enable efficient functioning haven't fully returned.

R5's Lesson. Cascades are mechanical once triggered, but the conditions for cascades are measurable beforehand. Watch for: funding persistence exceeding 14 days, OI growth exceeding depth growth, basis attractive enough to draw carry capital, and potential macro triggers. October had all four.

The October cascade also demonstrated that price targets become irrelevant during cascades. Positions are closed at whatever price the market offers. Slippage during the worst 48 hours exceeded 5x normal levels. This explains why orderly stop-losses didn't protect many participants - the prices they expected to exit at didn't exist.

The transition from R5 to R6 was gradual exhaustion rather than a distinct trigger. As liquidations depleted, selling pressure eased. Prices stabilized at lower levels. But the structural damage (impaired depth, subdued leverage, cautious market makers) persisted. R6 began not with a catalyst but with the absence of further selling - a fragile stability rather than genuine recovery.

Regime 6: Fragile Recovery (November 1 – December 31)

The Aftermath. The aftermath. The market that emerged from October is structurally different from the market that entered it.

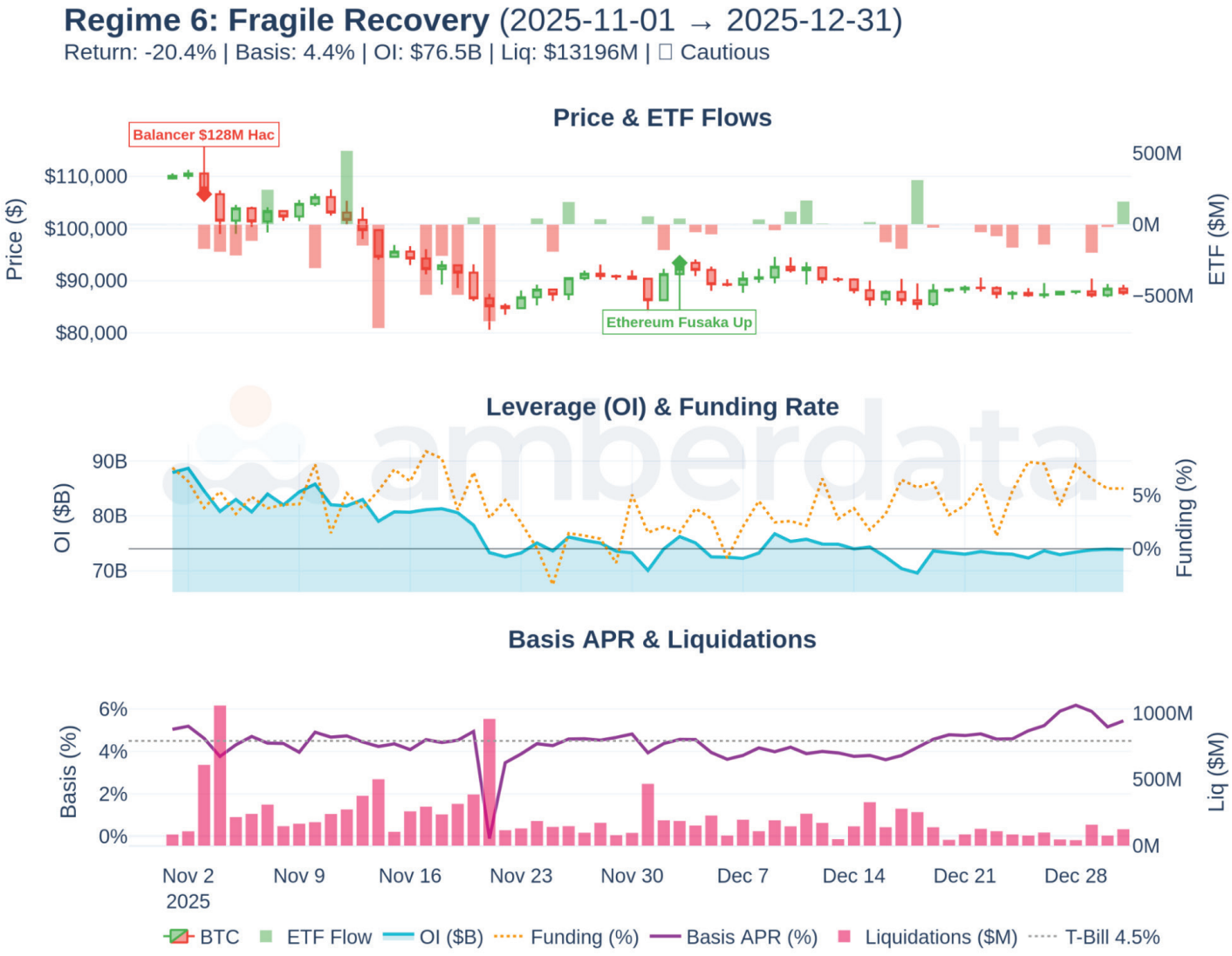


Figure 3.6: Regime 6: Fragile Recovery - R6's subdued activity. Lower OI, mixed ETF flows, depressed basis. The market is healing but not healed.

Trigger. Cascade aftermath plus continued macro uncertainty. November 3: Balancer $128M hack adds to uncertainty. December 3: Ethereum Fusaka upgrade provides a minor positive.

Flow-Leverage-Liquidity. The three dimensions during R6:

Flows: Mixed to weak - ETF flows volatile (-$3.4B net for regime).
Leverage: Subdued - OI $76.5B (40% below peak), funding oscillates around 4.1%.
Liquidity: Impaired - depth still below pre-crash levels.

Carry Trade Status: Marginal. Basis depressed at 4.4% average. Term structure flat (no conviction). Carry trade does not justify capital deployment.

Regime Metrics. Key performance indicators for R6:

Return: -20.4%
Days: 61
OI: $76.5B avg
ETF Flows: -$3.4B
Liquidations: $13.2B

R6's -20.4% return reflects continued weakness, not fresh selling. The market is finding its footing at lower levels. But the fragility persists: depth hasn't recovered, leverage is subdued, and the carry trade offers insufficient returns to attract new institutional capital.

Why No Transition? Why hasn't R6 transitioned to a new accumulation phase? Three factors: First, macro uncertainty persists (trade policy remains unresolved). Second, depth recovery requires market maker confidence that hasn't returned. Third, basis remains unattractive (4.4% versus T-bill rates near 4.5%), so arbitrage capital stays sidelined.

Regime Change Signals. R6 regime change signals to watch: Basis recovery above 6% (indicating renewed speculative interest). Depth recovery above pre-crash levels (indicating market maker return). Consistent ETF inflows above $500M weekly (indicating institutional accumulation). Funding stabilization in 4-8% range (indicating balanced positioning). Until these signals emerge, expect continued range-bound fragility.

The market that emerged from October is structurally different from the market that entered it. R6's fragility will persist until depth recovers, leverage rebuilds responsibly, and carry trade economics attract institutional capital again.

SO WHAT?

R6 conditions persist entering 2026. Position for fragility until regime change signals emerge: basis above 6%, depth recovery, consistent ETF inflows above $500M weekly. Until then, expect range-bound volatility.

Regime Comparison: The Full Picture

Side-by-Side Analysis. Comparing regimes side-by-side reveals the patterns that drove 2025's outcomes.

2025 Regime Comparison Matrix

YTD: -7.3% | Total Liq: $89.9B | ETF: $29.3B

Regime	Name	Period	Days	Return	Avg Basis	Avg OI	Funding	Liq	ETF Flow	Signal
R1	Policy Euphoria	01-01 → 01-23	23	+9.9%	12.7%	$72.1B	8.8%	$5249M	$+4.26B	Risk-On
R2	Security Shock	01-24 → 02-28	36	-19.6%	5.6%	$64.2B	5.7%	$7855M	$-0.51B	Risk-Off
R3	Infrastructure Build	03-01 → 05-31	92	+21.5%	3.6%	$70.4B	3.3%	$16859M	$+9.42B	Accumulation
R4	Institutional Expansion	06-01 → 09-30	122	+8.0%	4.5%	$116.4B	6.1%	$31490M	$+15.16B	Risk-On
R5	Macro Shock / Cascade	10-01 → 10-31	31	-7.6%	6.4%	$105.4B	4.6%	$15285M	$+4.39B	Capitulation
R6	Fragile Recovery	11-01 → 12-31	61	-20.4%	4.4%	$76.5B	4.1%	$13196M	$-3.38B	Cautious

Figure 3.7: 2025 Regime Comparison Matrix - All six regimes compared across key metrics. Note the extreme dispersion: R3's +21.5% vs R6's -20.4%. Regime identification matters more than market timing within the regime.

Performance Extremes. The dispersion across regimes:

Best Performer: R3 Infrastructure Build: +21.5% return with moderate leverage
Worst Performer: R6 Fragile Recovery: -20.4% return, aftermath of structural damage
Highest Leverage: R4 Institutional Expansion: Peak OI $116.4B
Largest Liquidations: R5 Macro Shock: $15.3B (17% of year in 31 days)

The comparison reveals the asymmetry between accumulation and liquidation phases. R4 took 122 days to build $31.5B in liquidation-generating leverage. R5 unwound a significant portion of that leverage in 31 days. The buildup is gradual; the unwind is violent. This asymmetry explains why crashes feel worse than rallies even when the percentage moves are similar.

Portfolio Construction Implications. For portfolio construction: regime identification matters more than market timing within a regime. R3 conditions favor accumulation strategies. R4 conditions favor hedging or reduced exposure despite positive returns. R6 conditions favor patience and selective positioning. The regime framework enables strategic positioning even without precise timing.

The dispersion across regimes is striking: R3's +21.5% versus R6's -20.4% represents a 42 percentage point swing. Within the same calendar year, the same asset delivered both substantial gains and substantial losses depending on timing. This dispersion underscores why regime identification matters more than general market outlook.

2026 Planning. For 2026 planning: monitor for R3-type conditions (moderate leverage, improving fundamentals, steady accumulation) as the ideal entry environment. Avoid adding exposure during R4-type conditions (extended duration, leverage accumulation, compressed volatility, funding persistence). Pre-position hedges before potential R5-type triggers (macro events hitting elevated leverage).

Cumulative Liquidations by Regime

Leverage Distribution. The liquidation distribution reveals where leverage concentrated and when it unwound.

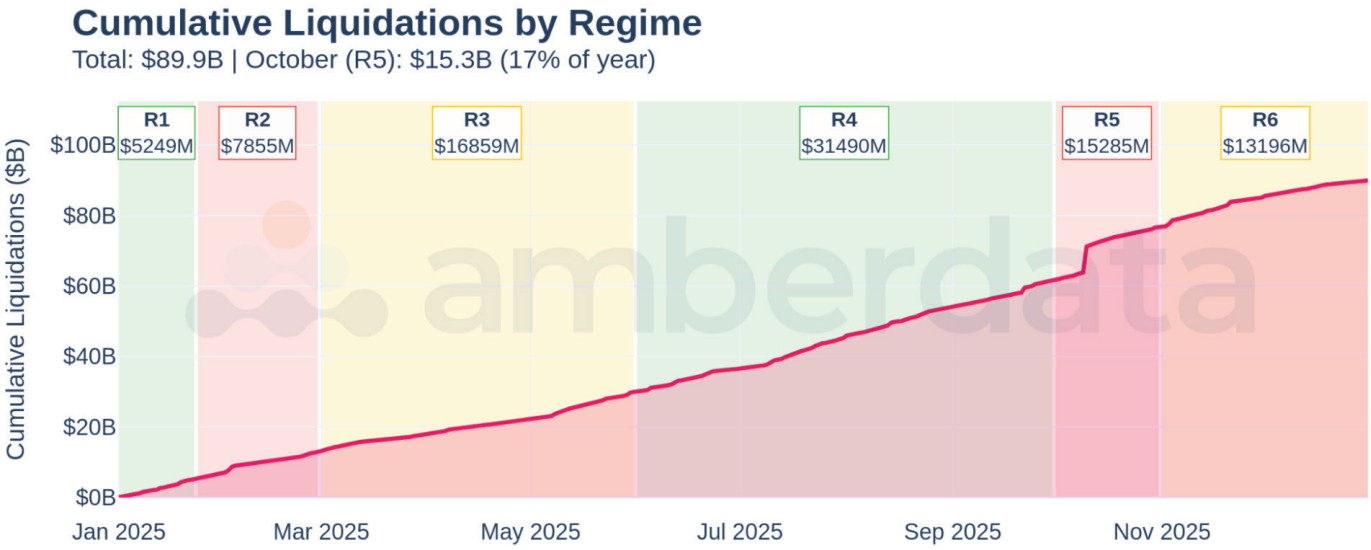


Figure 3.8: Cumulative Liquidations by Regime - Total BTC YTD liquidations: $89.9B. R4 contributed 35%, R5 contributed 17%. The leverage built in R4 unwound in R5.

BTC Liquidation Distribution. How liquidations distributed across regimes:

- **R1:** $5.2B (6%)
- **R2:** $7.9B (9%)
- **R3:** $16.9B (19%)
- **R4:** $31.5B (35%)
- **R5:** $15.3B (17%)
- **R6:** $13.2B (15%)

The pattern is clear: R4 accumulated 35% of annual liquidations during the buildup phase (normal market functioning with leverage churn). R5 concentrated 17% in 31 days (the cascade). Together, these two regimes accounted for over half of annual liquidation volume. The leverage that built over 122 days (R4) unwound over 31 days (R5).

Total Context. The $89.9B BTC cumulative total liquidation figure in 2025 represents structural churn - the cost of leverage in a volatile market. In R3's healthy accumulation phase, $16.9B in liquidations still occurred (19% of annual). Liquidations are not inherently problematic; concentrated liquidations in thin liquidity are problematic.

2026 Risk Assessment. For 2026 risk assessment: monitor liquidation intensity (liquidations relative to OI) rather than absolute liquidation volume. R5's 17% share of annual liquidations concentrated in 31 days represents 6x the normal daily intensity. That intensity, not the absolute number, indicates cascade conditions.

The liquidation data also reveals the importance of the accumulation-to-liquidation ratio. R4's 122 days accumulated $31.5B in liquidation-generating positions. R5's 31 days unwound a large portion of that. The ratio - roughly 4:1 accumulation time to unwind time - suggests that markets build fragility slowly but release it quickly. This asymmetry should inform position sizing and hedging timelines.

THE BOTTOM LINE

Understanding 2025 requires understanding these six regimes. Each subsequent analysis in the Amberdata Crypto Market Review 2025 contextualizes data within this framework - because the same metric means different things in Policy Euphoria versus Fragile Recovery. For 2026, monitor for regime transitions: the signals that indicate shift from R6's fragility to a new accumulation phase (basis recovery, depth restoration, consistent ETF inflows) or deterioration to renewed stress (funding persistence, OI/price divergence, depth withdrawal).

This regime framework applies (S2)'s volatility analysis to define the six distinct market phases. The triggers, signatures, and transitions established here provide the analytical spine that all subsequent sections reference.

From here, (S4) quantifies risk-adjusted performance by regime, (S5) examines carry trade economics across regimes, and (S6) analyzes how liquidity conditions evolved through each stress event. The cascade dynamics and regime characteristics introduced here recur throughout Sections 6-14.

Performance Under Fire: 2025's Risk-Adjusted Reality

Returns, drawdowns, volatility, and correlations - the numbers behind the narrative

KEY TAKEAWAYS

- **BTC ended 2025 down 7.3% YTD.** The headline masks extreme regime dispersion: +21.5% in R3 (Infrastructure Build), -20.4% in R6 (Fragile Recovery). Same asset, radically different performance depending on entry timing.
- **Maximum drawdown reached 32% from ATH.** The November 22 trough marked the year's deepest point, with current drawdown still at 29.7%. October's cascade created a hole the market hasn't climbed out of.
- **ETH underperformed BTC by 4.2 percentage points.** Beta didn't pay in 2025. ETH's -11.6% return versus BTC's -7.3% reflects the continued rotation toward Bitcoin as the institutional-grade crypto asset.
- **Correlation spiked to near 1.0 during stress.** BTC-ETH correlation approached unity during October's cascade - diversification benefits disappeared precisely when they were most needed.

Bitcoin ended 2025 down 7.3% YTD. That single number hides a 32% maximum drawdown, a -20.4% return in the final two months, and correlation patterns that shifted dramatically across regimes. The headline return is noise. The risk-adjusted story - how returns were generated and when - is signal.

Monthly Returns: The Calendar View

Revealing Dispersion. Breaking performance into monthly components reveals the dispersion that headline YTD figures obscure.

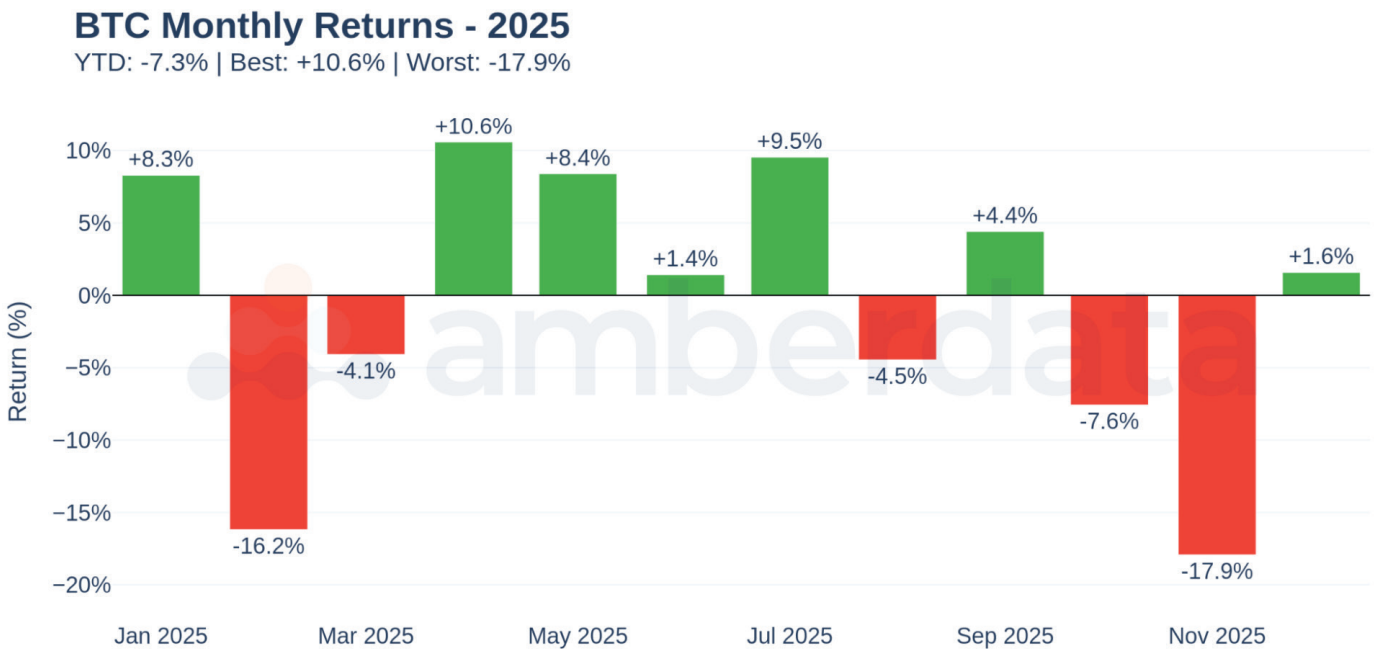


Figure 4.1: BTC Monthly Returns - 2025 - Seven positive months versus five negative. April's +10.6% best month; November's -17.9% worst. The dispersion tells the story.

The Winners. January (+8%), April (+10.6%), May (+8%), July (+10%), and September (+4%) delivered strong returns. These months aligned with favorable regime conditions - policy optimism in R1, infrastructure development in R3, and institutional expansion in R4.

The Losers. February (-16%), March (-4%), August (-4%), October (-8%), November (-17.9%), and December (+2% partial recovery). The February shock (Bybit hack) and October-November cascade dominated negative performance.

The Asymmetry. Winning months averaged +8%, losing months averaged -10%. Negative outliers hit harder than positive outliers helped. This asymmetry is characteristic of crypto - volatility clusters on the downside during stress. Risk management must account for this skew; equal weighting of upside and downside scenarios understates true portfolio risk.

SO WHAT?

Monthly return dispersion exceeds most traditional assets. Position sizing should account for the possibility of -17% months, not just average volatility. The distribution is not normal - fat tails exist on the downside.

Cumulative Returns: BTC vs ETH

Rotation Toward BTC. Comparing Bitcoin and Ethereum performance reveals the continued rotation toward BTC as the institutional-grade asset.

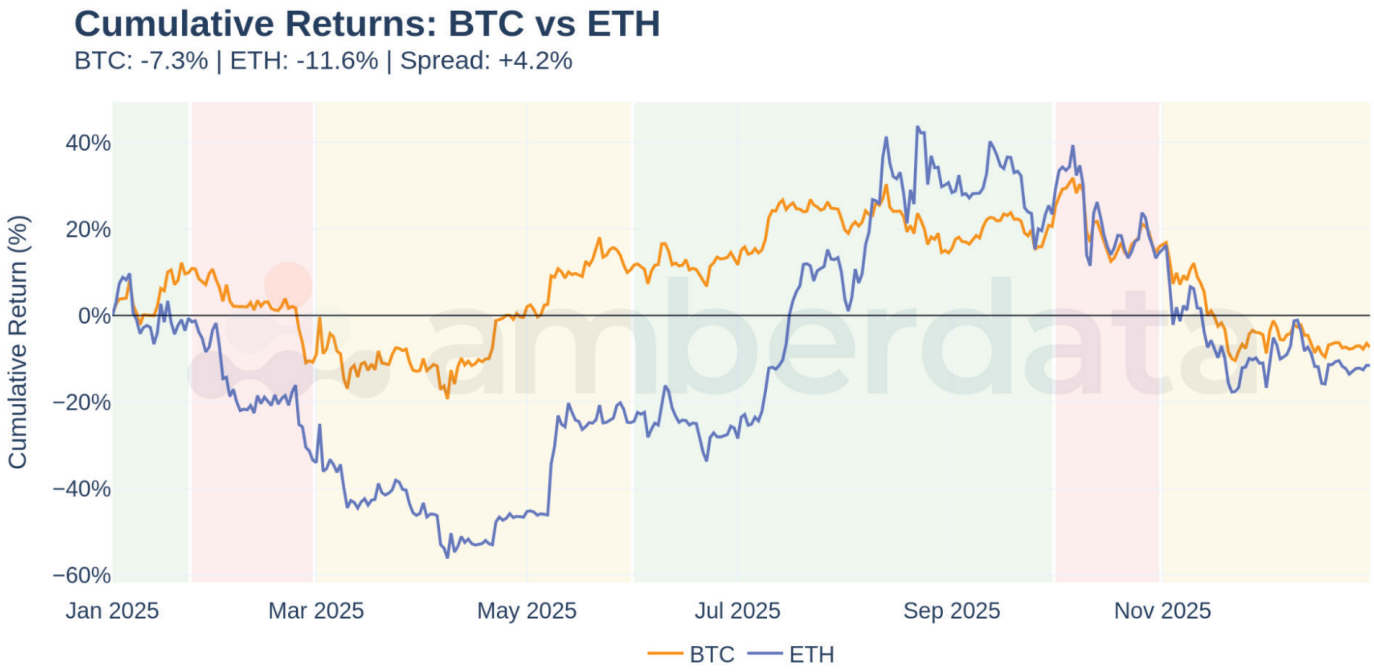


Figure 4.2: Cumulative Returns: BTC vs ETH - BTC outperformed ETH by 4.2 percentage points. The gap widened during stress periods as flight-to-quality favored Bitcoin.

-7.3%

BTC YTD return versus ETH's -11.6%. Same market conditions, 4.2 percentage points of divergence. Beta didn't pay in 2025.

BTC Returns by Regime. Performance across 2025's six regimes:

- **R1 Policy Euphoria:** +9.9%
- **R2 Security Shock:** -19.6%
- **R3 Infrastructure Build:** +21.5%
- **R4 Institutional Expansion:** +8.0%
- **R5 Macro Shock:** -7.6%
- **R6 Fragile Recovery:** -20.4%

Extreme Dispersion. The regime dispersion is extreme - R3 delivered +21.5% while R6 took -20.4%. Timing entry by regime mattered more than asset selection.

ETH Underperformance. ETH's underperformance reflects institutional preference. ETF flows concentrated in Bitcoin products. Corporate treasury allocations went to BTC. The "digital gold" narrative dominated "world computer" in 2025's risk-off environment.

The regime-by-regime analysis reveals that BTC outperformed ETH in 5 of 6 regimes. The only regime where ETH kept pace was R3 (Infrastructure Build), when Ethereum-specific developments (L2 scaling, staking improvements) provided idiosyncratic support. In all other regimes, flight-to-quality favored the larger, more liquid asset.

SO WHAT?

For portfolio construction, ETH no longer provides meaningful diversification from BTC. Correlation during stress approaches 1.0. The allocation decision is BTC exposure versus no crypto exposure - not BTC versus ETH.

Drawdown Analysis: The Pain Quantified

Peak-to-Trough Decline. Maximum drawdown measures the peak-to-trough decline - the worst-case experience for anyone who bought at the top.

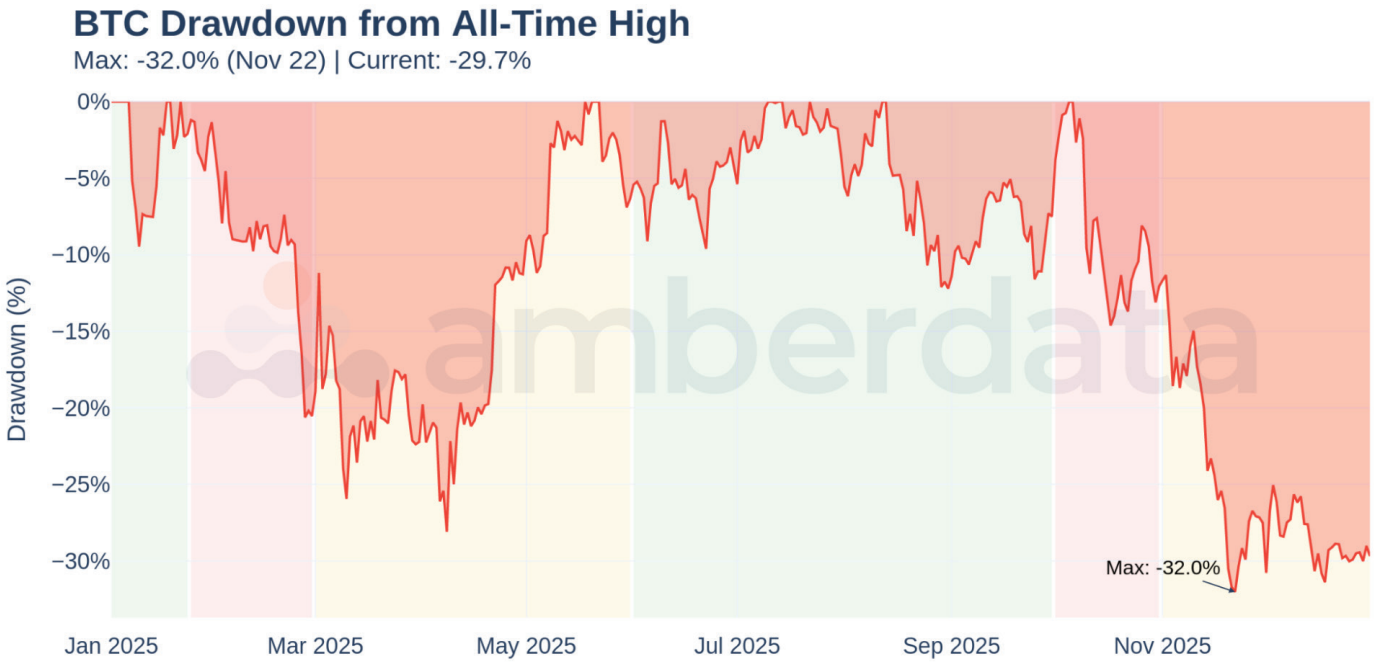


Figure 4.3: BTC Drawdown from ATH - Maximum drawdown of 32% on November 22. Current drawdown remains at 29.7% - the market hasn't recovered.

-32%

Maximum drawdown from all-time high, reached November 22, 2025. Current drawdown: -29.7%. The October cascade created a hole the market is still climbing out of.

Drawdown by Regime. Maximum drawdown experienced within each regime:

R1: -9.5%
R2: -20.6%
R3: -28.1%
R4: -12.2%
R5: -14.6%
R6: -32.0%

The R6 drawdown reflects cumulative damage - October's cascade plus November's continuation created the deepest hole.

Historical Context. For context: 2022's bear market reached -77% at its worst. 2025's -32% is significant but not historically extreme. However, the speed of October's move - much of the damage occurred in 48 hours - distinguishes this drawdown. Magnitude was moderate; velocity was extreme.

SO WHAT?

Drawdown recovery takes time. Current -29.7% drawdown requires +42% gain to return to ATH. With volatility elevated and momentum negative, recovery may be measured in months, not weeks. Position sizing should assume extended recovery periods.

Volatility Regime Analysis

Risk Conditions Evolution. Rolling 30-day volatility reveals how risk conditions evolved through the year's different phases.

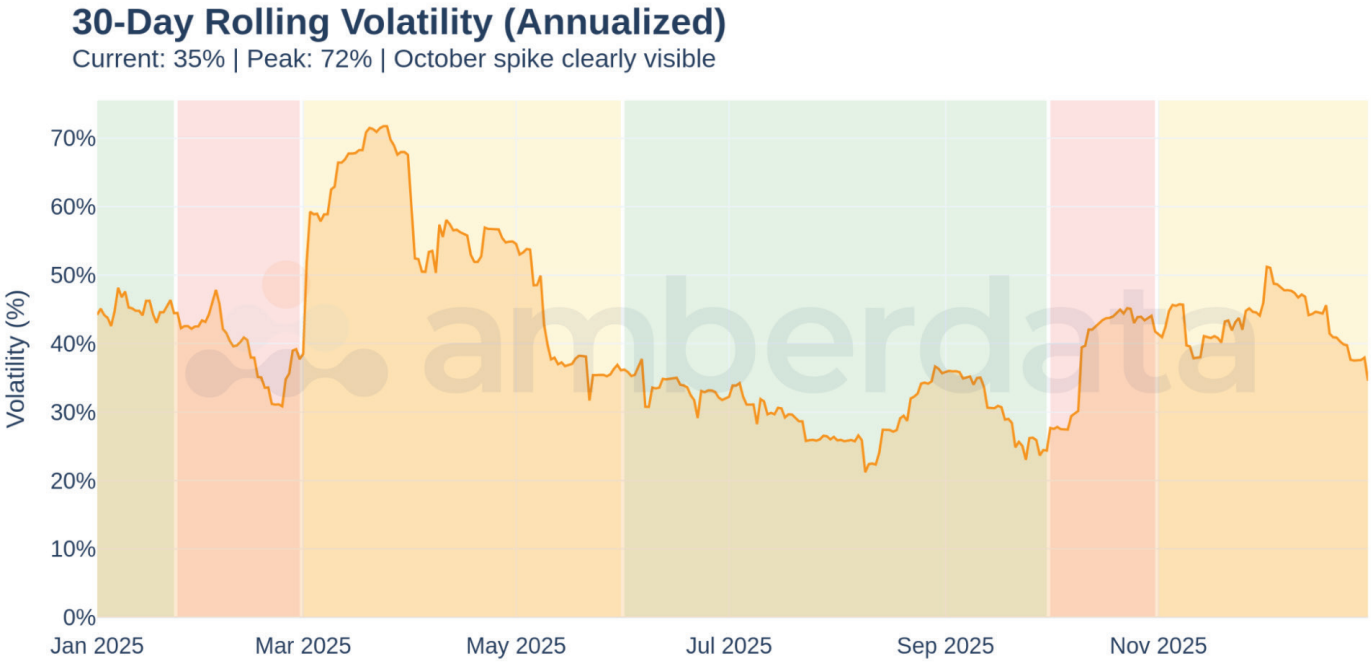


Figure 4.4: 30-Day Rolling Volatility - Volatility peaked at 72% during stress. Current 35% is below the 41% average - reflecting post-crisis calm, not structural change.

Volatility by Regime. 30-day annualized volatility across 2025:

- **R1 Policy Euphoria:** 45% (post-ETF adjustment)
- **R2 Security Shock:** 39% (shock absorption)
- **R3 Infrastructure Build:** 54% (high but recovering)
- **R4 Institutional Expansion:** 30% (calm before storm)
- **R5 Macro Shock:** 39% (during cascade)
- **R6 Fragile Recovery:** 43% (elevated recovery)

Notably, R4's 30% volatility was the year's lowest - calm conditions that preceded October's shock.

R4's 30% volatility was the calm before the storm. Low volatility doesn't mean low risk - it often means risk is building invisibly.

Current Conditions. Current volatility at 35% sits below the 41% annual average. This reflects subdued activity during recovery rather than structural risk reduction. Volatility tends to cluster - periods of calm are followed by periods of stress. The current calm should not be confused with safety.

SO WHAT?

Low volatility periods often precede high volatility events. R4's 30% volatility was the calm before October's storm. Current 35% volatility provides breathing room but not safety assurance. Maintain hedges even when implied volatility seems low.

Correlation Analysis: Diversification That Wasn't

Portfolio Diversification. BTC-ETH correlation measures how similarly the two assets move - critical for portfolio diversification assumptions.

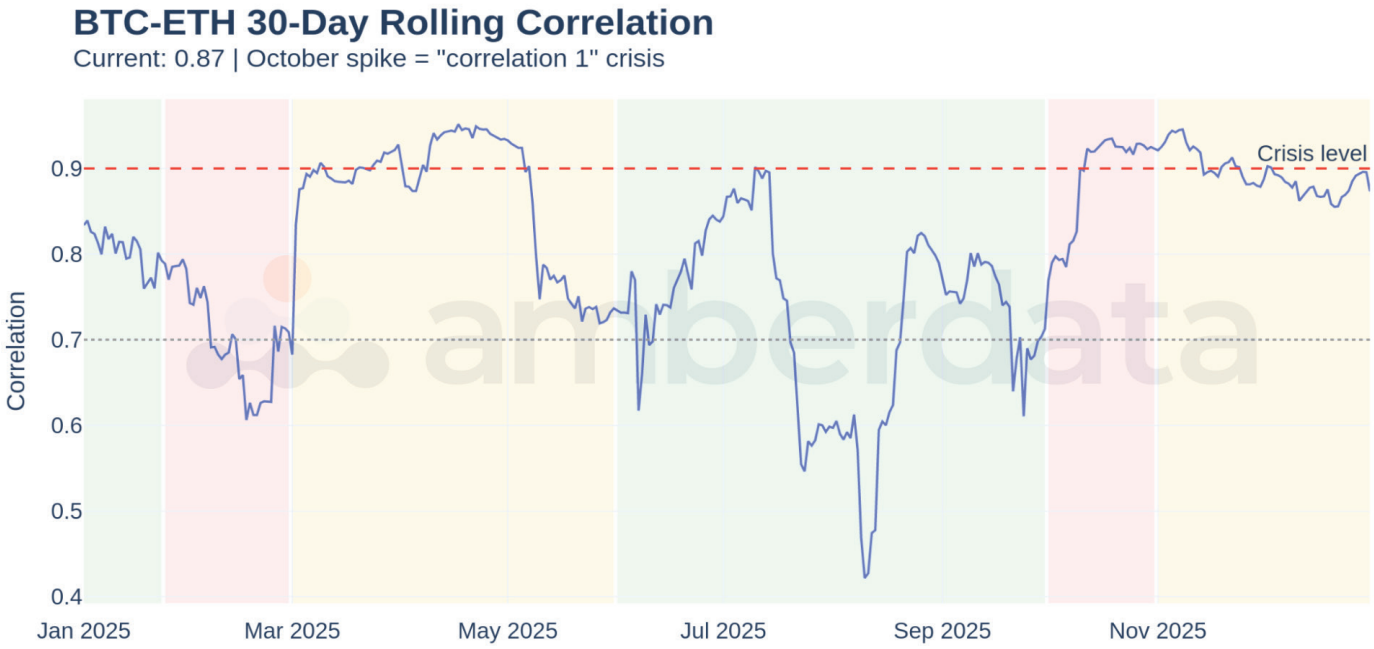


Figure 4.5: BTC-ETH 30-Day Rolling Correlation - Correlation spiked toward 1.0 during October stress. Diversification benefits disappeared when most needed.

Correlation Interpretation. How to read correlation levels:

Above 0.9: "Correlation 1" regime - indiscriminate selling
0.7-0.9: High but normal for crypto
0.5-0.7: Offers some diversification
Below 0.5: Provides genuine diversification benefit

October drove correlation toward 1.0 as all crypto assets sold together.

Consistent Pattern. This pattern is consistent with historical stress events. During liquidation cascades, traders don't discriminate - they sell whatever they can. Correlation approaches unity precisely when diversification would be most valuable. Portfolio construction must account for this stress-state behavior, not rely on normal-state correlation assumptions.

Portfolio Construction Implications. For portfolio construction purposes: assume correlation = 1.0 during any stress scenario. Run stress tests using unity correlation, not historical average correlation. Size positions such that simultaneous 30% declines across all crypto positions remain survivable. The diversification benefit is a fair-weather friend.

Regime Performance Matrix

Complete Picture. Synthesizing returns, volatility, and risk-adjusted metrics by regime reveals the complete picture.

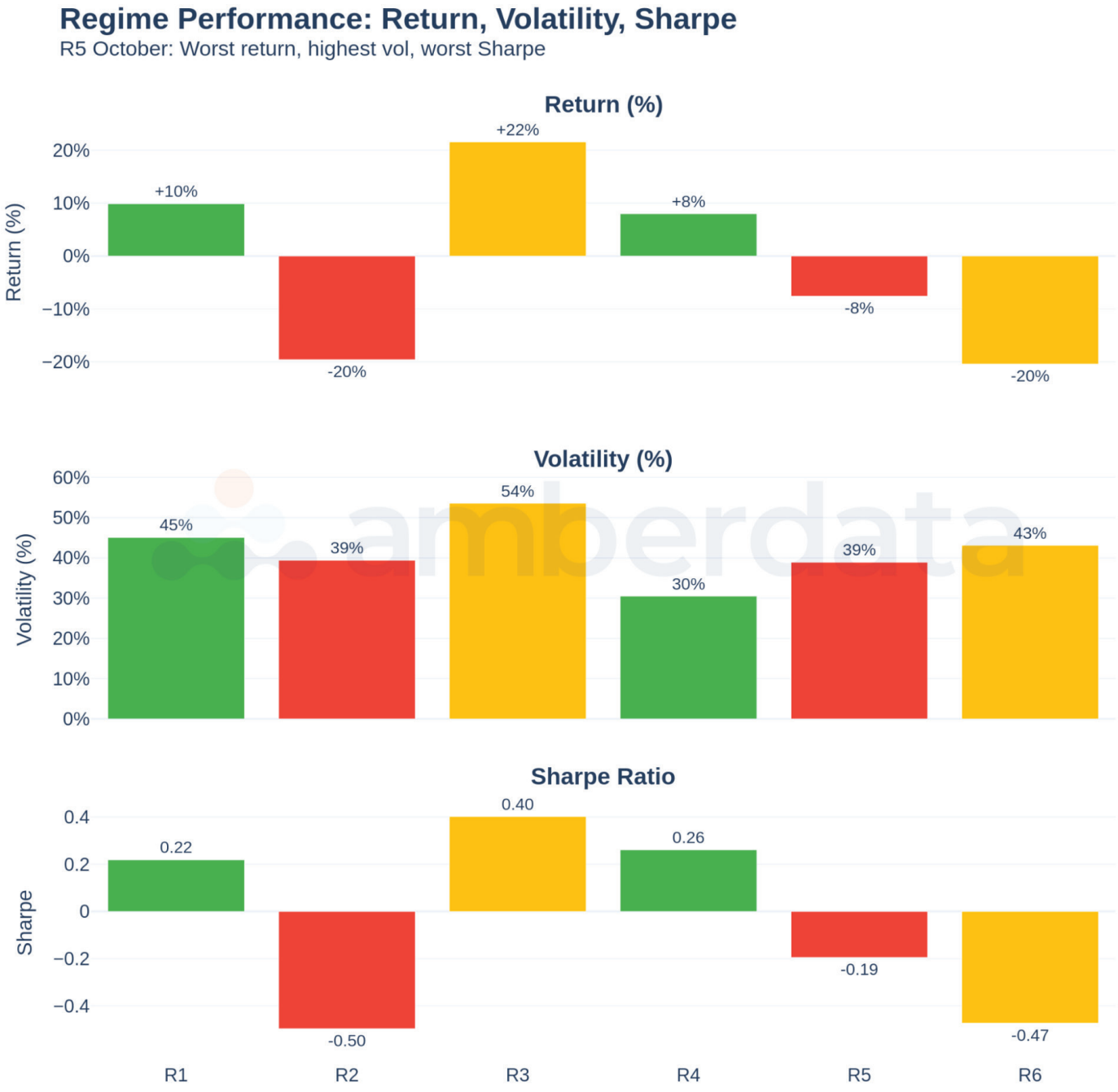


Figure 4.6: Regime Performance Matrix - R3 delivered the best risk-adjusted returns. R6 delivered the worst. Regime identification matters more than timing within the regime.

Best Risk-Adjusted. R3 (Infrastructure Build) delivered +21.5% return with 54% volatility - Sharpe of approximately 0.40. R4 delivered +8.0% with only 30% volatility - similar Sharpe but lower absolute return.

Worst Risk-Adjusted. R6 (Fragile Recovery) delivered -20.4% return with 43% volatility - negative Sharpe. R2 (Security Shock) delivered -19.6% with 39% volatility - similarly poor.

SO WHAT?

Regime identification is the primary alpha source in crypto. Within-regime timing matters less than being correctly positioned for regime character. The Amberdata Crypto Market Review 2025's regime framework (Section 3) provides the foundation for this analysis.

2026 Implications: What Performance Tells Us

Clear Signals. The 2025 performance data provides several clear signals for 2026 positioning.

Regime Matters Most. The dispersion between the best regime (+21.5%) and worst regime (-20.4%) exceeds the dispersion between assets (BTC -7.3% vs ETH -11.6%). Regime identification should drive larger allocation decisions than asset selection within crypto.

Recovery Is Not Guaranteed. Current 29.7% drawdown requires +42% gain to return to ATH. Historical recovery times from similar drawdowns range from 3-18 months. Position sizing should assume extended recovery rather than V-shaped bounce.

Volatility Signals. Current 35% volatility below average (41%) provides an entry opportunity for volatility strategies. Mean reversion suggests volatility will increase. Options strategies that benefit from volatility expansion may be timely.

Correlation Assumptions. Do not assume BTC/ETH diversification during stress. Portfolio construction should treat crypto exposure as a single correlated block. True diversification requires assets outside the crypto ecosystem.

THE BOTTOM LINE

2025's -7.3% YTD return obscures the real story: extreme regime dispersion (+21.5% to -20.4%), a 32% maximum drawdown, and correlation behavior that eliminated diversification during stress. Risk-adjusted analysis reveals that regime positioning dominated all other factors. R3 and R4 rewarded exposure; R2 and R6 punished it. For 2026, the implication is clear: regime identification matters more than asset selection within crypto. The framework for that identification drives the strategic analysis in subsequent sections.

This analysis builds on (S3)'s regime definitions that established the six distinct market phases. The performance patterns here validate that regime classification captures meaningful market state differences.

From here, (S5) examines how carry trade economics varied across these regimes - connecting performance outcomes to the yield-seeking behavior that drove much of 2025's leverage buildup. (S6) analyzes liquidity conditions that amplified drawdowns, and (S14) uses these performance patterns to model 2026 scenarios.

The Carry Trade That Broke: How Basis Compression Triggered the Cascade

Institutional yield-seeking drove 2025's leverage build - until it didn't

KEY TAKEAWAYS

- **Peak basis reached 15%+ APR in R1.** The 30-day basis hit 15.3% during Policy Euphoria - over 10% above T-bill rates. This attracted institutional capital into the carry trade at scale.
- **Carry trade was attractive only 31 days (8%) of 2025.** Using a 10%+ threshold, the carry trade offered compelling risk-adjusted returns for less than one month total. Most of 2025 was unattractive or marginal.
- **Term structure inverted during stress.** Term premium (90d minus 7d basis) went negative in R6, indicating backwardation. Short-term rates exceeded long-term - a fear signal that preceded further selling.
- **The current basis at 5.4% is unattractive.** With T-bills at 4.5%, the 0.9% excess return doesn't compensate for crypto volatility and execution risk. Institutional carry traders have better opportunities elsewhere.

In January, the crypto carry trade was yielding 15%+ APR - over 10% above T-bills. Institutional capital flowed in, seeking yield in a rate-starved environment. Long spot, short futures: capture the basis while hedging directional risk. The strategy worked until October, when basis compressed toward zero, "hedged" positions became losing positions, and forced unwinds amplified the cascade.

Understanding the carry trade mechanics is essential for institutional readers. This wasn't speculation gone wrong - it was a legitimate yield strategy that became crowded, then unwound violently when market conditions shifted. The pattern will repeat in different forms; the mechanics are transferable.

Carry Trade Mechanics: The Setup

Exploiting the Basis. The crypto carry trade exploits the basis - the difference between futures and spot prices. When futures trade at a premium (contango), traders can capture yield by buying spot and shorting futures. As contracts approach expiration, futures converge to spot, and the trader keeps the premium.

The Math. A 15% annualized basis means futures trade 15% above spot on an annualized basis. Buy $100M spot, short $100M futures. As basis collapses at expiration, capture ~$15M annually (less funding and execution costs). With T-bills at 4.5%, the excess return of 10.5% attracted serious institutional capital.

The Risk. The strategy is not risk-free. If spot drops faster than futures (basis compression), the long spot leg loses more than the short futures leg gains. The "hedge" becomes a loss amplifier. This is exactly what happened in October.

Additional Risks. Additional risks include: funding rate variability (perpetual futures funding can swing against the position), exchange counterparty risk (funds held on exchange during the trade), and execution slippage (entering and exiting positions at scale moves markets). These frictions reduce realized returns below theoretical basis.

Basis APR by Tenor: The Term Structure Story

Market Expectations. Different contract tenors reveal market expectations about future basis levels and volatility.

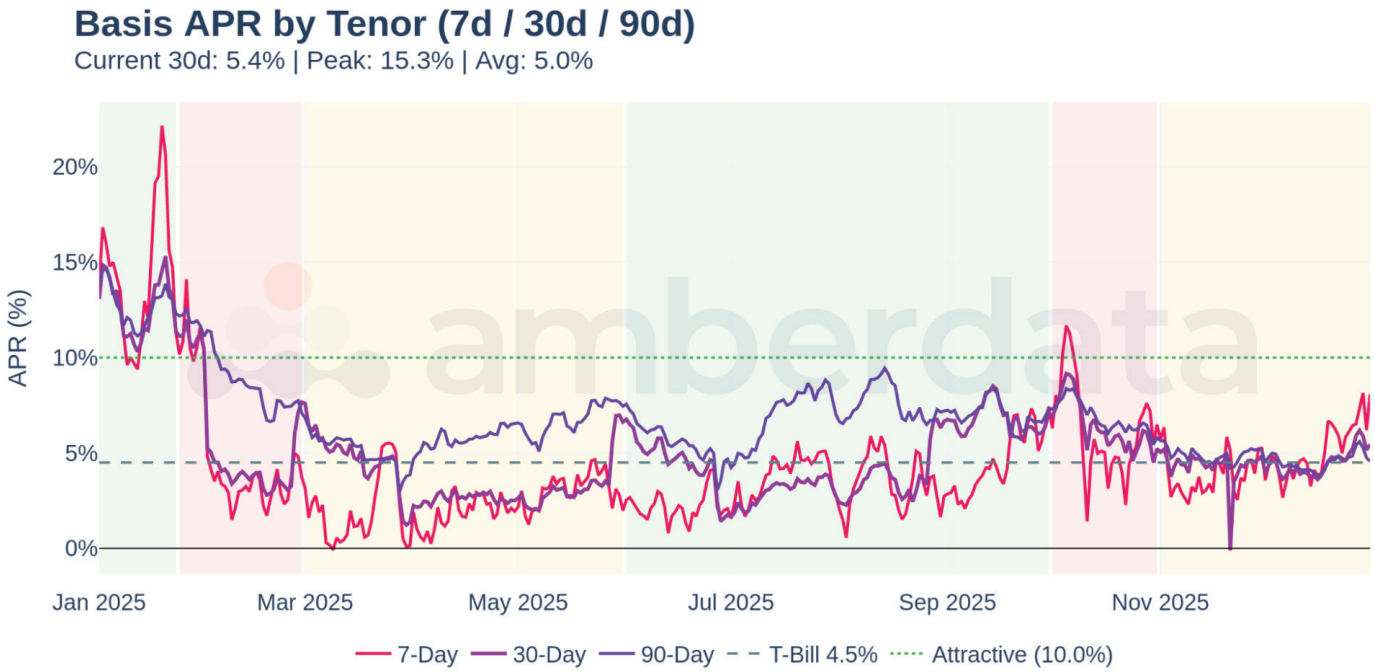


Figure 5.1: Basis APR by Tenor - 7-day, 30-day, and 90-day basis APR across 2025. Note how all tenors collapsed together during October stress.

Current Readings. Basis APR by tenor:

7-day: 8.1%
30-day: 5.4%
90-day: 4.6%
180-day: 4.4%

The inverted structure (shorter tenors yielding more than longer tenors) indicates near-term uncertainty.

YTD Averages. Average basis APR across 2025:

7-day: 4.4%
30-day: 5.0%
90-day: 6.8%

Normal contango would show 90-day above 7-day. The averages reflect periods of both normal and inverted structures.

15.3%

Peak 30-day basis APR reached in January 2025. Assuming T-bills at 4.5%, this represented 10.8% excess return - highly attractive for institutional carry traders.

Peak Readings. Maximum basis APR reached in 2025:

7-day: 22.2%
30-day: 15.3%
90-day: 14.6%

These peaks occurred during R1 (Policy Euphoria) when optimism about the Trump administration crypto policy drove aggressive long positioning and elevated futures premiums.

Overcrowding Warning. The tenor structure during peak basis is informative. 7-day basis exceeded 30-day, which exceeded 90-day - an inverted term structure despite bullish conditions. This inversion signaled overcrowding in the front-end. Too much capital chasing near-term yield compressed longer-dated opportunities. The inversion was a warning that positioning had become extreme.

Excess Return Over T-Bills: The Opportunity Cost View

Capital Allocation Comparison. Institutional capital allocation requires comparison to risk-free alternatives. The excess return over T-bills determines whether the crypto carry is worth the operational complexity and counterparty risk.

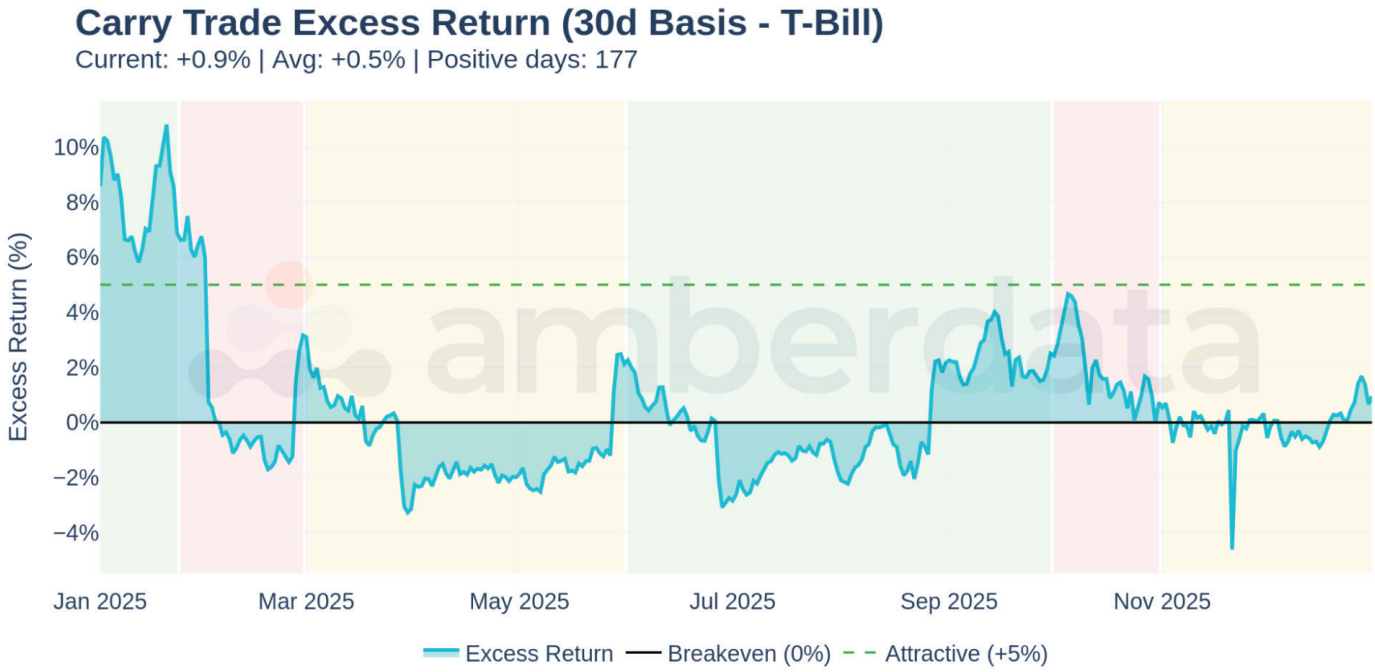


Figure 5.2: Carry Trade Excess Return - 30-day basis minus 4.5% T-bill rate. Positive = attractive; negative = capital should be elsewhere.

Current Excess. +0.9% over T-bills. This doesn't compensate for crypto-specific risks: exchange counterparty risk, execution slippage, funding rate variability, and basis volatility.

Peak Excess. +10.8% over T-bills (January peak). This level attracted institutional capital despite the risks. At 10%+ excess, the trade makes sense. Below 3% excess, it doesn't.

Quarterly Breakdown. Excess return by quarter:

- **Q1:** +2.6% (marginal)
- **Q2:** -1.0% (unattractive)
- **Q3:** +0.0% (neutral)
- **Q4:** +0.6% (unattractive)

Only early January offered compelling excess returns. Days with positive excess return: 177 of 365 (48%). Days with attractive excess (>5%): only 31 (8%). The carry trade opportunity window was narrow.

SO WHAT?

Current basis levels don't justify institutional carry trade deployment. Capital should remain in T-bills until excess return exceeds 5% sustainably. Monitor for basis expansion as the signal to re-engage.

Term Structure: Contango vs Backwardation

Market Structure Expectations. Term premium (90-day minus 7-day basis) reveals market structure expectations. Positive term premium (contango) indicates bullish expectations; negative (backwardation) indicates fear.

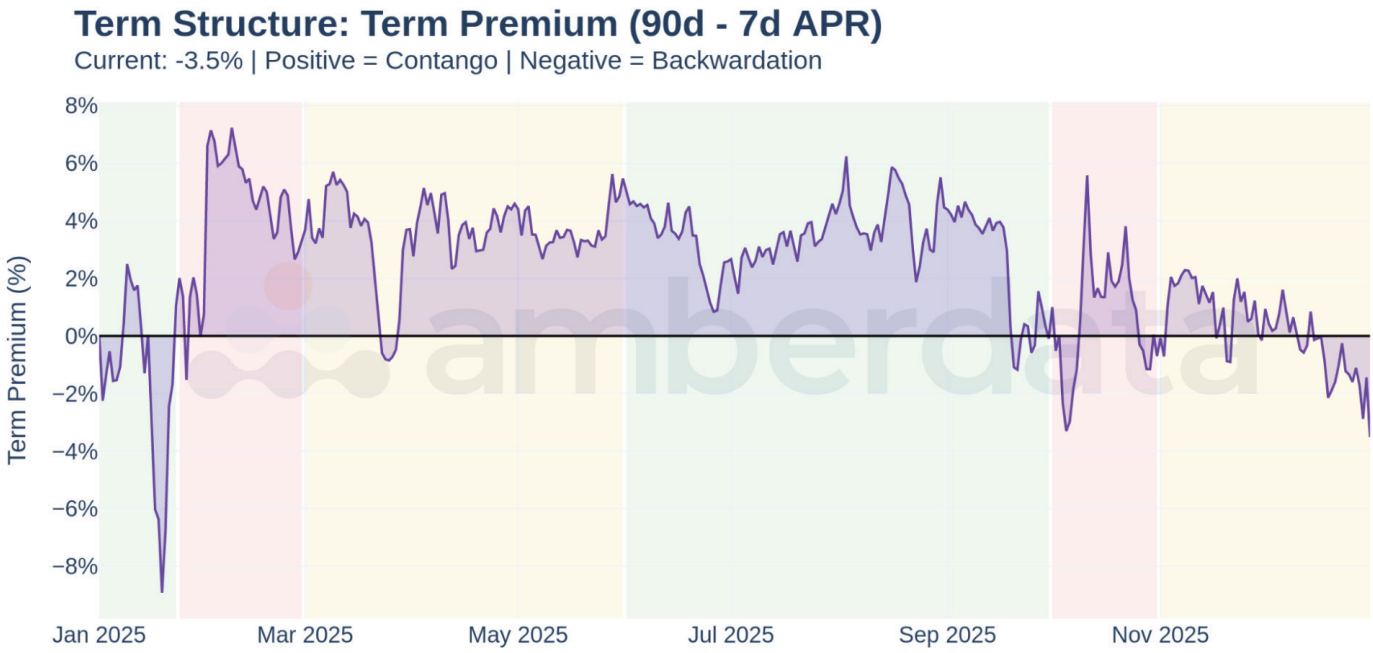


Figure 5.3: Term Structure: Term Premium - Positive = contango (normal, bullish). Negative = backwardation (fear). October stress drove inversion.

Current Reading. -3.5% term premium - mild backwardation. Near-term uncertainty exceeds longer-term expectations.

Average Reading. +2.4% term premium - normal contango on average. The year included extended periods of both structures.

Term Premium by Regime. How term structure varied across regimes:

- **R1 Policy Euphoria:** -1.5% (inverted despite euphoria - overcrowded front-end)
- **R2 Security Shock:** +4.2% (normalizing post-shock)
- **R3 Infrastructure Build:** +3.6% (healthy contango)
- **R4 Institutional Expansion:** +3.3% (bullish structure)
- **R5 Macro Shock:** +0.7% (flattening during stress)
- **R6 Fragile Recovery:** +0.2% (flat, no conviction)

R1 Inversion Explained. The R1 inversion is counterintuitive - during maximum euphoria, front-end basis exceeded back-end. This reflected overcrowded positioning in near-term contracts. Too much capital chasing the same trade compressed longer-dated opportunities while bidding up short-term premiums. The inversion itself was a warning sign of crowding.

Term structure tells you what the market believes. Contango means 'higher prices ahead.' Backwardation means 'fear now, uncertainty later.' R6's flat structure reveals a market without conviction.

Carry Attractiveness by Regime

Strategy Viability Mapping. Mapping carry trade viability to regimes reveals when the strategy worked and when it didn't.

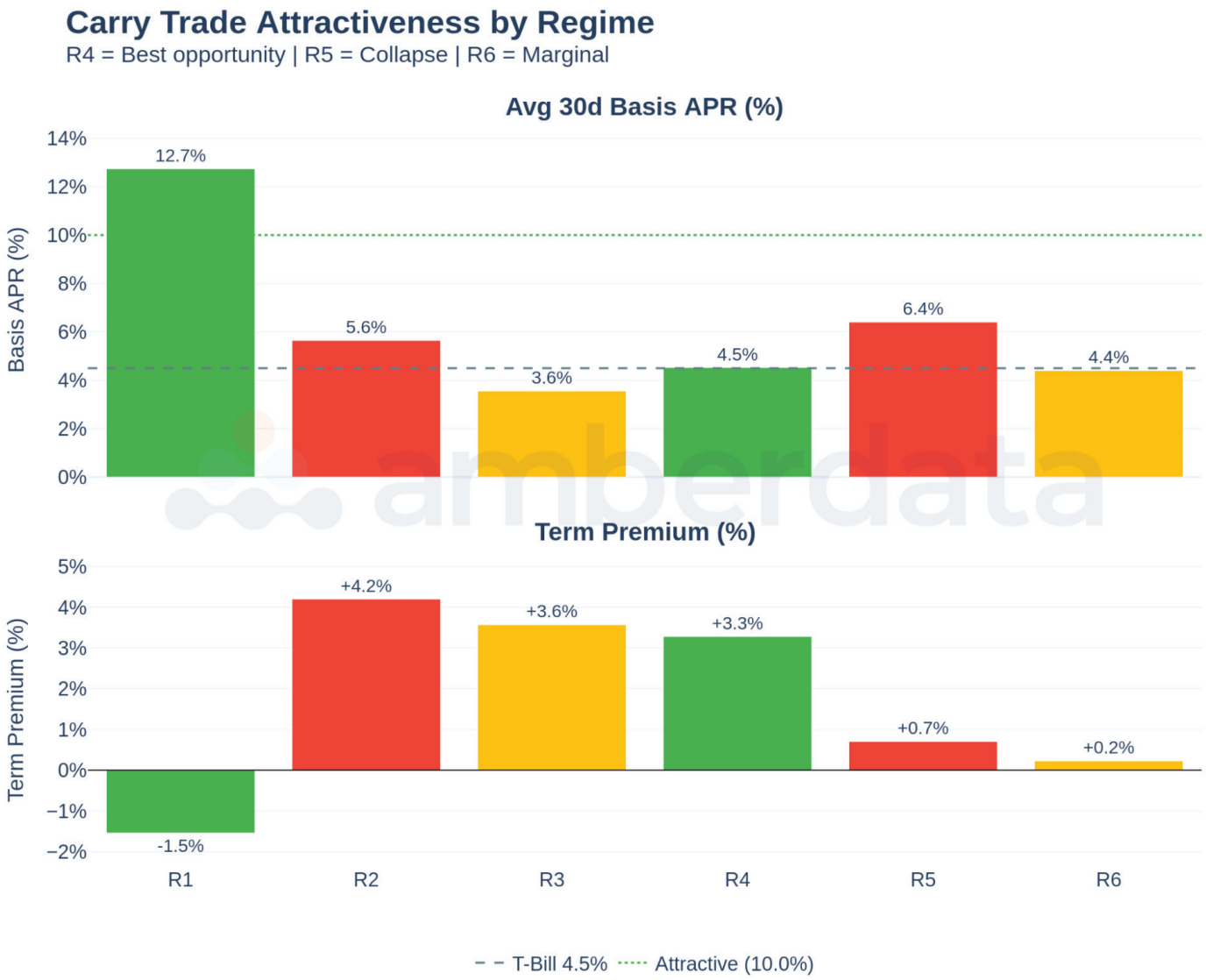


Figure 5.4: Carry Attractiveness by Regime - Only R1 offered 'Excellent' carry conditions. R3, R4, and R6 were unattractive. Most of 2025 did not justify carry trade deployment.

Viability Thresholds. How to interpret basis APR levels:

Above 12% APR: Excellent
8-12%: Good
5-8%: Marginal
Below 5%: Unattractive

Regime Assessment. Carry viability by regime:

R1 Policy Euphoria: 12.7% - Excellent (this was the window)
R2 Security Shock: 5.6% - Marginal
R3 Infrastructure Build: 3.6% - Unattractive
R4 Institutional Expansion: 4.5% - Unattractive
R5 Macro Shock: 6.4% - Marginal
R6 Fragile Recovery: 4.4% - Unattractive

Uncomfortable Truth. The regime assessment reveals an uncomfortable truth: most of 2025 did not justify carry trade deployment. R3, R4, and R6 - representing 246 days or 67% of the year - offered unattractive conditions. R2 and R5 were marginal at best. Only R1's 23 days offered genuinely compelling risk-adjusted returns.

The pattern is clear: the carry trade was only attractive for approximately 23 days in January (R1). Traders who deployed after February were accepting marginal or negative risk-adjusted returns. The crowding into an unattractive trade set the stage for October's unwind.

October: The Carry Unwind

Amplified Selling. October's cascade included a carry trade component that amplified selling pressure beyond pure directional liquidations.

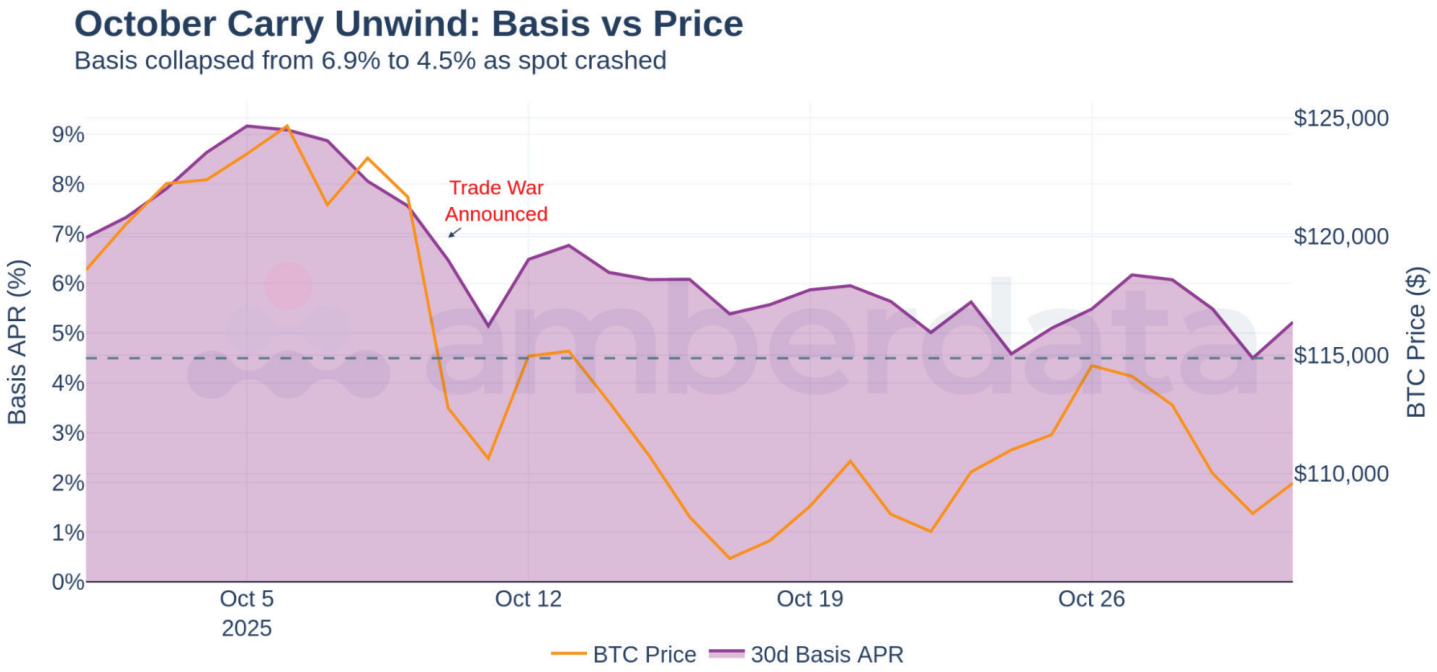


Figure 5.5: October Carry Unwind - Basis collapse from 6.9% to 4.5% coincided with price decline. The 'hedge' became a loss amplifier.

The Mechanism. Pre-crash: carry traders held long spot, short futures. Crash: spot sold off. Futures followed but more slowly (basis compressed). The long leg lost more than the short leg gained. "Hedged" positions showed losses. Risk managers forced position closure.

The Amplification. Closing the carry trade means selling spot (adding to downward pressure) and buying futures (supporting basis). The unwind itself accelerated the crash. This is mechanical, not discretionary - risk limits don't negotiate.

October Numbers. Basis behavior during the crash:

- **Basis start:** 6.9%
- **Basis trough:** 4.5%
- **Basis end:** 5.2%

The 2.4% compression on a 30-day basis translates to roughly 0.2% loss on notional - modest in isolation but significant at scale.

Scale Impact. For a $100M carry trade position, 0.2% loss is $200,000 - manageable. But the basis compression occurred simultaneously with spot losses. If spot dropped 15% while basis compressed 2.4%, the combined loss approached 15.6% on a 'hedged' position. At institutional scale, these losses triggered risk limit breaches and forced unwinds.

The unwind sequence is predictable once it begins: risk managers identify losses on 'hedged' positions, demand position reduction, traders sell spot (adding selling pressure) and buy futures (supporting basis), the selling begets more selling until positions are cleared. This is mechanical, not discretionary - compliance doesn't negotiate with P&L limits.

SO WHAT?

Carry trade unwinds amplify crashes. When basis compresses, 'hedged' positions become losing positions, and forced exits add selling pressure. This mechanism connects futures markets to spot markets during stress. Monitor basis compression as an early warning of cascade risk.

ETF Flows and Basis: The Arbitrage Connection

Connecting Markets. ETF arbitrageurs connect spot ETF markets to futures markets. When basis is attractive, they buy ETF shares and short futures. When basis compresses, they unwind.

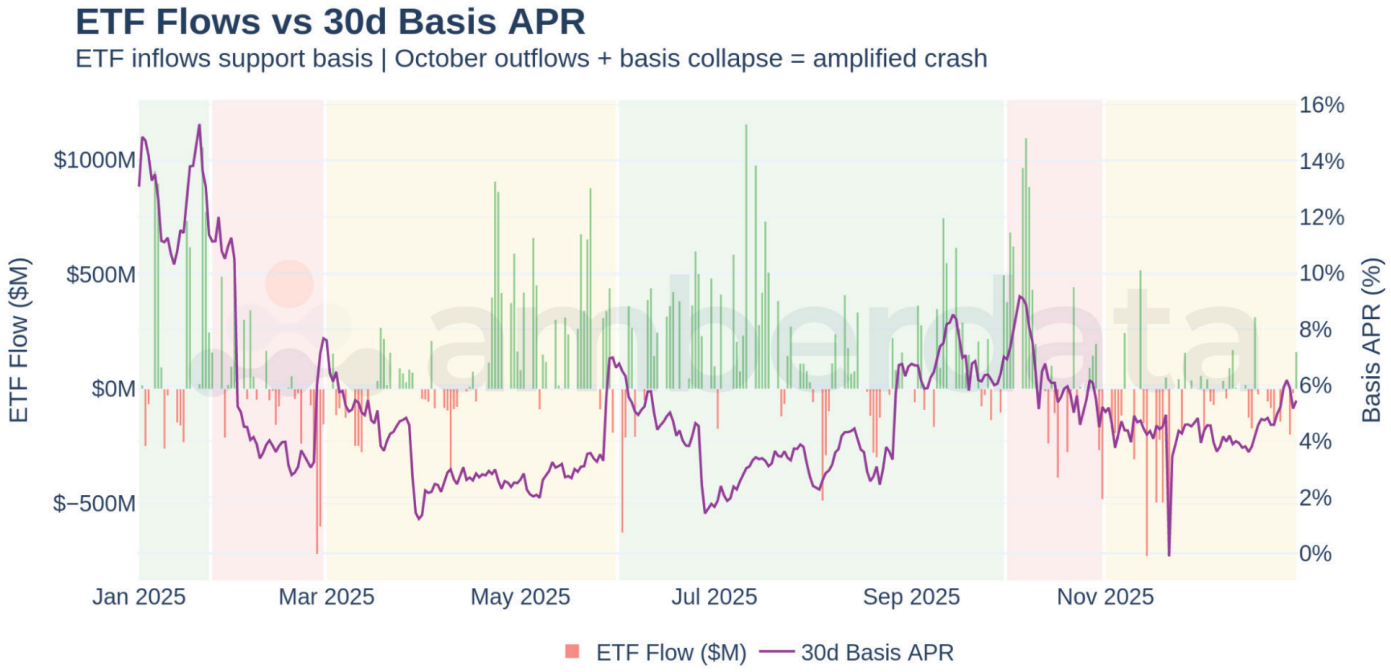


Figure 5.6: ETF Flows vs 30d Basis APR - ETF flows correlated with basis changes. October outflows partly reflected arbitrage unwinds, not fundamental selling.

The Arbitrage Mechanism. When basis exceeds ETF costs (~0.25% management fee + execution), arbitrageurs buy ETF shares (creating inflows) and short futures. When basis compresses below profitability, they redeem ETF shares (creating outflows) and close futures shorts.

October Implications. Some of October's ETF outflows reflected mechanical arbitrage unwinds rather than fundamental selling. Investors watching ETF flows as a sentiment indicator may have misread the signal. The outflows were not structural panic.

This connection explains why basis analysis matters for understanding flows. High basis attracts ETF inflows via arbitrage. Basis compression triggers outflows. The relationship is mechanical and predictable once understood. Watching only ETF flows without basis context leads to misinterpretation - October's outflows looked like capitulation but were partly just math.

Arbitrage Threshold. Looking at it simply, the arbitrage threshold is approximately basis minus ETF costs (management fee ~0.25%, creation/redemption ~0.10%, execution ~0.15%). When 30-day basis exceeds ~0.5%, arbitrage is profitable. When basis compresses below this threshold, existing positions unwind. This mechanical relationship explains significant portions of ETF flow variance.

Carry Score: A Composite Signal

Single Viability Metric. The Carry Score combines excess return, volatility, and term structure into a single viability metric.

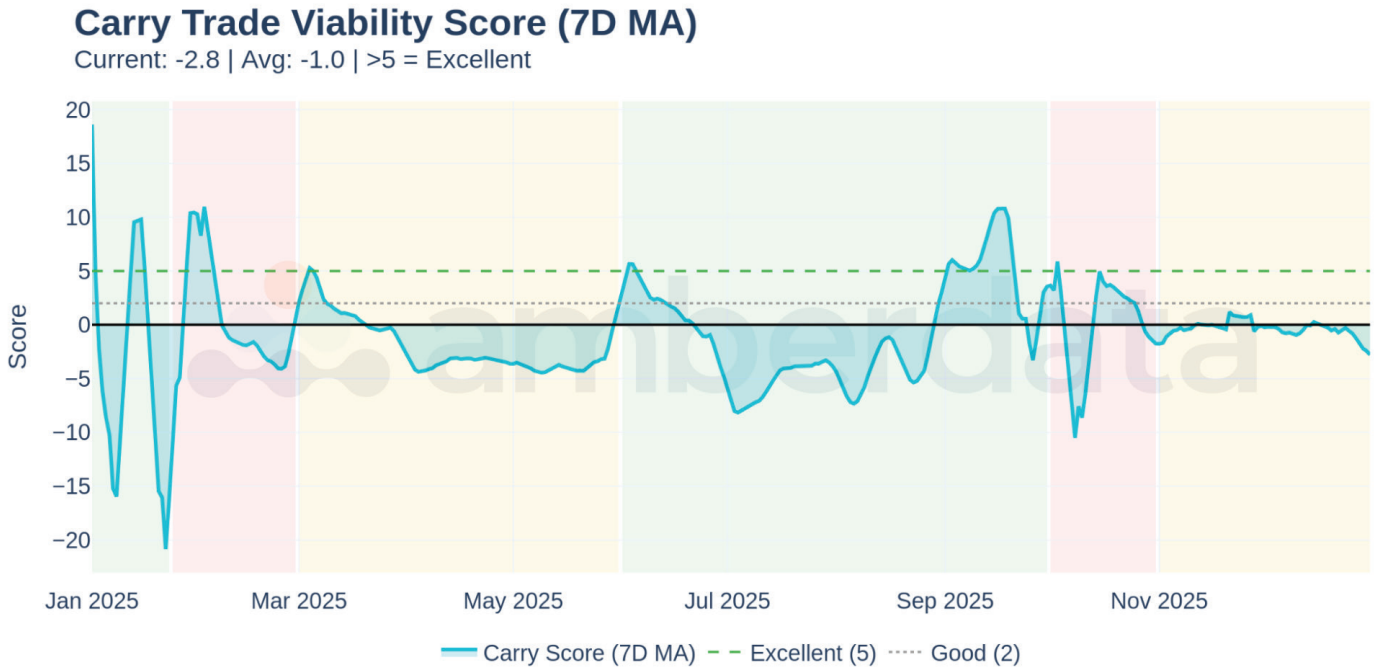


Figure 5.7: Carry Trade Viability Score - Score above 20 = deploy capital. Below 10 = stay in T-bills. Current conditions do not justify carry trade deployment.

Score Components. Excess return over T-bills (primary driver) / Volatility (risk adjustment) x Term structure sign (directional confirmation). Higher scores indicate more attractive carry conditions.

Current Assessment. As of writing, the score indicates unattractive conditions. Excess return is minimal, volatility remains elevated, and term structure is flat to inverted. Capital should remain in alternatives until the score improves.

Deployment Thresholds. How to use the score for capital allocation:

Above 20: Justifies institutional capital allocation
10-20: Marginal - acceptable for crypto mandates, not compelling for generalists
Below 10: Capital should remain in T-bills or alternatives

Current conditions fall in the unattractive range. Monitoring the score provides actionable signals. Rising score above 15 suggests preparing capital for deployment. Score crossing 20 triggers entry. Score falling below 10 triggers exit or position reduction.

Regime Carry Summary

Reference Table. A reference table for each regime's carry trade characteristics.

Regime Carry Trade Summary

R1 best (12.7%) | R3 worst (3.6%) | YTD Avg: 5.0%

Regime	Name	Period	30d Basis	Excess	BTC Return	Status
R1	Policy Euphoria	01-01 → 01-23	12.7%	+8.2%	+9.9%	Excellent
R2	Security Shock	01-24 → 02-28	5.6%	+1.1%	-19.6%	Marginal
R3	Infrastructure Build	03-01 → 05-31	3.6%	-0.9%	+21.5%	Unattractive
R4	Institutional Expansion	06-01 → 09-30	4.5%	+0.0%	+8.0%	Unattractive
R5	Macro Shock / Cascade	10-01 → 10-31	6.4%	+1.9%	-7.6%	Marginal
R6	Fragile Recovery	11-01 → 12-31	4.4%	-0.1%	-20.4%	Unattractive

Figure 5.8: Regime Carry Trade Summary - Complete breakdown of basis, excess return, term premium, and viability assessment by regime.

Key Insight. R1 was the only regime where carry trade deployment was justified on a risk-adjusted basis. Traders who recognized this and exited by late January captured the opportunity. Those who stayed through R2-R6 experienced poor risk-adjusted returns or outright losses during the October unwind.

Lesson for 2026. Wait for attractive conditions rather than forcing trades in marginal environments. Basis exceeding 10% with positive term structure signals opportunity. Basis below 5% with flat or inverted structure signals patience. The carry trade is a tool - use it when conditions justify, ignore it otherwise.

For institutional allocators, the regime framework provides deployment timing guidance. Capital can remain in T-bills during unattractive regimes (most of 2025), then deploy rapidly when conditions improve. This approach avoids the opportunity cost of idle capital in marginal trades while capturing genuine opportunities when they appear.

2026 Outlook: When Does Carry Become Attractive Again?

Re-Engagement Signals. Several conditions would signal carry trade re-engagement in 2026.

Basis Threshold. 30-day basis sustainably above 10% APR (5.5%+ excess over T-bills). Current 5.4% is insufficient. Watch for basis expansion during the next bullish regime.

Term Structure. Positive term premium indicating normal contango. Current -3.5% inversion signals uncertainty. Normalization to +2-3% would confirm bullish structure.

Volatility Compression. 30-day volatility below 35% improves Sharpe ratios. Current 35% is marginally acceptable. Further compression would improve risk-adjusted returns.

ETF Flow Confirmation. Sustained ETF inflows indicate new capital entering - basis-supportive. Watch for $500M+ weekly inflows as confirmation.

Likely Catalyst. The catalyst most likely to restore attractive carry conditions: sustained price appreciation that drives futures premiums higher while T-bill rates decline. A new bull market leg, combined with Fed rate cuts, would recreate conditions similar to early 2024. Until then, patience is warranted.

THE BOTTOM LINE

The carry trade story is a microcosm of 2025: institutional yield-seeking scaled faster than market infrastructure could absorb. Peak basis of 15%+ APR in January attracted capital. But the window was narrow - only 31 days offered attractive conditions. By October, crowded positioning in an unattractive trade created fragility. When spot prices dropped, basis compressed, 'hedged' positions lost money, and forced unwinds amplified the cascade. Current basis at 5.4% (0.9% above T-bills) doesn't justify carry trade deployment. The signal to re-engage: sustained excess return above 5% with positive term structure.

This analysis builds on (S4)'s volatility and drawdown analysis - the risk conditions that determine carry trade Sharpe ratios and position sizing.

From here, (S7) examines the open interest and funding rate mechanics that accompanied the carry trade buildup. (S8) connects the basis-ETF arbitrage relationship to actual flow data during October's stress.

The Liquidity That Vanished: Inside October's 40% Depth Collapse

When October's liquidation cascade hit, market makers disappeared - and haven't fully returned

KEY TAKEAWAYS

- **Liquidity collapsed before price did.** Order book depth at 10bps fell 46% during October's cascade - from $48M to $26M. Market makers pulled quotes as liquidation pressure intensified, amplifying the move.
- **Current depth remains 40% below peak.** At $29M (10bps), liquidity has not recovered to pre-crash levels three months later. The market's capacity to absorb large orders is structurally impaired.
- **Liquidity Score reveals regime character.** R4's score of 8.0 reflected healthy conditions. October's trough hit 1.3 - a 6x deterioration. Current 12.6 shows recovery but masks underlying fragility.
- **Volume concentration creates venue risk.** Top 5 exchanges handle 67% of BTC spot volume. During stress, traders fled to deepest venues, concentrating execution risk on Binance and Coinbase.

Order book depth at 10 basis points collapsed 46% in 48 hours - from $48 million to $26 million. Market makers pulled liquidity as the cascade accelerated, widening spreads and amplifying every forced liquidation. Three months later, depth remains 40% below pre-crash levels.

Liquidity is the market's immune system. When stressed, it determines whether a correction stays contained or cascades into crisis. October tested that immune system - and found it wanting. Understanding what happened to liquidity, and why it hasn't fully recovered, is essential context for assessing 2026 risk.

The Full Year Liquidity Story: Building and Breaking

Measuring Depth. Order book depth measures resting liquidity - how much capital sits in limit orders waiting to be filled. Depth at 10 basis points (0.1% from mid-price) captures institutional execution quality. Higher depth means larger orders execute with less slippage.

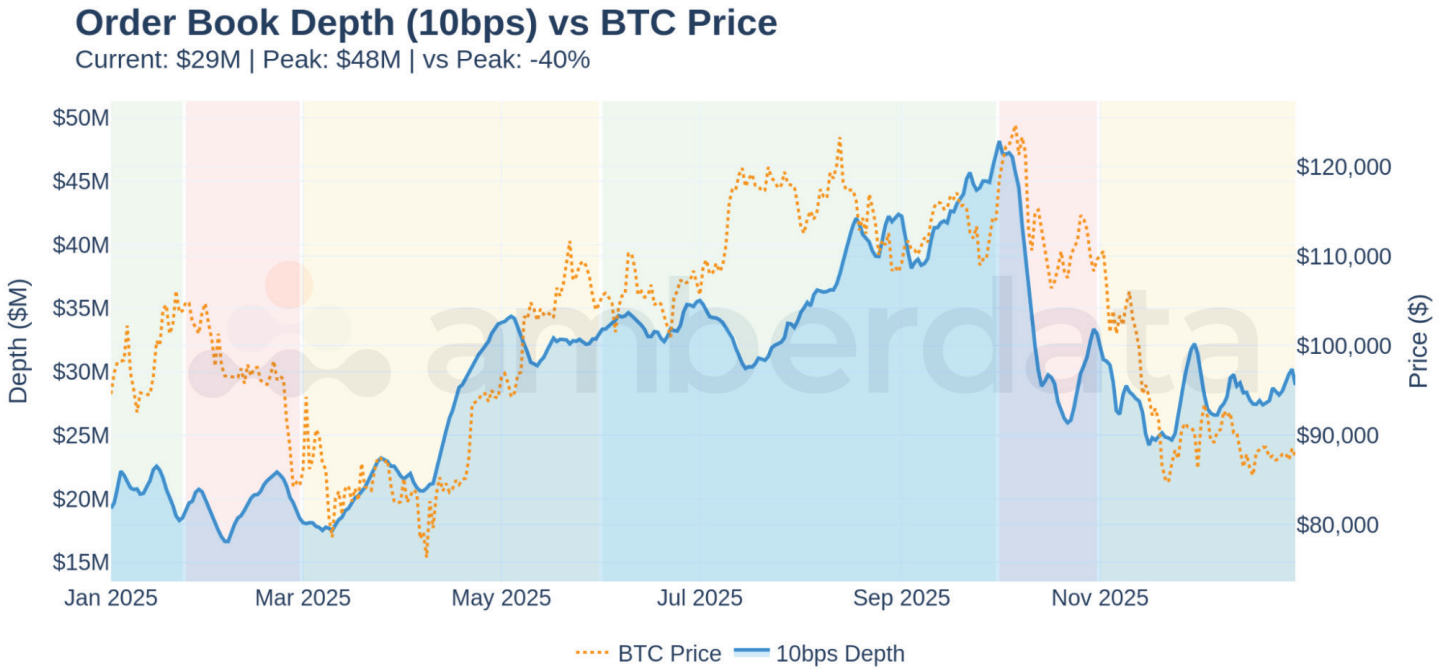


Figure 6.1: Order Book Depth vs Price - Note the divergence between depth and price during R4. Depth peaked in early October, then collapsed while price was still elevated - a leading indicator of fragility.

R1-R3: The Building Phase. Depth grew steadily from $21M (R1) to $26M (R3) as market makers expanded capacity. ETF launches brought new institutional flow, and market makers responded by posting more liquidity to capture the spread.

R4: Peak Liquidity. Average depth reached $37M during Institutional Expansion (R4), with the absolute peak of $48M on October 1st. This represented the healthiest liquidity conditions of the year - deep books, tight spreads, and robust market maker participation.

R5-R6: Collapse and Incomplete Recovery. October's cascade destroyed the liquidity infrastructure. Average depth fell to $34M during R5, then to $28M in R6 as market makers maintained conservative positioning. Current depth at $29M remains 40% below peak.

-40%

Current order book depth versus October 1st peak. Three months after the crash, market maker liquidity has not recovered to pre-crisis levels.

SO WHAT?

Depth levels provide early warning of market fragility. When depth peaked October 1st then began declining before price, it signaled market makers were already reducing exposure. Monitoring depth relative to recent peaks helps identify when the market's capacity to absorb shocks is deteriorating.

Regime Analysis: How Liquidity Responded to Each Phase

Mapping Liquidity to Regimes. Mapping liquidity to the year's six regimes reveals distinct patterns in market maker behavior during different market conditions.

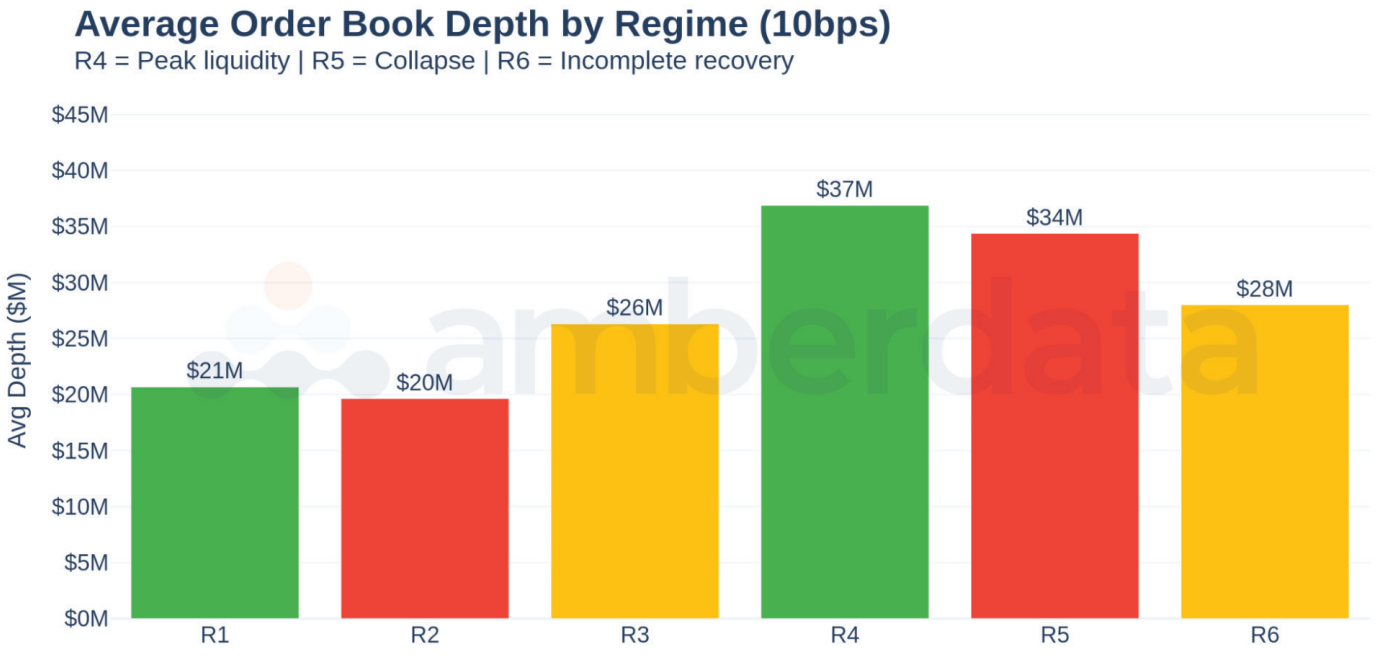


Figure 6.2: Average Depth by Regime - R4 peak at $37M versus R6 at $28M shows 24% permanent reduction. Market makers have not restored full liquidity despite price stabilization.

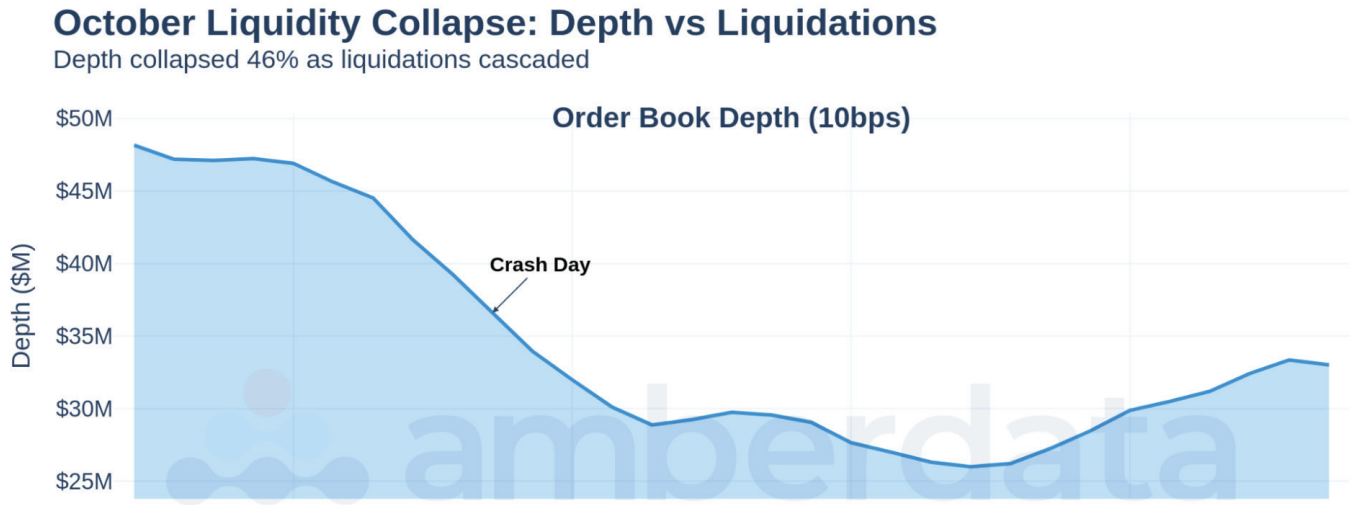
Depth by Regime. Average order book depth (10bps) across 2025:

- **R1 Policy Euphoria:** $21M average - moderate depth given uncertainty about new ETF flow patterns
- **R2 Security Shock:** $20M average - brief 5% withdrawal during Bybit hack uncertainty
- **R3 Infrastructure Build:** $26M average - gradual expansion as market makers grew comfortable
- **R4 Institutional Expansion:** $37M average - peak liquidity conditions, deepest books of year
- **R5 Macro Shock:** $34M average - 7% decline, understates 46% intraday collapse
- **R6 Fragile Recovery:** $28M average - 24% below R4 peak, market makers remain cautious

Market makers remember. October's cascade taught them that crypto liquidity can evaporate faster than they can adjust quotes. The 24% permanent reduction reflects that lesson.

October Case Study: Anatomy of a Liquidity Crisis

Textbook Example. October 10-11 provides a textbook example of how liquidity crises unfold in crypto markets. The sequence reveals how market maker behavior amplifies - rather than dampens - volatility during stress.



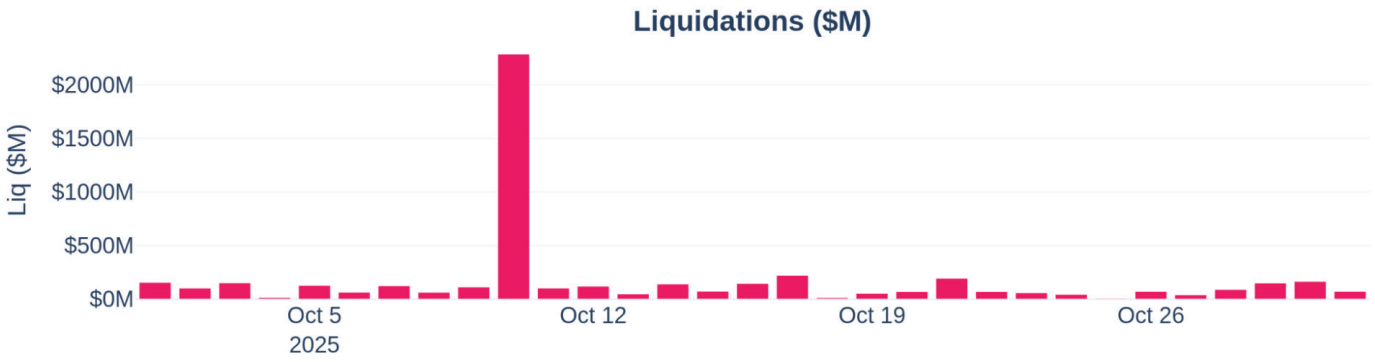


Figure 6.3: October Liquidity Collapse - Dual-panel view showing depth collapse (top) coinciding with liquidation surge (bottom). Note depth hit minimum during peak liquidation intensity.

Phase 1: The Trigger. Tariff headlines triggered initial selling. Depth remained stable as market makers absorbed the initial flow. Price declined but within normal ranges.

Phase 2: Liquidation Cascade Begins. As price dropped through key levels, leveraged long liquidations accelerated. Market makers began widening quotes to protect against inventory risk.

Phase 3: Liquidity Withdrawal. With liquidations cascading, market makers faced adverse selection - every fill was likely followed by further forced selling. Rational response: pull quotes. Depth collapsed from $48M to $26M in hours.

Phase 4: Maximum Stress. At crisis peak, thin order books meant each liquidation moved price further, triggering more liquidations. The feedback loop continued until leverage was exhausted.

Phase 5: Stabilization. As liquidations slowed, market makers cautiously returned. Depth recovered to $30M+ but well below pre-crisis levels.

46%

Peak-to-trough depth collapse during October 10-11. From $48M to $26M in hours as market makers withdrew during the cascade.

Key Insight. Market makers are momentum amplifiers during stress, not stabilizers. Their rational response to adverse selection - pulling quotes - is exactly what transforms corrections into cascades. This is not a flaw in the market; it is the market's fundamental nature.

SO WHAT?

During liquidation cascades, do not expect order book depth to provide support. Market makers will withdraw, spreads will widen, and slippage will spike. Position sizing must account for the possibility of execution quality deteriorating precisely when you need to exit. Pre-set stops may execute far worse than expected.

Depth Profile: Near vs Far Liquidity

Depth at Different Levels. Order book depth at different distance levels reveals distinct liquidity characteristics. Near-market depth (10bps) serves institutional execution; far-market depth (100bps) represents stress capacity.

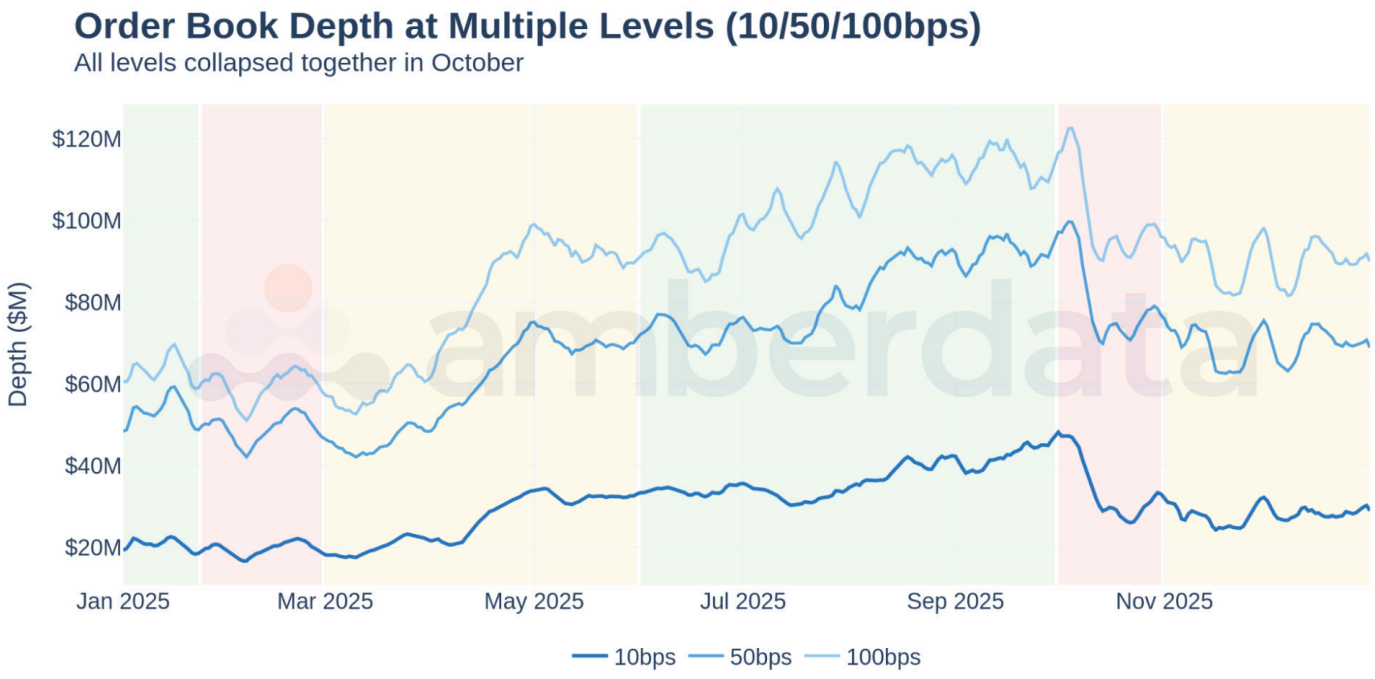


Figure 6.4: Depth at Multiple Levels - All three levels (10/50/100bps) collapsed together in October, indicating market-wide liquidity withdrawal rather than just near-market thinning.

Current Depth Profile. Depth at different distances from mid-price:

10bps: $29M (institutional execution)
50bps: $69M (large retail)
100bps: $90M (stress capacity)

The ratio of 100bps to 10bps depth (3.1x) indicates reasonable depth profile shape - liquidity increases with distance from mid-price. A healthy market shows this graduated structure; crisis conditions flatten the profile as all levels thin simultaneously.

October Pattern. During October's collapse, all depth levels fell proportionally - this is significant. If only near-market depth had thinned, it would suggest market makers were simply widening quotes. The parallel collapse across all levels indicates wholesale liquidity withdrawal - market makers pulling entire quote ladders rather than just adjusting spreads.

Execution Implications. For execution purposes, the 10bps depth determines institutional fill quality. At $29M, a $5M market order would consume roughly 17% of near-market depth, resulting in meaningful slippage. For comparison, at October 1st peak ($48M), that same order would have consumed only 10% of available depth.

Venue Dynamics: Where Liquidity Lives

Volume Concentration. Trading volume concentration reveals where market participants execute and where liquidity risk concentrates during stress.

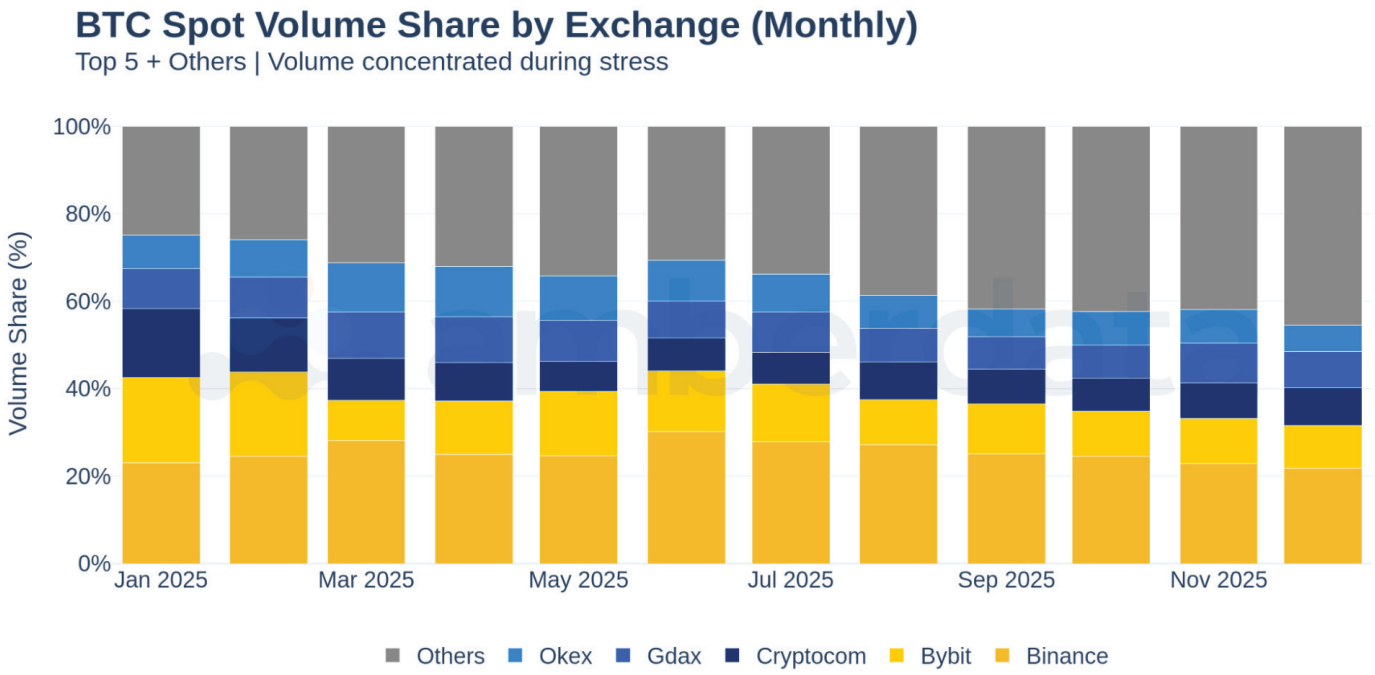


Figure 6.5: Volume Share by Exchange - Top 5 exchanges capture 67% of BTC spot volume. During October stress, concentration increased further as traders sought deepest liquidity.

Volume Distribution. BTC spot volume by exchange:

- **Coinw:** 24.1%
- **Binance:** 19.1%
- **Bybit:** 10.0%
- **Crypto.com:** 7.2%
- **Coinbase/GDAX:** 6.7%
- **Others:** 33%

This concentration means systemic risk is heavily weighted toward a few venues.

Stress Behavior. During October, volume concentrated further on Binance and Coinbase as traders sought the deepest liquidity. Smaller venues saw relative volume decline as participants consolidated execution on venues most likely to absorb large orders. This flight to liquidity is rational but creates concentration risk - if the dominant venues experience issues, alternatives are limited.

Risk and Opportunity. The venue concentration creates both risk and opportunity. Risk: if a major venue experiences technical issues during stress, execution alternatives are limited. Opportunity: monitoring depth and spread on top venues provides a strong signal about market-wide liquidity conditions. Binance's order book serves as a reasonable proxy for aggregate market health.

Liquidity Resilience Score: A Composite Signal

Composite Metric. The Liquidity Resilience Score combines depth and volume into a single metric that captures how well the market can absorb trading activity. Formula: (Depth at 100bps / Daily Volume) x 100.

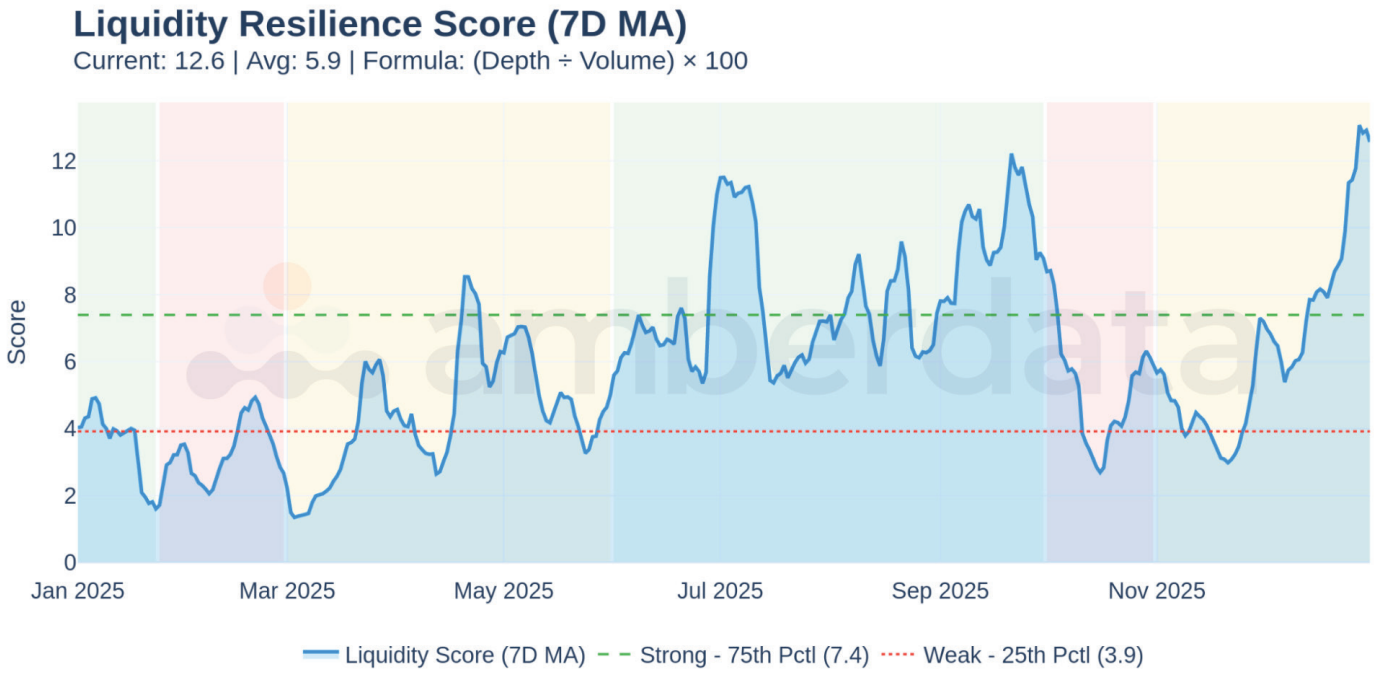


Figure 6.6: Liquidity Resilience Score - Score collapsed from R4's 8.0 average to October trough of 1.3 - a 6x deterioration. Current 12.6 reflects recovery but masks underlying structural changes.

Interpreting the Score. How to read the Liquidity Resilience Score:

Above 7.4: Strong liquidity (75th percentile)
3.9-7.4: Normal conditions
Below 3.9: Weak conditions (25th percentile)

October's trough at 1.3 represented extreme stress - depth evaporated while volume spiked during panic selling.

Current Reading: 12.6. This elevated score reflects two factors: moderate depth recovery ($29M at 10bps) and reduced trading volume as the market consolidates. The ratio benefits from low volume as much as strong depth. Elevated scores during low-activity periods can mask underlying fragility.

Regime Patterns. Liquidity Score by regime:

R1: 3.6
R2: 3.3
R3: 4.5
R4: 8.0 (healthy)
R5: 5.2 (stress recovery)
R6: 6.4 (consolidation)

The R4 peak coincided with both strong depth and active trading - genuine healthy conditions rather than low-activity artifact.

SO WHAT?

The Liquidity Score below 4.0 should trigger heightened awareness of execution risk. Current 12.6 is reassuring but partially reflects subdued activity. If volume surges without corresponding depth increase, the score will collapse rapidly. Monitor both components, not just the ratio.

2026 Implications: Trading in a Fragile Structure

Persistent Characteristics. October's liquidity crisis revealed structural characteristics that persist into 2026. Trading strategy must account for these realities.

Depth Recovery Thresholds. Current $29M (10bps) represents the new baseline. Recovery above $35M would signal market maker confidence returning. Sustained readings above $40M would indicate pre-crisis conditions restored. Current trajectory suggests gradual improvement but full recovery is unlikely in near term.

Stress Indicators. Watch for depth declining while price remains stable - this divergence preceded October's collapse. Depth below $25M (10bps) combined with rising volume would signal elevated cascade risk.

Execution Implications. In current conditions, expect 10-20% more slippage on large orders than pre-October norms. Scale position sizes accordingly. During any stress episode, assume slippage will multiply 3-5x from normal levels as market makers withdraw. Pre-positioned limit orders may not fill as market makers skip price levels entirely during fast moves.

The market structure has fundamentally changed. Market makers learned that crypto liquidity can evaporate faster than traditional risk models predict. Their permanent reduction in liquidity provision is not a temporary caution - it is a rational response to demonstrated risk. Trading in 2026 means trading in a structurally thinner market.

THE BOTTOM LINE

Liquidity is the market's immune system, and in 2025 that immune system was tested severely. October's 46% depth collapse demonstrated how quickly market maker liquidity can evaporate during stress. Three months later, depth remains 40% below peak - market makers remember, and they've permanently reduced their risk appetite. The Liquidity Score's collapse from 8.0 to 1.3 quantified the stress intensity. Current elevated readings (12.6) partly reflect subdued activity rather than restored health. For 2026, assume thinner markets, worse execution during stress, and the possibility that any correction can cascade if leverage has rebuilt. The market's immune system is weaker than it was.

This analysis connects to (S2)'s October crash anatomy (the event that broke liquidity) and (S5)'s basis compression analysis (which triggered the ETF outflows that added to selling pressure during the crisis).

From here, (S7) examines the leverage that fueled October's cascade - the $56.6B in open interest that provided the fuel. (S14) incorporates the fragile liquidity structure into 2026 scenario analysis and risk assessment.

Leverage & Liquidations: The $31B Deleveraging

Open interest, funding rates, and the mechanics of crypto's largest-ever liquidation cascade

KEY TAKEAWAYS

- **Open interest peaked at $54.7B before collapse.** The August-September build created the largest aggregate leverage position in Bitcoin history. Current OI sits 42% below peak at $31.9B - the deleveraging was structural, not temporary.
- **$31.4B in total BTC liquidations YTD - 60% from longs.** October 10 alone saw $2.3B liquidated in a single day, with 86% coming from forced long closures. The market was catastrophically one-sided.
- **Funding rates signaled danger for weeks.** Peak funding hit 29.9% APR during R4 euphoria. Persistent readings above 15% historically precede corrections - the warning was visible to anyone watching.
- **Liquidation cascades are mechanical, not discretionary.** When liquidation intensity exceeds 5% of OI, forced selling triggers more forced selling. October's cascade reached 4.82% intensity - extreme by any historical measure.

October 10, 2025: $2.3 billion liquidated in a single day. 86% from forced selling of longs. The largest single-day liquidation event in Bitcoin's history unfolded not through panic selling, but through mechanical forced closures as margin calls cascaded through an overleveraged system.

The warning signs were visible for weeks. Funding rates had sustained above 15% APR. Open interest had climbed to record highs. The market was positioned for continuation - and when continuation failed, the leverage unwound violently. Understanding how leverage creates systemic fragility is essential for anyone managing risk in crypto markets.

The Open Interest Story: Building the Powder Keg

Real-Time Leverage Measure. Open interest - the total value of outstanding derivative contracts - serves as a real-time measure of leverage in the system. In 2025, BTC open interest told a story of building fragility that culminated in October's cascade.

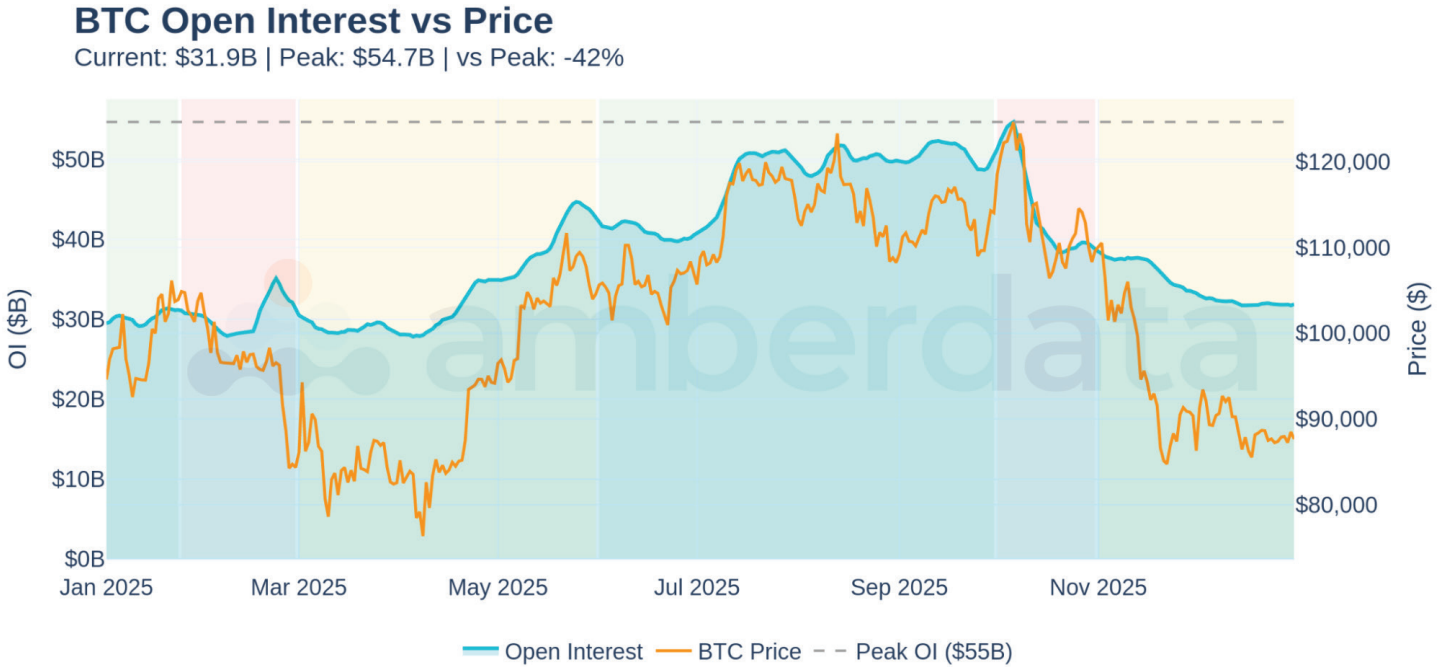


Figure 7.1: BTC Open Interest vs Price - Note the divergence between OI peak ($54.7B) and price peak. Leverage accumulated faster than price appreciation - a classic fragility indicator.

The Build Phase (R1-R4). Open interest climbed steadily from $30B at year start to $54.7B peak during R4 (Institutional Expansion). This 82% increase represented the largest aggregate leverage position in Bitcoin history.

Average OI by Regime. How open interest evolved across 2025:

- **R1 Policy Euphoria:** $30.2B
- **R2 Security Shock:** $30.5B
- **R3 Infrastructure Build:** $33.2B
- **R4 Institutional Expansion:** $47.4B

The steady build reflected growing institutional participation and retail speculation converging into a single directional bet.

One-Sided Positioning. What made this build particularly dangerous was its one-sided nature. Long positions dominated, creating asymmetric liquidation risk. When everyone is positioned the same way, there is no natural buyer for forced selling - only more forced selling.

$54.7B

Peak open interest reached during R4 (August-September). The largest aggregate leverage position in Bitcoin history - and the fuel for October's cascade.

The Collapse. October's correction triggered forced liquidations that reduced OI by 42% from peak. Current open interest sits at $31.9B - below where the year started. This represents genuine deleveraging, not temporary position reductions.

The OI collapse pattern reveals cascade mechanics. Initial price decline triggers margin calls. Forced closures add selling pressure. Lower prices trigger more margin calls. The feedback loop continues until leverage is purged from the system. October proved this mechanism operates at unprecedented scale in modern crypto markets.

SO WHAT?

Open interest levels relative to historical averages serve as a fragility indicator. When OI significantly exceeds prior peaks, the system is primed for cascade risk. Current OI at $31.9B (42% below peak) represents meaningfully reduced systemic risk - but also reduced speculative appetite for the next move.

Funding Rates: The Sentiment Indicator That Warned

Cost of Leverage. Perpetual futures funding rates reflect the cost of holding leveraged positions. Positive funding means longs pay shorts - indicating bullish positioning dominance. The magnitude of funding reveals how crowded that positioning has become.

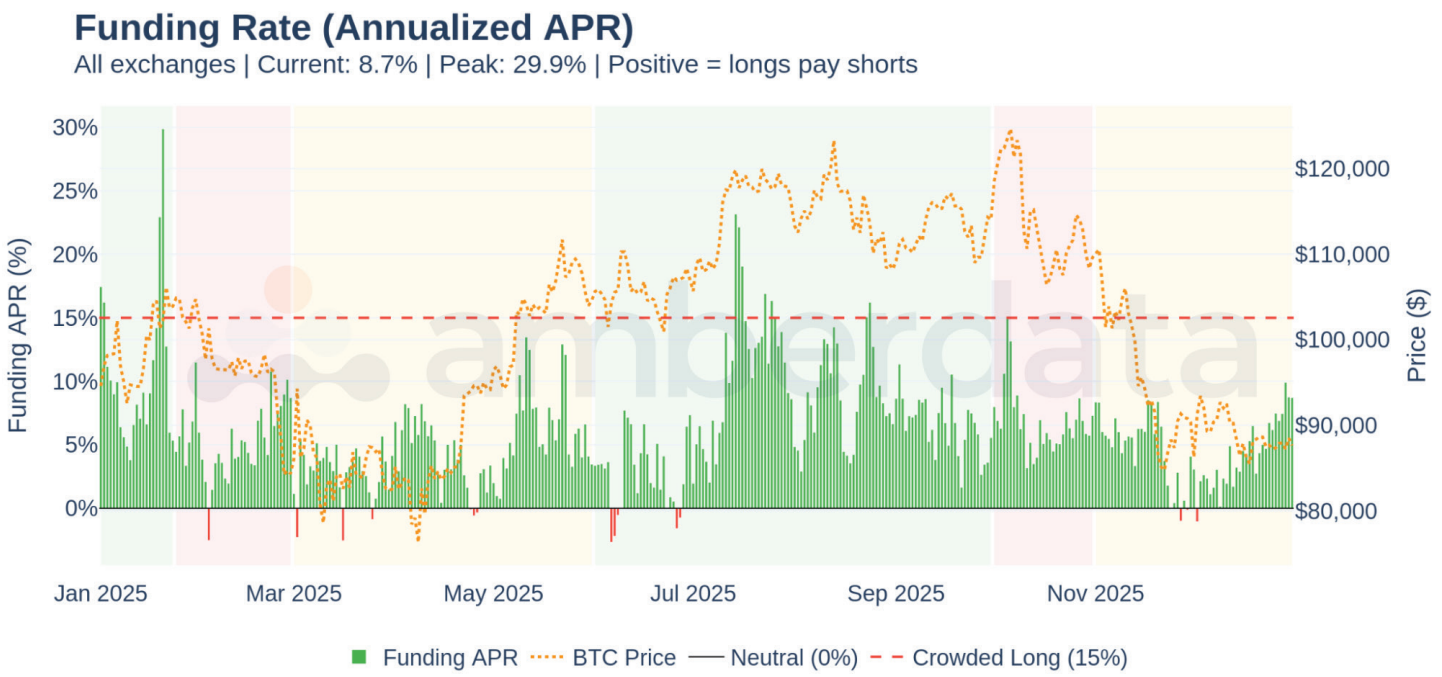


Figure 7.2: Funding Rate (Annualized APR) - Funding exceeded 15% (crowded long territory) repeatedly during R4. The persistence of elevated funding preceded the October correction by weeks.

The Warning Threshold. Funding rates above 15% APR historically signal crowded long positioning. During R4, funding peaked at 29.9% APR - nearly double the warning threshold. This wasn't a brief spike but sustained elevation across multiple weeks.

Interpretation Framework. How to read funding rates:

Above 15%: Crowded longs - warning signal

5-15%: Bullish sentiment

0-5%: Neutral

Negative: Shorts paying - bearish positioning

Funding rates above 15% APR for extended periods have preceded every major correction in 2025. The signal was visible - the question was timing.

Regime Patterns. Average funding by regime reveals sentiment evolution:

- **R1 Policy Euphoria:** 10.6% (post-ETF euphoria)
- **R2 Security Shock:** 5.4% (Bybit shock reset)
- **R3 Infrastructure Build:** 4.4% (quiet building)
- **R4 Institutional Expansion:** 7.3% (accumulation - peak readings exceeded 29%)
- **R5 Macro Shock:** 6.8% (crash period)
- **R6 Fragile Recovery:** 4.5% (recovery caution)

Current Conditions. Current funding at 8.7% APR sits in neutral-to-bullish territory - elevated but not crowded. The deleveraging process reset positioning to sustainable levels. Traders are rebuilding exposure cautiously rather than aggressively.

The Liquidation Cascade: Anatomy of a Deleveraging Event

Total Liquidations. Total liquidations in 2025 reached $31.4B - with $19.0B (60%) coming from forced long closures. This asymmetry reveals the one-sided nature of positioning that preceded major corrections.

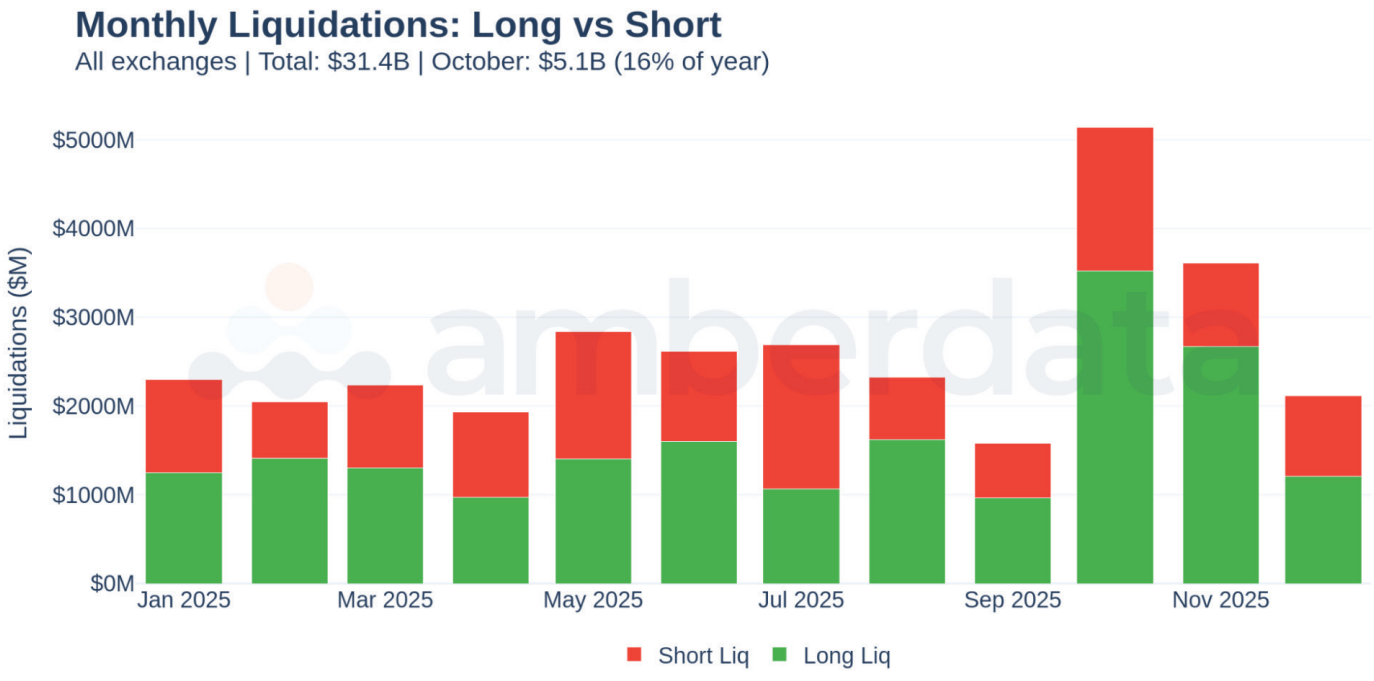


Figure 7.3: Monthly Liquidations: Long vs Short - October stands out with $5.1B in liquidations (16% of annual total). Note the consistent long-side dominance across most months.

86%

Percentage of October 10 liquidations from forced long closures. The market was catastrophically one-sided before the cascade began.

October 10: The Cascade Day. The single largest liquidation day in 2025 saw $2.3B in forced closures, with 86% from long positions. This concentration reveals how crowded long positioning had become. When the liquidation cascade began, there was only one direction for forced selling to flow.

Cascade Mechanics. The mechanics are straightforward but relentless: initial price drop triggers margin calls, forced closures add selling pressure, additional price decline triggers more margin calls, and the cycle continues until leverage is exhausted.

The speed of cascade propagation matters as much as magnitude. Modern exchange liquidation engines can process billions in forced closures within hours. This compressed timeline means traditional risk management approaches - waiting for support levels, scaling into positions - fail when cascades accelerate beyond human reaction time.

Top 10 Liquidation Days

All exchanges | October dominated | Long liquidations = 85%+ on worst days

Rank	Date	Total	Long	Short	Long %
1	2025-10-10	$2286M	$1962M	$324M	86%
2	2025-11-21	$595M	$471M	$124M	79%
3	2025-07-10	$432M	$11M	$421M	3%
4	2025-11-04	$379M	$336M	$42M	89%
5	2025-07-14	$377M	$48M	$329M	13%
6	2025-05-08	$374M	$21M	$353M	6%
7	2025-11-14	$322M	$280M	$42M	87%
8	2025-06-12	$318M	$310M	$8M	97%
9	2025-06-05	$315M	$292M	$23M	93%
10	2025-09-22	$314M	$299M	$15M	95%

Figure 7.4: Top 10 Liquidation Days - October 10 dominates at $2.3B - nearly 4x the second-largest day. The concentration of liquidation risk into a single event demonstrates cascade mechanics.

Liquidation Intensity. Liquidation intensity (daily liquidations / open interest) peaked at 4.82% during October - approaching the 5% threshold that indicates extreme cascade risk.

Intensity Thresholds. How to interpret liquidation intensity:

0.5-2%: Normal intensity

2-5%: Elevated - signals stress

Above 5%: Systemic cascade - forced selling overwhelms organic buying

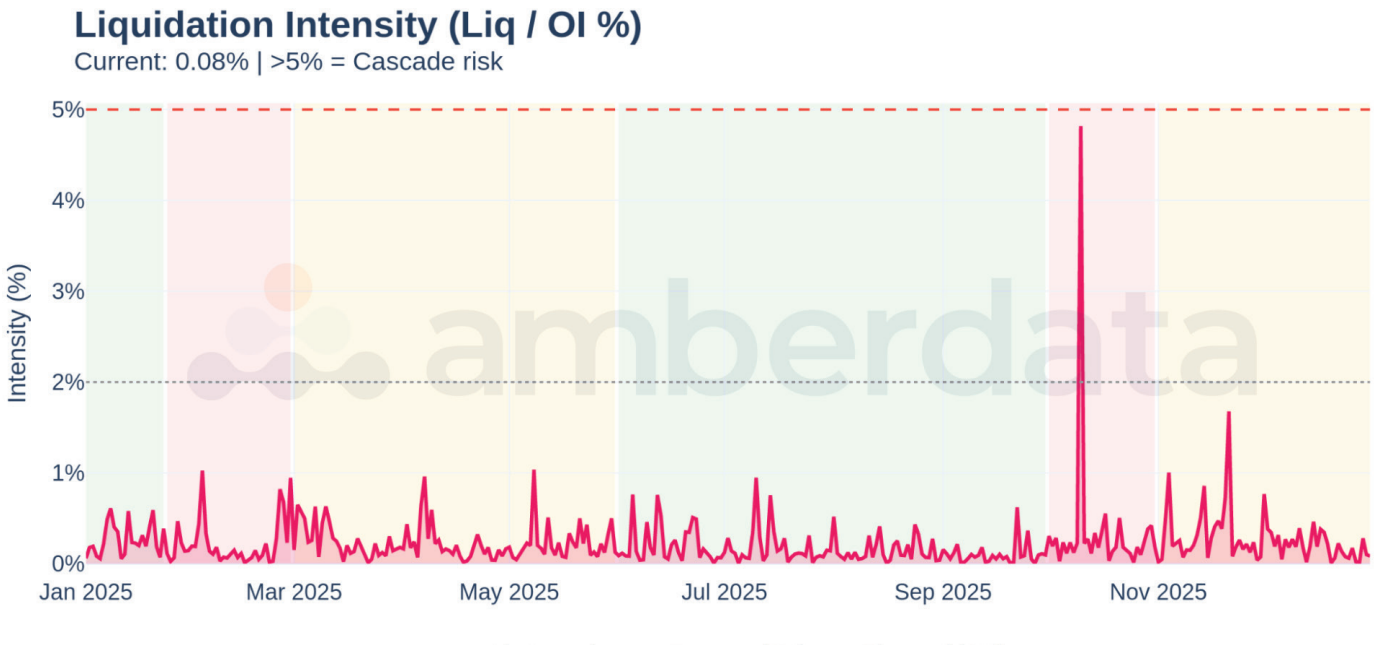


Figure 7.5: Liquidation Intensity (Liq / OI %) - The October spike to 4.82% intensity represents extreme stress - just below the 5% cascade threshold. Current readings at 0.08% indicate normalized conditions.

SO WHAT?

Liquidation intensity above 2% signals elevated stress; above 5% indicates potential cascade. Monitoring this ratio provides early warning of systemic risk. Current intensity at 0.08% reflects the post-deleveraging quiet - but also means the market lacks the fuel for sharp moves in either direction.

Exchange Concentration: Where Leverage Lives

Systemic Risk Sources. Understanding where open interest concentrates helps identify systemic risk sources. In 2025, leverage remained concentrated across a handful of major venues.

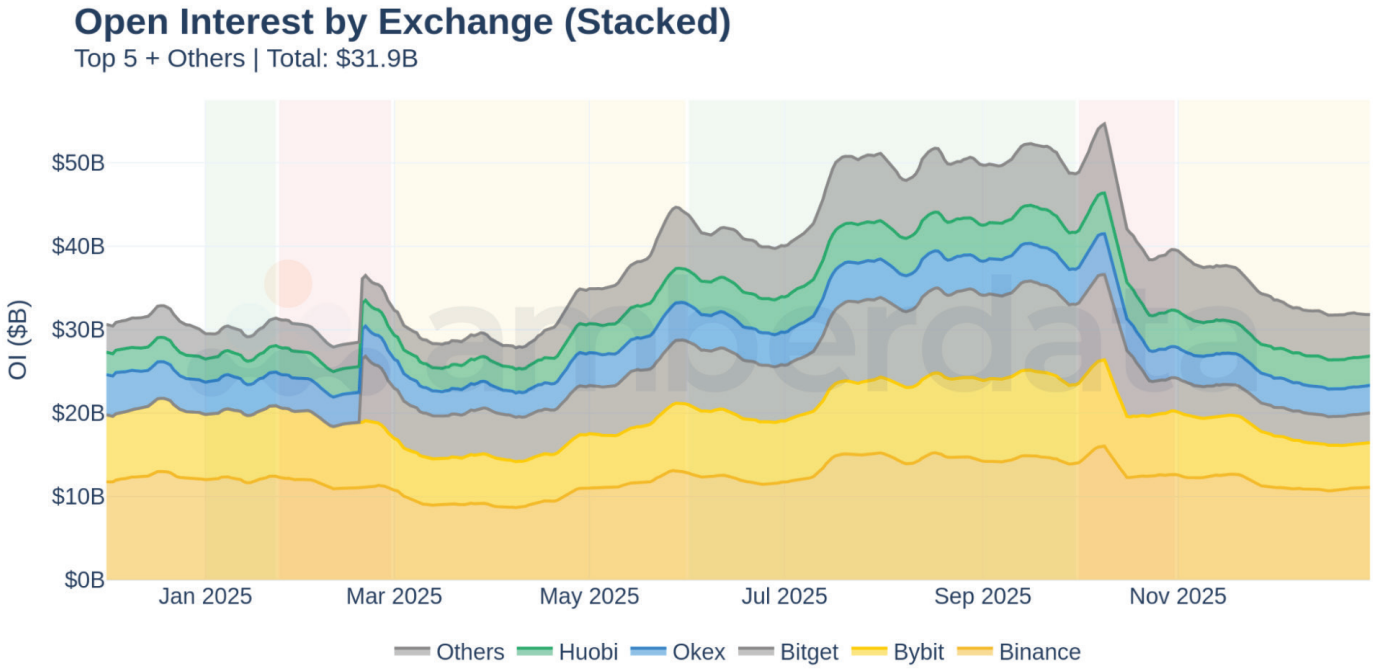


Figure 7.6: Open Interest by Exchange - Binance dominates with $11.1B (35% share). Top 5 exchanges account for 85%+ of total BTC futures OI.

Binance Dominance. Binance maintains the largest share of BTC open interest at $11.1B - approximately 35% of total. This concentration means Binance liquidation engine behavior significantly impacts market-wide cascade dynamics. When Binance begins processing large-scale liquidations, the selling pressure propagates to other venues through arbitrage and crosses order books.

Exchange Distribution. BTC futures open interest by exchange:

- **Binance:** $11.1B (35%)
- **Bybit:** $5.5B
- **Bitget:** $3.5B
- **OKX:** $3.5B
- **Huobi:** $3.5B
- **Others:** $4.8B

Together, the top five exchanges account for 85%+ of BTC futures open interest. The concentration among top venues creates both risks and opportunities - risks from correlated liquidation cascades, opportunities from cross-exchange arbitrage during stress events.

Cascade Propagation. Exchange concentration creates correlated liquidation risk. When cascades begin on major venues, they propagate across smaller exchanges through price arbitrage. The interconnected nature of crypto derivatives means no venue operates in isolation - price dislocations on one exchange create arbitrage opportunities that transmit selling pressure across the entire market.

For risk managers, this concentration suggests monitoring the top five exchanges provides sufficient coverage for systemic risk. Unusual activity patterns on these venues - sudden OI spikes, funding rate divergences, or liquidation clusters - often precede broader market moves.

Leverage by Regime: The Full Picture

Positioning Evolution. Mapping leverage metrics to the year's six regimes reveals how positioning evolved through different market conditions.

Leverage Summary by Regime

R4 = Peak leverage | R5 = Cascade | R6 = Subdued

Regime	Name	Period	Avg OI	Avg Funding	Total Liq	Long Liq %
R1	Policy Euphoria	01-01 → 01-23	$30.2B	10.6%	$1875M	53%
R2	Security Shock	01-24 → 02-28	$30.5B	5.4%	$2467M	67%
R3	Infrastructure Build	03-01 → 05-31	$33.2B	4.4%	$7011M	53%
R4	Institutional Expansion	06-01 → 09-30	$47.4B	7.3%	$9213M	57%
R5	Macro Shock / Cascade	10-01 → 10-31	$44.0B	6.8%	$5144M	68%
R6	Fragile Recovery	11-01 → 12-31	$34.2B	4.5%	$5723M	68%

Figure 7.7: Leverage Summary by Regime - R4 shows peak OI ($47.4B avg) with elevated funding (7.3%), setting up October's liquidation concentration. R6 shows meaningful deleveraging.

R1 - Policy Euphoria. OI $30.2B average, funding 10.6% APR, liquidations $1.9B. Post-ETF launch excitement drove elevated funding, but OI remained moderate. Liquidations stayed contained.

R2 - Security Shock. OI $30.5B average, funding 5.4% APR, liquidations $2.5B. The Bybit hack triggered brief deleveraging. Funding reset to neutral as optimism cooled.

R3 - Infrastructure Build. OI $33.2B average, funding 4.4% APR, liquidations $7.0B. Gradual leverage rebuild began. Funding stayed neutral as traders rebuilt positions cautiously.

R4 - Institutional Expansion. OI $47.4B average, funding 7.3% APR, liquidations $9.2B. The build-up phase. OI reached record highs as institutions accumulated. Funding elevated but not extreme on average - though peak readings exceeded 29%.

R5 - Macro Shock. OI $44.0B average, funding 6.8% APR, liquidations $5.1B. The cascade period. Despite fewer days, October's concentrated liquidations represented extreme intensity.

R6 - Fragile Recovery. OI $34.2B average, funding 4.5% APR, liquidations $5.7B. Deleveraging continued through year-end. Positioning remains cautious with funding in neutral territory.

R4's record open interest ($47.4B average) combined with crowded long positioning created the conditions for October's cascade. The leverage existed - the catalyst was simply a matter of timing.

2026 Implications: Monitoring Leverage Risk

Baseline Metrics. The 2025 leverage cycle provides baseline metrics for monitoring systemic risk going forward. Several key thresholds emerged from this year's experience.

OI Thresholds. Current OI at $31.9B represents 58% of peak. Recovery above $45B would signal renewed leverage build-up. Sustained readings above $50B should trigger heightened risk awareness.

Funding Warnings. Persistent funding above 15% APR preceded October's correction. Brief spikes are normal; sustained elevation (14+ days above threshold) historically precedes corrections.

Intensity Monitoring. Liquidation intensity above 2% signals stress. Above 5% indicates cascade risk. Current readings at 0.08% reflect post-deleveraging calm. Establishing baseline intensity levels during quiet periods helps calibrate alerts for when readings elevate.

Exchange Concentration Risk. With 85%+ of OI concentrated on five exchanges, monitoring the largest venues provides sufficient coverage for systemic risk assessment. Unusual activity patterns on Binance, in particular, deserve immediate attention given its 35% market share.

The deleveraging of 2025 created healthier market structure. Lower aggregate leverage means reduced cascade risk - but also reduced fuel for sharp rallies. The market must rebuild speculative positioning before the next major move, which takes time and requires sustained directional conviction. This rebuilding process is already underway, but OI remains well below the levels that preceded October's cascade.

THE BOTTOM LINE

Leverage is the amplifier. Without October's $54.7B in peak open interest, the cascade couldn't have reached $31.4B in annual liquidations. The 2025 experience demonstrated that crowded positioning (86% long liquidations on cascade day), persistent funding warnings (29.9% peak APR), and concentrated exchange exposure (Binance 35% share) combine to create systemic fragility. Current OI at $31.9B (-42% from peak) represents genuine deleveraging. The market is structurally healthier - but that health came at the cost of $31B in forced liquidations.

This analysis builds on (S5)'s examination of carry trade mechanics (how basis compression forced arbitrage unwinds that added to liquidation pressure) and (S6)'s liquidity analysis (the order book conditions that allowed cascades to propagate so rapidly).

From here, (S8) examines the flow consequences: where capital moved during and after the deleveraging event, including ETF outflows that proved to be arbitrage unwinds rather than fundamental selling. (S14) incorporates these leverage metrics into 2026 risk scenarios.

Following the Flows: ETFs, Stablecoins, and Where Capital Actually Went

$29.3B in ETF inflows, $77B in stablecoin growth, and the October outflow that wasn't what it seemed

KEY TAKEAWAYS

- **$29.3B in net ETF inflows YTD.** Despite October's headlines about institutional exodus, spot Bitcoin ETFs accumulated 257,285 BTC - approximately 7% of total supply now sits in ETF custody.
- **October outflows were arbitrage unwinds, not capitulation.** Basis compression from 15%+ to under 5% forced mechanical position closures. Understanding this distinction separated informed traders from reactive ones.
- **Stablecoin supply hit $269B - record dry powder.** A $77.3B YTD expansion signals capital staged and ready for deployment. Stablecoin minting often precedes BTC rallies.
- **Two issuers dominate the flow story.** BlackRock ($24B) and Fidelity ($9.8B) captured virtually all net new institutional capital, while GBTC saw $4B in outflows as fee-sensitive capital rotated.

In October, ETF headlines screamed "institutional exodus." The numbers looked damning - billions flowing out of spot Bitcoin ETFs during one of the year's sharpest corrections. Financial media framed it as smart money abandoning ship.

They got the story wrong.

The outflows were mechanical - basis arbitrage positions unwinding as the carry trade collapsed from 15%+ APR to under 5%. This was not fundamental selling. Understanding the difference was the edge that separated reactive trading from informed positioning. This section follows the money: where it came from, where it went, and what the flow patterns reveal about 2026.

The ETF Story: What $29.3 Billion Tells Us

Structural Transformation. The headline number - $29.3 billion in cumulative net inflows - understates the structural transformation that occurred in 2025. For perspective, this represents 257,285 BTC absorbed by institutional vehicles, approximately 7% of Bitcoin's circulating supply now sitting in regulated ETF custody.

257,285 BTC

Total BTC accumulated by spot ETFs in 2025 - approximately 7% of circulating supply now held in institutional custody.

Consistent Demand. The flow pattern revealed consistent institutional demand. Of 305 trading days, 195 (64%) saw net inflows while only 110 (36%) saw outflows. This asymmetry matters: institutional buyers maintained accumulation pressure through multiple volatility regimes, corrections, and macro shocks.

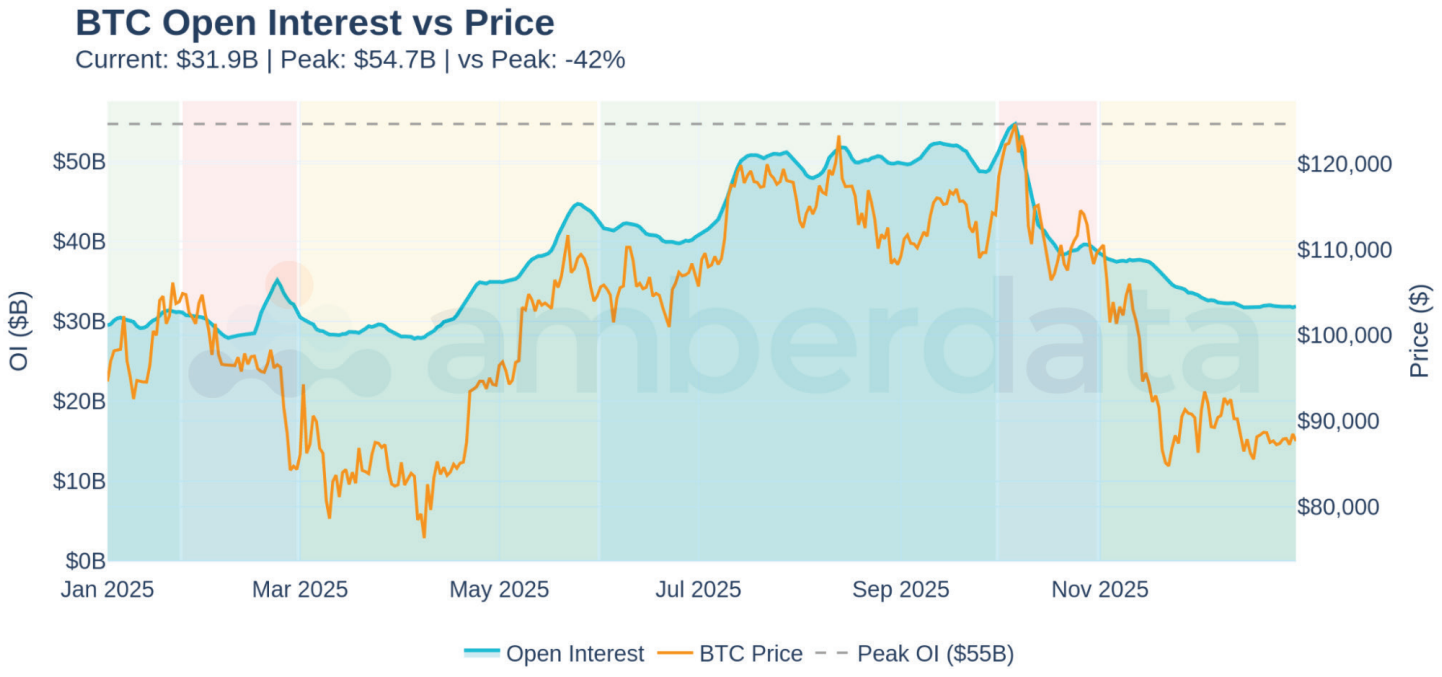


Figure 8.1: BTC ETF Cumulative Flows vs Price - Note the steady accumulation trend despite price volatility. The gap between price peaks and flow peaks reveals systematic buying behavior rather than performance chasing.

The January Surge. ETF approval euphoria drove record volumes exceeding $4.6 billion daily in January's opening weeks. This initial burst captured pent-up institutional demand that had accumulated during years of regulatory uncertainty.

The Infrastructure Build. July brought in-kind redemptions approval, a seemingly technical change with profound implications. Market makers could now arbitrage ETF premiums more efficiently, tightening spreads and improving execution for all participants.

The August Milestone. By August, aggregate AUM across 76 Bitcoin ETPs globally reached $156 billion. The spot Bitcoin ETF complex had become the most successful ETF launch in history by capital raised in the first year.

SO WHAT?

ETF flows represent a fundamental shift in Bitcoin's market structure. With 7% of supply now in institutional custody, the marginal price setter has changed. Tracking ETF flows provides insight into how the largest market participants are positioned - information that was previously invisible to retail traders.

October's Misunderstood Outflows: Arbitrage vs Capitulation

Misleading Headlines. October's outflows triggered alarming headlines. Multiple days saw hundreds of millions flowing out of spot ETFs. The surface narrative was compelling: institutions were fleeing Bitcoin during a market correction. This interpretation missed the mechanism entirely.

The October ETF outflows were not institutional capitulation - they were mechanical arbitrage unwinds forced by basis compression. The distinction was worth billions in alpha for those who understood it.

The Basis Arbitrage Mechanism. Throughout 2025's first three quarters, basis traders captured 15%+ annualized yields by holding spot Bitcoin in ETFs while shorting futures. This "cash and carry" trade was one of the most reliable institutional strategies in crypto. When October's volatility compressed basis to under 5%, the trade's economics inverted.

Basis arbitrage unwinds require selling the spot position (ETF redemptions) while covering the short futures position. From outside, this looks identical to fundamental selling. The distinction: arbitrage unwinds are mechanical responses to changed economics, not judgments about Bitcoin's value.

15% → 5%

Basis APR compression that triggered mechanical arbitrage unwinds. The carry trade economics, not fundamental views, drove October's ETF outflows.

What the Flows Actually Showed. Regime-level analysis reveals the pattern. R4 (Institutional Expansion, through September) saw $15.16 billion in inflows - the peak of institutional accumulation. R5 and R6 combined saw mixed flows as arbitrage positions unwound and then partially rebuilt.

The Key Evidence. GBTC, which has minimal basis arbitrage activity due to its structure, saw proportionally smaller outflows than lower-fee ETFs favored by arbitrageurs. If the outflows represented fundamental selling, GBTC would have led given that its higher fee structure creates stronger exit incentives for long-term holders. The opposite pattern confirms the arbitrage interpretation.

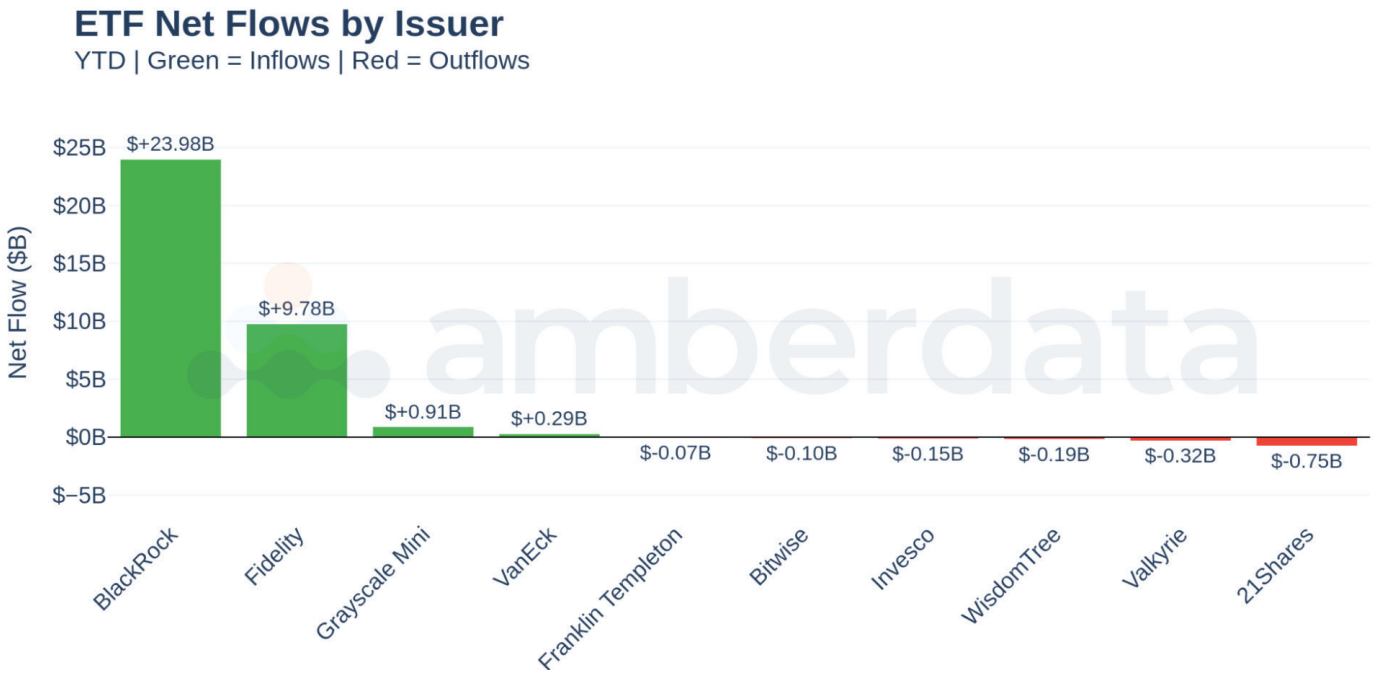


Figure 8.2: Monthly ETF Net Flows - October's outflows visible in context of full year. Note the magnitude relative to cumulative inflows - the "exodus" represented a fraction of YTD accumulation.

Issuer Dynamics: The Winner-Take-Most Competition

Market Consolidation. The ETF issuer landscape consolidated rapidly. Two names captured the vast majority of net new capital, while the rest fought for scraps or experienced outflows.

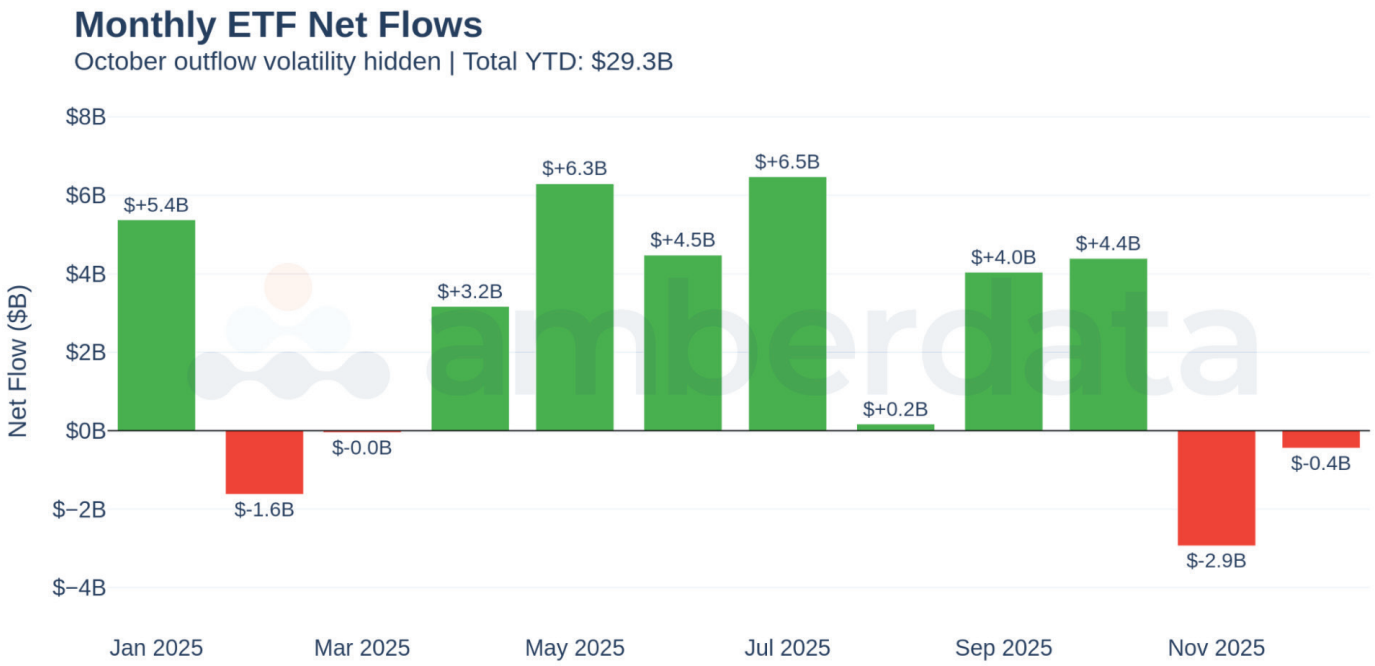


Figure 8.3: ETF Net Flows by Issuer - BlackRock and Fidelity dominate genuine net new flows.

BlackRock's IBIT: $23.98 billion. The world's largest asset manager captured 82% of net new ETF flows. IBIT's advantages compound: brand recognition, liquidity depth, and distribution access through BlackRock's institutional relationships. The Aladdin platform integration gave advisors seamless portfolio allocation tools.

Fidelity's FBTC: $9.78 billion. Fidelity secured the second position with strong retail distribution. Their self-custody model - holding BTC on Fidelity infrastructure rather than using Coinbase - appealed to investors with custody preferences.

The Long Tail. Everyone else combined for minimal to negative net flows. Grayscale Mini captured $0.91B, but this largely represented internal transfers from GBTC. VanEck, Franklin Templeton, Bitwise, WisdomTree, Invesco, Valkyrie, and 21Shares all saw net outflows or minimal positive flows.

82%

Share of net new ETF capital captured by BlackRock's IBIT. The ETF competition quickly became a duopoly.

SO WHAT?

The ETF market has consolidated into a duopoly with BlackRock and Fidelity commanding 80%+ market share of flows. For traders monitoring institutional positioning, this simplifies analysis - tracking IBIT and FBTC flows provides most of the signal. The distribution advantages of these two firms suggest further consolidation is likely.

Stablecoin Supply: The $269 Billion Dry Powder Indicator

Broader Capital View. While ETF flows capture institutional positioning in Bitcoin specifically, stablecoin supply provides a broader view of crypto-ready capital. At $269.4 billion, stablecoin supply reached all-time highs in 2025, up $77.3 billion year-to-date.

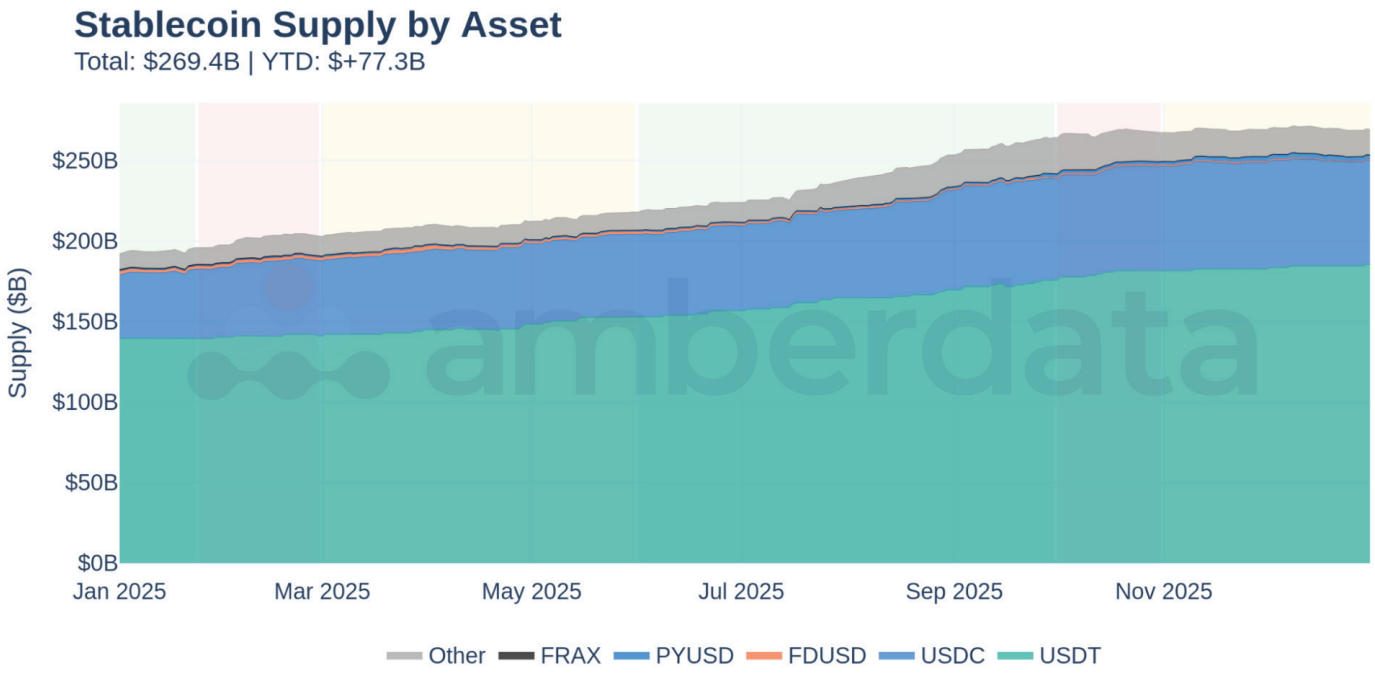


Figure 8.4: Stablecoin Supply by Asset - USDT dominates at $185.6B (69%), followed by USDC at $64.6B (24%). The expansion pattern shows capital staged and ready for deployment.

Stablecoin Distribution. Market share across stablecoin issuers:

USDT: $185.6B (69% share) - primary trading pair across offshore exchanges
USDC: $64.6B (24% share) - regulated alternative for institutional demand
PYUSD: $2.7B - PayPal's fintech entry
Others: $15.9B - FDUSD, FRAX, and specialized use cases

Stablecoin supply at $269 billion represents the largest-ever pool of crypto-ready capital. When conviction returns, this dry powder deploys rapidly.

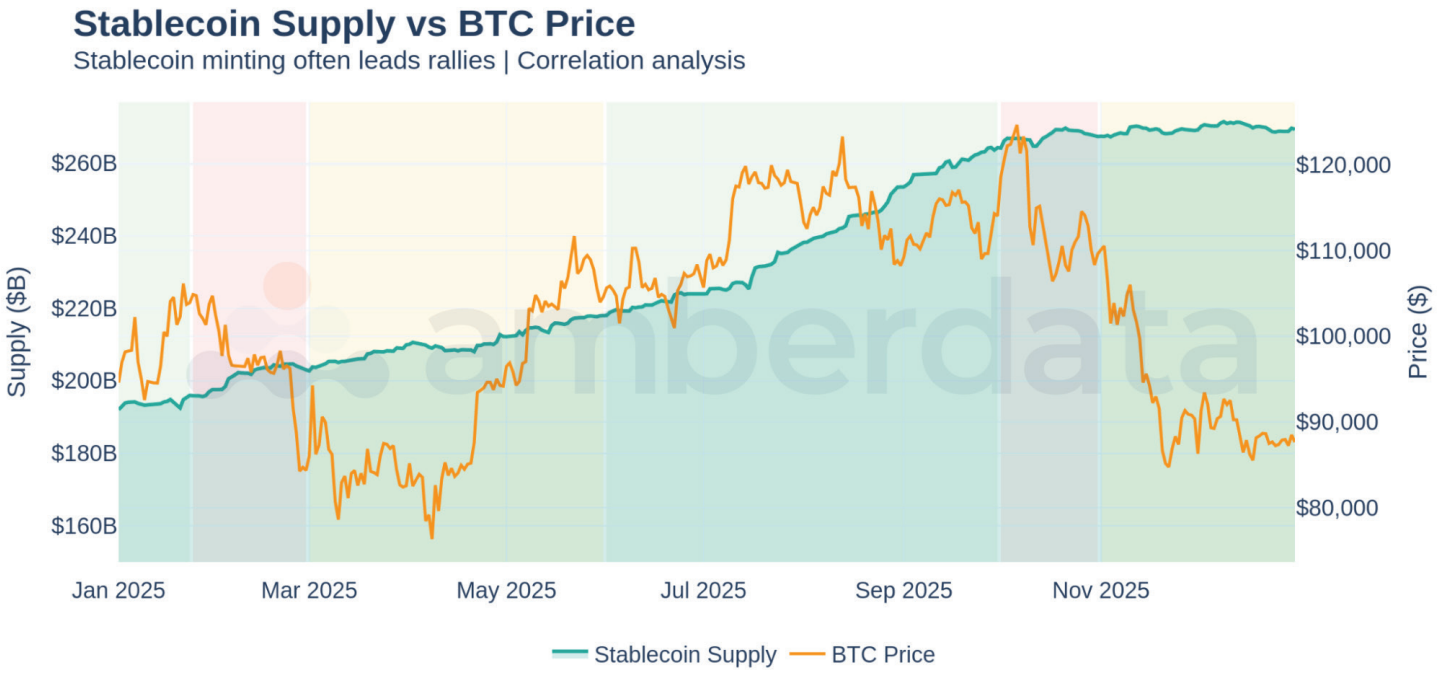


Figure 8.5: Stablecoin Supply vs BTC Price - Note the leading indicator relationship - stablecoin expansion often precedes BTC rallies as capital stages before deployment.

The Leading Indicator Pattern. Historically, stablecoin minting precedes Bitcoin rallies. The mechanism is straightforward: investors convert fiat to stablecoins before deploying into risk assets. Rising stablecoin supply without corresponding price appreciation suggests capital accumulating on the sidelines.

The current $77.3B YTD expansion - a 40% increase - represents one of the largest-ever stablecoin growth periods. Much of this capital remains undeployed, parked in yield strategies or waiting for entry points. When macro conditions or crypto catalysts align, this dry powder can deploy rapidly, amplifying price moves.

Flow Patterns by Regime: When Capital Moved

Institutional Response. Mapping ETF flows to the year's six market regimes reveals how institutional capital responded to different market conditions.

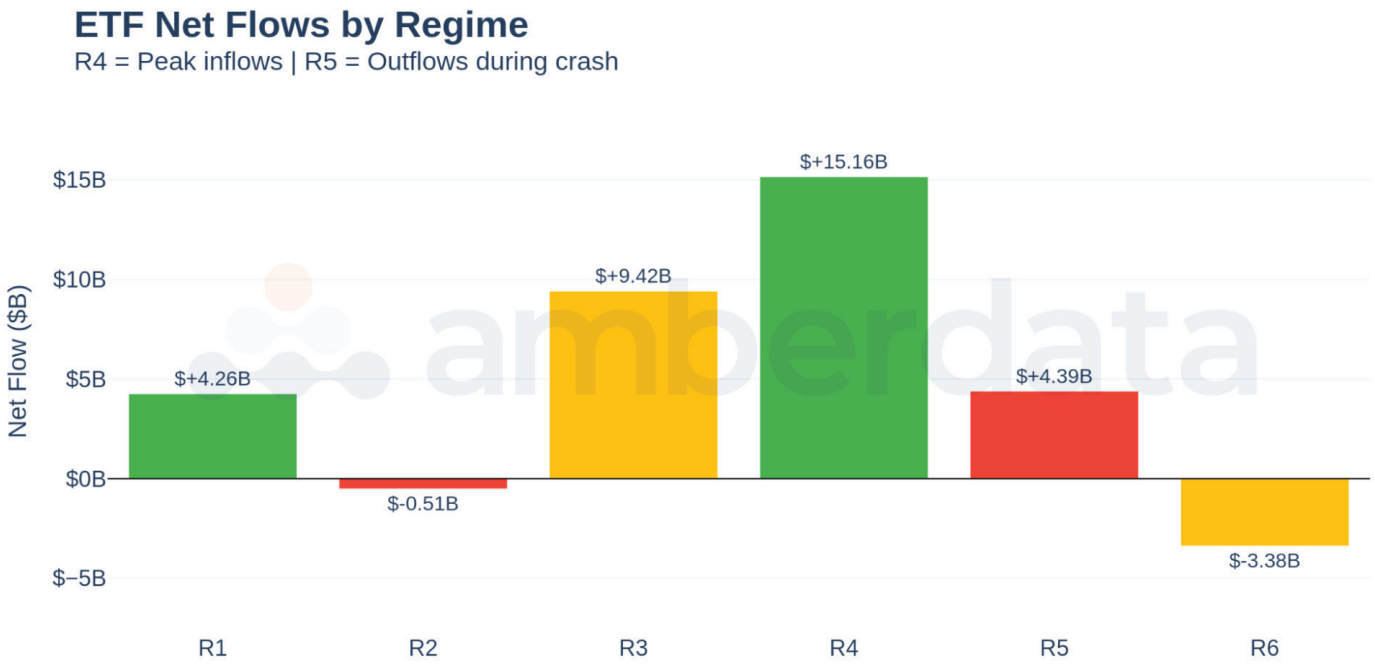


Figure 8.6: ETF Net Flows by Regime - R4 (Institutional Expansion) dominates with $15.16B - peak institutional accumulation. R5/R6 shows mixed flows during and after the October correction.

ETF Flows by Regime. How capital moved across 2025's six phases:

- **R1 Policy Euphoria:** +$4.26B - ETF launch momentum drove initial accumulation
- **R2 Security Shock:** -$0.51B - Bybit incident triggered brief, contained outflows
- **R3 Infrastructure Build:** +$9.42B - steady accumulation, in-kind redemptions improved structure
- **R4 Institutional Expansion:** +$15.16B - peak inflows, positive feedback loop with price
- **R5 Macro Shock:** +$4.39B - net positive despite headlines about outflows
- **R6 Fragile Recovery:** -$3.38B - arbitrage unwinds and year-end rebalancing

SO WHAT?

Institutional flows respond to regime changes with a lag. The R4 peak came during price strength, not before it. This confirms that large allocators are generally price takers rather than price setters - they respond to established trends rather than anticipating reversals. Understanding this timing pattern helps calibrate expectations for flow-driven moves.

2026 Implications: What Flow Patterns Signal

Baseline Metrics. The 2025 flow data provides baseline metrics for monitoring 2026 positioning. Several key thresholds emerge from this year's patterns.

ETF Flow Thresholds. Sustained inflows exceeding $1B/week characterized strong accumulation phases. Below $500M/week suggested institutional pause. Outflow weeks exceeding $2B signaled either arbitrage unwinds or genuine de-risking.

Stablecoin Supply Levels. The $269B base represents unprecedented dry powder. Weekly minting exceeding $5B suggests accelerating institutional preparation. Supply contraction would signal capital rotation out of crypto entirely.

Issuer Concentration. BlackRock and Fidelity will likely maintain flow dominance. Watching their flows provides the clearest read on institutional positioning. Secondary issuers may see further outflows as the duopoly consolidates.

The structural shift of 2025 - 7% of supply is now in ETF custody - creates new market dynamics. Institutional flows are now large enough to move prices directly, not just reflect sentiment. This amplifies both rallies and corrections, creating faster, more volatile price discovery than the pre-ETF era.

THE BOTTOM LINE

The 2025 ETF flow narrative was misread in real-time. What headlines called institutional exodus was mechanical arbitrage unwinding. The actual story: $29.3B in net accumulation, 257,285 BTC absorbed, 7% of supply now in institutional custody. Stablecoin supply at $269B represents record dry powder staged for deployment. BlackRock and Fidelity dominate the institutional access points. The infrastructure for the next institutional wave is built and tested. The flow data says one thing clearly: institutional infrastructure is expanding, not contracting.

This analysis builds on (S5)'s examination of the ETF-basis connection (how basis arbitrage mechanics created the October "outflows") and (S7)'s derivatives positioning data (which provided the leverage context for understanding forced unwinds).

From here, (S9) examines the on-chain perspective: where did the Bitcoin go? HODL wave analysis and balance bucket rotation reveal whether ETF accumulation represented new market participants or existing holder rotation. (S14) projects these flow patterns forward to construct 2026 scenarios.

The Great Rotation: Who Bought Bitcoin's Dip and Why It Matters

HODL waves, balance buckets, and the wealth transfer that defined 2025

KEY TAKEAWAYS

- **Mega Whales accumulated aggressively.** +123,173 BTC (+4.41%) during the October drawdown, buying what retail was panic-selling at the fastest pace of the year.
- **Retail distributed throughout 2025.** -15,330 BTC left the smallest wallet cohorts as small holders sold both into strength and capitulated into weakness.
- **The 5+ year cohort held steady.** Diamond hands didn't sell despite 100%+ gains and October's volatility. These holders survived 2017, 2021, and 2022 - they're not leaving.
- **Classic bull market rotation.** Supply moved up the wealth ladder from weak hands (retail, STH) to strong hands (whales, LTH). This pattern historically precedes major rallies.

While ETFs reported outflows and headlines declared capitulation, on-chain data told a different story. Mega Whales added 123,173 BTC. The 5+ year cohort held steady. Retail sold. This wasn't a crisis of confidence - it was a wealth transfer.

The 2025 market delivered no shortage of drama. October brought a 26% drawdown that triggered panic across traditional media. ETF flows turned negative. Social sentiment collapsed. But the blockchain tells a more nuanced story - one of conviction divergence, where sophisticated holders accumulated aggressively while retail capitulated at precisely the wrong moment.

This section examines the on-chain evidence of what we call "The Great Rotation" - the systematic transfer of Bitcoin from weak hands to strong hands that occurred throughout 2025, accelerating during periods of maximum fear. Understanding who bought, who sold, and why, provides critical context for interpreting 2026's market structure.

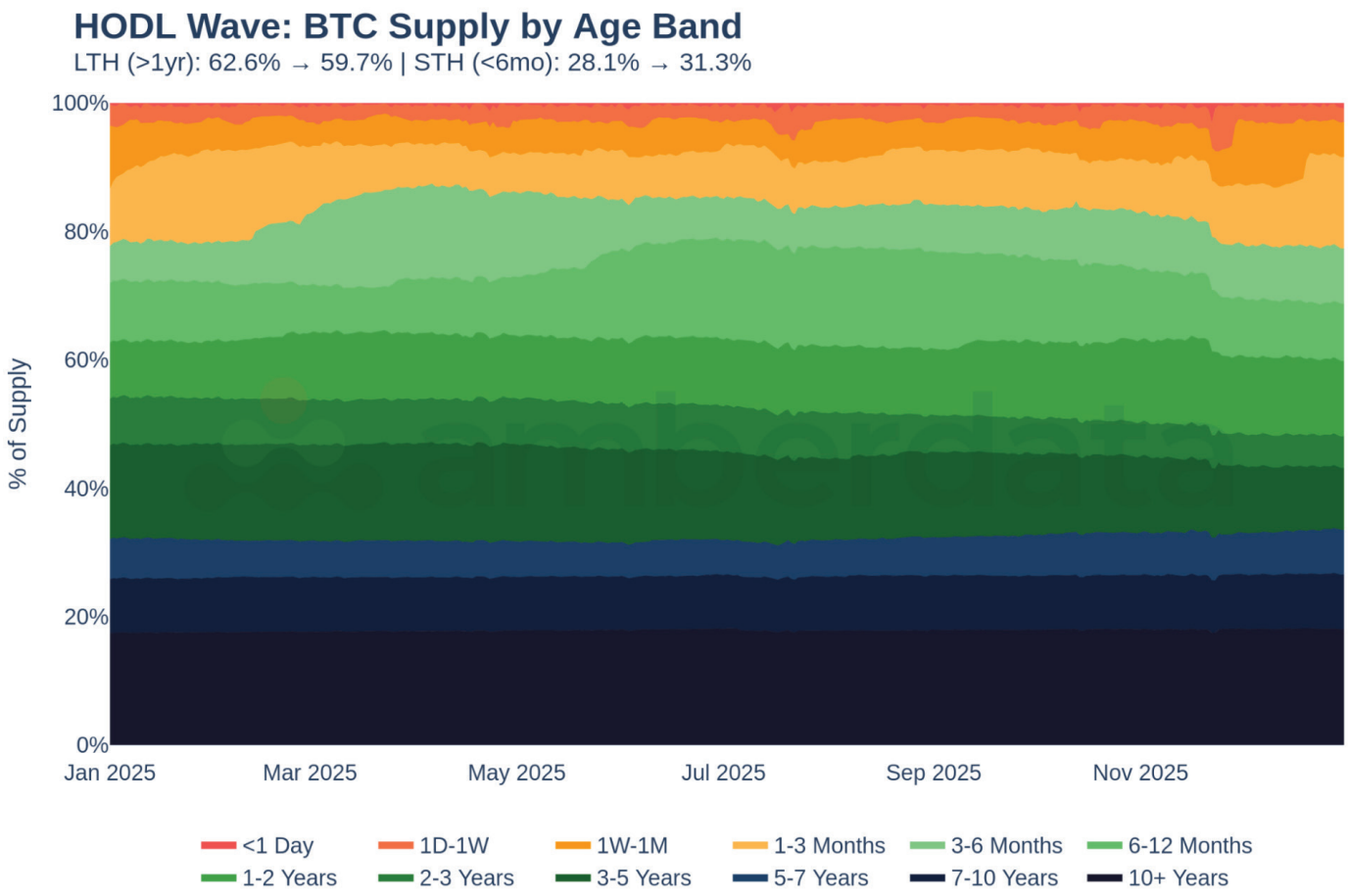


Figure 9.1: HODL Wave: BTC Supply by Age Band - Twelve age cohorts reveal holder conviction. Note the stability of the 5+ year bands (bottom) throughout 2025's volatility, while the 1-6 month bands (top) fluctuate with price action. The transition zone (6-12 months) shows the battleground between diamond hands and paper hands.

The HODL Wave Story: What Changed in 2025

Conviction Profile. HODL waves segment Bitcoin's circulating supply by the time since the coins last moved. Twelve distinct age bands - from coins moved within the past 24 hours to those dormant for over a decade - reveal the conviction profile of the market. When long-term holders distribute to short-term speculators, it signals potential tops. When short-term holders capitulate to long-term accumulators, it signals potential bottoms.

The Data. Long-term holders (LTH) - defined as wallets holding coins for more than one year - declined from 62.6% of supply at year-start to 59.7% by December, a 2.9 percentage point reduction. This wasn't panic selling. It was measured profit-taking from holders who bought during the 2022-2023 accumulation phase, now realizing gains as prices exceeded $100,000.

STH Increase. Simultaneously, short-term holders (STH) - coins held less than six months - increased from 28.1% to 31.3% of supply, a 3.2 percentage point gain. New buyers entered the market throughout the year, absorbing supply from those taking profits. The medium-term cohort (6-12 months) fluctuated most dramatically, serving as the transition zone where STH either graduated to LTH status or capitulated back to exchanges.

This STH increase reflected genuine new demand entering the market rather than mere speculation. On-chain velocity metrics showed these new buyers tended to acquire and hold rather than rapidly flip positions. The accumulation pattern suggested conviction buying - market participants who believed in the long-term thesis and were willing to build positions at prices previously considered cycle tops.

-2.9%

LTH supply change (62.6% to 59.7%). Not capitulation - measured profit-taking from 2022-2023 accumulators who found 100%+ gains too attractive to pass up.

What Didn't Happen. The 5+ year mega-holder cohort held remarkably steady throughout the year's volatility. These are holders who survived the 2017 bubble, the 2018 crash, the 2021 euphoria, and the 2022 collapse. They watched Bitcoin rise from four figures to six figures and back multiple times. October's 26% drawdown didn't move them. The subsequent rally didn't trigger distribution. They simply held.

This behavioral divergence is significant. The LTH decline came primarily from the 1-3 year cohort - holders who accumulated during the 2022-2023 bear market and found 100%+ gains too attractive to pass up. The oldest coins, representing the deepest conviction, remained locked. This suggests the rotation wasn't a cycle top distribution pattern, but rather a healthy rebalancing within the holder base.

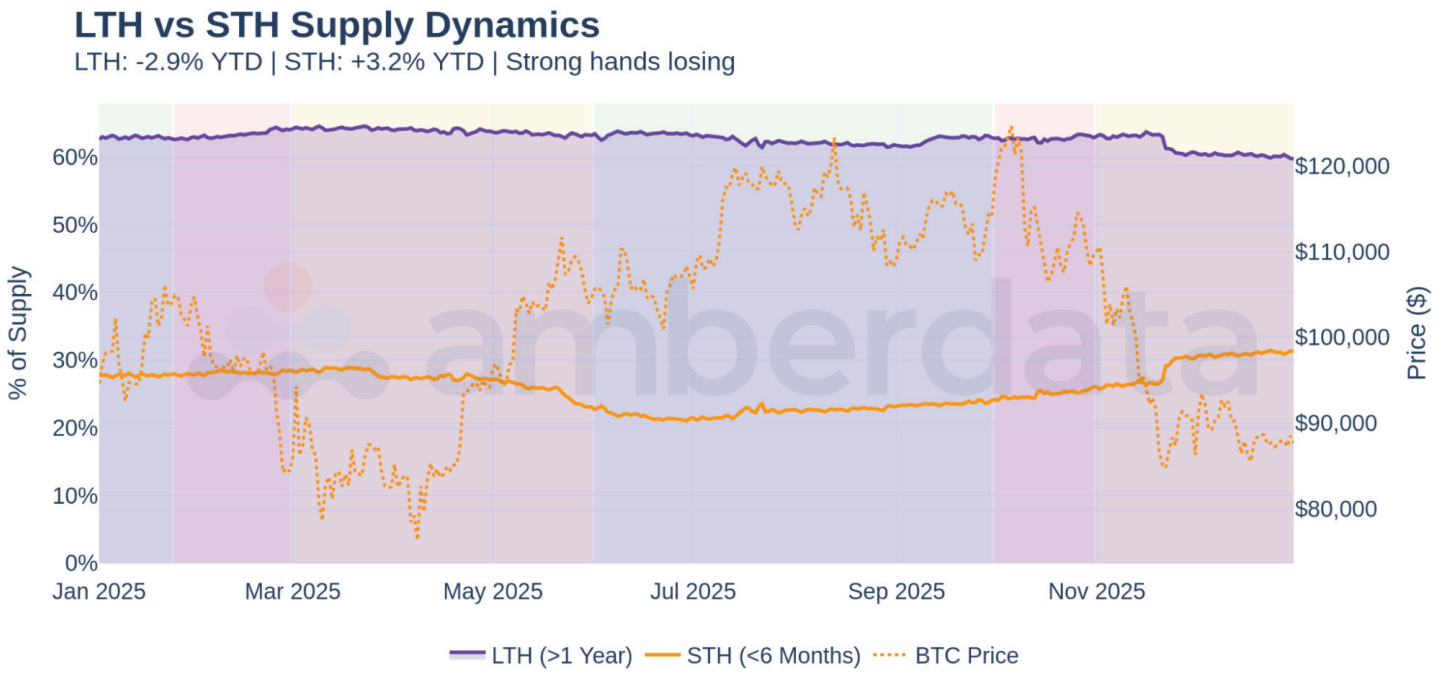


Figure 9.2: LTH vs STH Supply Dynamics - The inverse relationship reveals classic rotation: as LTH declines (profit-taking), STH rises (new buyers absorbing). Note the widening gap in October - STH capitulated while LTH held steady.

The Balance Bucket View: Who Bought, Who Sold

Holder Classification. While HODL waves reveal when coins last moved, balance buckets reveal who holds them. Addresses are categorized by their Bitcoin holdings:

- **Plankton:** <0.1 BTC
- **Shrimp:** 0.1-1 BTC
- **Crab:** 1-10 BTC
- **Fish:** 10-100 BTC
- **Shark:** 100-1K BTC
- **Whale:** 1K-10K BTC
- **Mega Whale:** 10K+ BTC

This classification system allows us to track the flow of wealth across holder cohorts.

The Pattern. The 2025 data reveals an unmistakable trend: supply moved systematically from small holders to large holders throughout the year. Mega Whales - addresses holding more than 10,000 BTC, representing institutional-scale positions - accumulated 123,173 BTC over the course of 2025, a 4.41% increase to their collective holdings. This accumulation accelerated during periods of maximum fear, with the October drawdown triggering the most aggressive buying.

The sheer scale of Mega Whale accumulation demands attention. At an average 2025 price of approximately $100,000, this represents over $12 billion in acquisitions. These aren't speculative trades - they're strategic allocations by entities with the resources and conviction to deploy capital at scale.

Perhaps more revealing than the total accumulation is its timing. Mega Whale buying didn't peak during price rallies when sentiment was positive. It peaked during corrections when sentiment was most negative. This countercyclical behavior demonstrates the informational and psychological advantages of institutional capital.

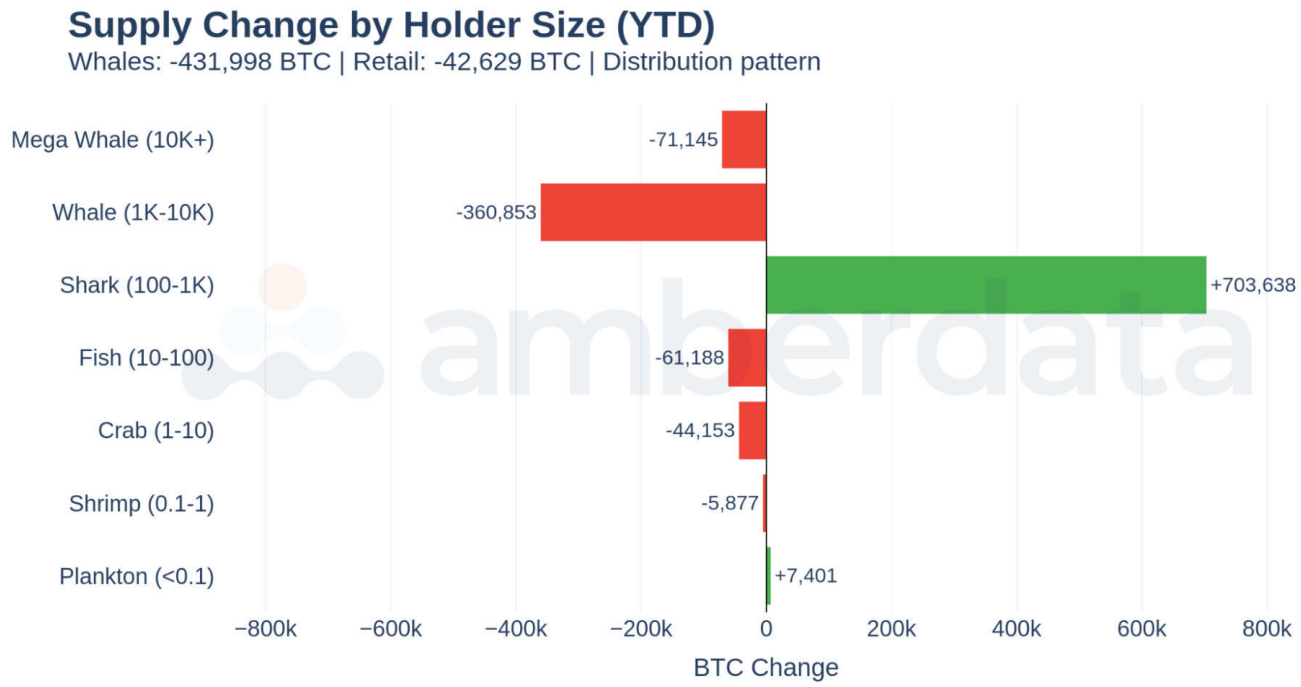


Figure 9.3: Supply Change by Holder Size (YTD) - Green bars (accumulation) dominate the right side (large holders) while red bars (distribution) dominate the left (retail). The wealth transfer is visible in a single chart.

Retail Distribution. On the opposite end of the spectrum, retail cohorts (Plankton, Shrimp, and Crab combined) distributed 15,330 BTC throughout the year. The pattern was consistent: small holders sold during price strength and capitulated during weakness, while whales accumulated in both conditions but particularly during corrections.

Retail distribution wasn't uniform across the year. The data shows two distinct phases: profit-taking during Q1 and Q2 as prices rallied, followed by panic selling during the October correction. In the first phase, small holders were selling into strength - a reasonable strategy for those with shorter time horizons. In the second phase, they were selling into weakness - the classic capitulation pattern that marks local bottoms and transfers supply to stronger hands.

+123,173 BTC

Mega Whale accumulation YTD (+4.41%). At an average 2025 price of ~$100K, this represents over $12 billion in strategic acquisitions during volatility.

Middle Cohorts. The Shark cohort (100-1K BTC) showed mixed behavior, with some addresses graduating to Whale status through accumulation while others distributed. Fish (10-100 BTC) generally accumulated, suggesting this cohort - often representing high-net-worth individuals or small funds - shared the institutional conviction pattern rather than the retail panic pattern.

While ETFs reported outflows, Mega Whales added 123,173 BTC. The Great Rotation wasn't visible in headlines - it was written on the blockchain.

The Great Rotation Thesis: Why This Pattern Matters

Wealth Transfer. The simultaneous data from HODL waves and balance buckets tells a coherent story we call "The Great Rotation." This isn't capitulation - it's wealth transfer. When retail sells and institutions buy, supply concentrates into fewer, stronger hands. When short-term holders panic and long-term holders accumulate, the market's conviction base strengthens even as its price weakens temporarily.

The mechanics of The Great Rotation are straightforward but their implications are profound. Every Bitcoin that moves from a retail wallet to an institutional cold storage address represents a fundamental shift in supply dynamics. Retail holders, on average, sell during volatility. Institutional holders, on average, accumulate during volatility. Over time, this behavioral asymmetry concentrates supply in addresses that won't sell except under extreme circumstances.

Figure 9.4: The Great Rotation: Weak to Strong - Sankey diagram showing supply flows from retail cohorts (left) to whale cohorts (right). The width of each flow represents BTC volume transferred.

The Mechanism. Supply held by conviction holders is effectively removed from the liquid market. Mega Whales don't sell at the first sign of volatility - they've demonstrated this repeatedly across multiple cycles. Each Bitcoin that moves from a retail wallet to an institutional cold storage address represents one fewer coin available to meet future demand.

Historical Precedent. This pattern has preceded significant rallies. The 2018-2019 bear market saw similar rotation, with whales accumulating at lows while retail capitulated. Following that rotation, Bitcoin rallied from $3,200 to $64,000. The 2022 bottom showed identical signatures - and Bitcoin subsequently rallied from $15,500 to over $100,000. The mechanism is consistent: concentrated supply + returning demand = amplified price moves.

The 2025 rotation occurred at higher price levels than previous cycles, suggesting institutional conviction now extends well above the $100,000 level. Mega Whales weren't just buying the dip - they were buying at prices that would have seemed absurd just two years prior. This behavioral shift indicates a maturing market where sophisticated capital views six-figure Bitcoin as a reasonable entry point rather than a speculative peak.

SO WHAT?

The Great Rotation is the on-chain story of 2025. Supply moved from weak hands (retail, short-term holders) to strong hands (whales, long-term holders) during volatility. This pattern historically precedes major rallies because it reduces liquid supply while increasing holder conviction. The 123,173 BTC accumulated by Mega Whales won't return to market quickly - they're playing a multi-year game.

The October Crash: Rotation in Action

Maximum Fear. October 2025 provided the clearest example of The Great Rotation in action. Bitcoin dropped 26% from its August highs, triggering a cascade of negative sentiment. Headlines declared the bull market dead. ETF outflows dominated the news cycle. Social media amplified the panic. On the surface, it appeared the market had lost conviction.

The fear was real and widespread. Crypto Twitter sentiment hit its lowest point of the year. Google searches for "Bitcoin crash" spiked. Mainstream financial media ran stories questioning whether the bull market was over. But sentiment indicators often peak precisely when smart money finds the best opportunities.

What the Blockchain Showed. Balance bucket data showed Mega Whales accelerating their accumulation precisely as fear peaked. While retail rushed for the exits, institutional-scale addresses added to positions at the fastest pace of the year. The 4.41% increase in Mega Whale holdings represents billions of dollars of patient capital absorbing the panic selling.

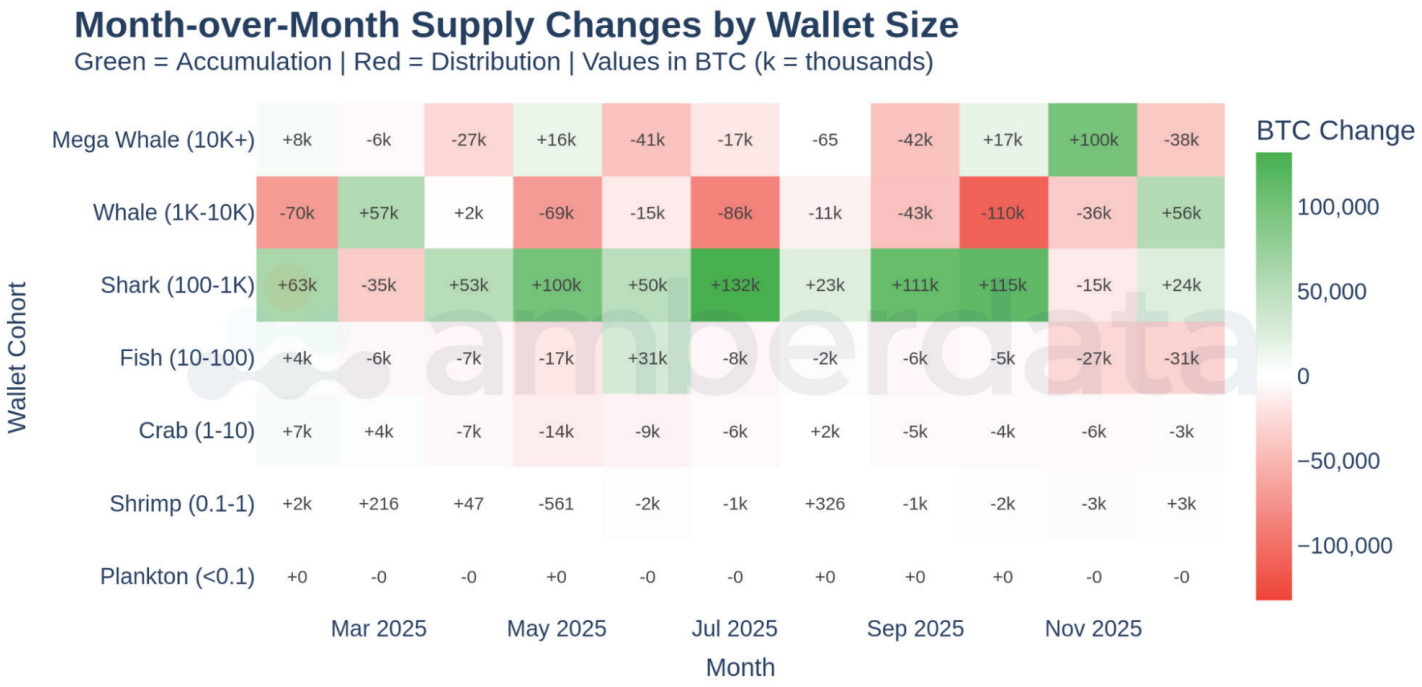


Figure 9.5: Month-over-Month Supply Changes - Heatmap showing cohort behavior by month. October's column reveals the divergence: deep red (distribution) in retail rows, deep green (accumulation) in whale rows. The rotation accelerated during maximum fear.

HODL Wave Confirmation. HODL wave data from October reinforces this narrative. The STH cohort saw accelerated distribution as recent buyers - those who entered during the summer rally - panicked and sold at losses. Meanwhile, the percentage of supply held by 1+ year holders actually increased during the crash, as LTH simply held through the volatility while STH supply contracted.

This conviction divergence is precisely what separates cyclical bottoms from genuine market tops. At tops, long-term holders distribute to euphoric new entrants. At bottoms, long-term holders accumulate from panicking short-term speculators. October showed the latter pattern despite occurring at historically elevated price levels - a powerful signal of institutional conviction.

-15,330 BTC

Retail distribution YTD. Small holders sold into strength (Q1-Q2) and capitulated into weakness (October). This is a classic behavioral pattern that creates future demand when they attempt to re-enter at higher prices.

The 5+ Year Cohort: Diamond Hands in Action

Ultimate Diamond Hands. Perhaps the most remarkable finding from the 2025 HODL wave data is the stability of the 5+ year cohort. These are the ultimate diamond hands - holders who accumulated before Bitcoin reached five figures and held through every subsequent milestone. They watched their holdings appreciate from four-figure prices to six-figure prices without selling. They endured multiple 80%+ drawdowns. They've seen every headline declaring Bitcoin dead.

And in 2025, they held steady. Despite Bitcoin trading above $100,000 - prices that would have seemed impossible when these holders accumulated - the 5+ year cohort showed minimal distribution. This wasn't because they couldn't sell; on-chain liquidity was abundant throughout the year. It was because they chose not to sell. Their conviction has moved beyond price considerations to something more fundamental.

Different Investment Thesis. The contrast with the 1-3 year cohort is instructive. Holders who accumulated during the 2022-2023 bear market showed willingness to take profits at 100%+ gains - a rational response to a successful investment. But the oldest cohort, sitting on 10-50x returns, showed no comparable distribution. This suggests a fundamentally different investment thesis: these aren't traders optimizing for returns, but conviction holders who view Bitcoin as a permanent allocation.

The 5+ year cohort held steady. These holders survived 2017's peak, 2021's euphoria, and 2025's volatility. They're not selling - and their supply is effectively removed from circulation.

This behavioral pattern has significant implications for supply dynamics. Coins held by the 5+ year cohort represent the most stable portion of Bitcoin's supply - effectively permanent holders who reduce the circulating float that responds to price signals. Each passing year that these coins remain dormant strengthens the supply squeeze thesis, as more supply becomes behaviorally illiquid.

Flows Summary by Regime

ETF: $29.3B YTD | Stablecoin: $+77.3B YTD

Regime	Name	Period	ETF Flow	ETF BTC	Stable Δ
R1	Policy Euphoria	01-01 → 01-23	$+4.26B	+41,060	$+3.93B
R2	Security Shock	01-24 → 02-28	$-0.51B	-8,717	$+7.13B
R3	Infrastructure Build	03-01 → 05-31	$+9.42B	+92,528	$+15.19B
R4	Institutional Expansion	06-01 → 09-30	$+15.16B	+134,132	$+46.28B
R5	Macro Shock / Cascade	10-01 → 10-31	$+4.39B	+35,132	$+3.19B
R6	Fragile Recovery	11-01 → 12-31	$-3.38B	-36,851	$+1.92B

Figure 9.6: Flows Summary by Regime - Reference table showing holder behavior patterns across 2025's six market regimes. LTH accumulated during weakness (R2, R5), retail distributed during both strength and weakness. The 5+ year cohort remained stable across all regimes.

The 2026 Implications: What the Rotation Means

Supply Concentration. More Bitcoin now sits in fewer, stronger hands. Mega Whales and long-term holders control a larger percentage of supply than at any point since early 2024. This concentration reduces the liquid supply available to meet future demand. In a supply squeeze scenario - where new demand meets constrained supply - prices can move aggressively to the upside.

Latent Demand. The 15,330 BTC that left retail wallets represents potential buyers who may return during the next euphoria cycle. When fear turns to greed, these former holders often become aggressive re-accumulators, driving demand at precisely the moment supply is most constrained.

This retail re-entry dynamic has been consistent across previous cycles. Holders who sold during the 2018 crash became buyers during the 2020-2021 rally. Holders who capitulated in 2022 re-entered during 2023-2024. The pattern suggests that retail distribution creates latent demand that resurfaces during subsequent bull phases - often at higher prices than where they sold.

Reduced Sell Pressure. The 123,000 BTC accumulated by Mega Whales won't return to market quickly. These holders have demonstrated through multiple cycles that they measure their investment horizons in years, not months. Their accumulation during 2025's weakness suggests they expect significantly higher prices ahead.

Supply Floor. The stability of the 5+ year cohort establishes a floor of supply that won't respond to normal market volatility. These coins are functionally removed from circulation until something truly extraordinary occurs.

The combined effect of these dynamics is a market structure increasingly favorable to holders. Supply is concentrating in patient hands. Retail capitulation has created latent future demand. Institutional conviction extends above $100,000. The 2025 rotation has set the stage for what comes next - though the timing and magnitude remain uncertain, the supply dynamics are increasingly constructive for long-term price appreciation.

SO WHAT?

Historical pattern: Whale accumulation during corrections precedes major rallies. Watch for demand catalysts in 2026 - 401(k) launches, Fed cuts, macro risk-on shifts. The supply dynamics established by 2025's rotation create conditions for potential supply squeeze if institutional demand returns. Reduced liquid supply + concentrated ownership = amplified price response to demand changes.

THE BOTTOM LINE

The Great Rotation is the on-chain story of 2025. While headlines focused on price and ETF outflows, supply was moving from weak hands to strong hands. Mega Whales accumulated 123,000 BTC (+4.41%). The 5+ year cohort held steady - diamond hands didn't sell despite the year's volatility. Supply moved up the wealth ladder, from retail to institutions. This rotation pattern historically precedes major rallies, as it reduces liquid supply while concentrating ownership among high-conviction holders. The Amberdata Crypto Market Review 2025 connects this rotation to valuation metrics (Section 10) and 2026 scenarios (Section 14).

This analysis builds on (S8)'s examination of ETF flows and stablecoin supply - the institutional capital flows that complemented the on-chain rotation.

From here, (S10) examines on-chain valuation metrics - MVRV, realized price, and thermocap - to assess whether current prices represent opportunity or risk. (S14) incorporates the rotation data into 2026 scenario modeling. (S3)'s regime framework provides the market context for understanding when accumulation and distribution occurred.

On-Chain Valuation: What Bitcoin's Realized Price Says About 2026

MVRV, NUPL, Puell Multiple - the signals that called October's bottom and what they mean now

KEY TAKEAWAYS

- **MVRV at 1.41 signals undervaluation.** The metric peaked at 2.524 in January but never approached the 3.5+ euphoria threshold that marked prior cycle tops. Current levels show a 41% premium to aggregate cost basis - elevated but nowhere near the 250-300% premiums of 2017 and 2021 peaks.
- **Realized price at $61,120 provides structural floor.** The aggregate cost basis rose 48% during 2025 as new buyers entered at higher prices through ETFs. With market price at $88,000, the +41% premium represents a healthy valuation above this key support.
- **Miners in accumulation mode.** MPI at -0.53 indicates miners are holding rather than selling. Combined with the Puell Multiple at 0.79, miner economics suggest post-halving adjustment is complete and selling pressure has abated.
- **Network activity shows consolidation.** Active addresses at 553,981 sit mid-range for 2025. Address momentum at 0.968 and adoption rate at 60.2% indicate continued network growth despite price consolidation.

In October, MVRV touched 1.56 while NUPL dropped to 0.355 - levels that historically signal capitulation and mark cycle bottoms. For traders watching on-chain signals, this combination provided a clear buy signal that cut through the noise of panic headlines. Prices stabilized and began recovering in November as extreme pessimism created buying opportunities for those watching the blockchain rather than reading the headlines that were declaring crypto dead. The $19 billion in liquidations that defined October's chaos had cleared excess leverage without forcing the average holder underwater - a subtle but critical distinction.

But here is the puzzle that defines the 2026 setup: 2025 never reached the euphoria readings that typically mark cycle tops. MVRV peaked at 2.524 - well below the 3.5+ threshold that preceded the 2017 and 2021 crashes. NUPL never sustained greed zones above 0.75 despite prices reaching all-time highs above $125,000. The valuation metrics that called every prior cycle peak stayed silent throughout 2025, leaving market participants to wonder whether the signals had lost predictive power or the cycle simply was not finished. This question - structural change or incomplete cycle - is the central tension that frames all 2026 positioning decisions.

This section examines eleven valuation metrics across six market regimes. We analyze the foundational metrics - MVRV, Z-Score, NUPL, and realized price - that anchor all on-chain valuation analysis. We examine miner economics through the Puell Multiple, daily revenue, and the Miner Position Index. Finally, we assess network activity through liveliness, active addresses, and adoption metrics, to gauge underlying blockchain health.

MVRV: The Foundational Valuation Metric

Market Value to Realized Value. MVRV compares Bitcoin's market cap ($1.749 trillion) to its realized cap ($1.241 trillion, the sum of all coins valued at their last transaction price). The resulting ratio of 1.41 tells us the market trades at a 41% premium to aggregate cost basis. When MVRV is high, holders sit on substantial unrealized gains and face selling temptation. When low, the market approaches average acquisition cost - historically the best buying opportunities.

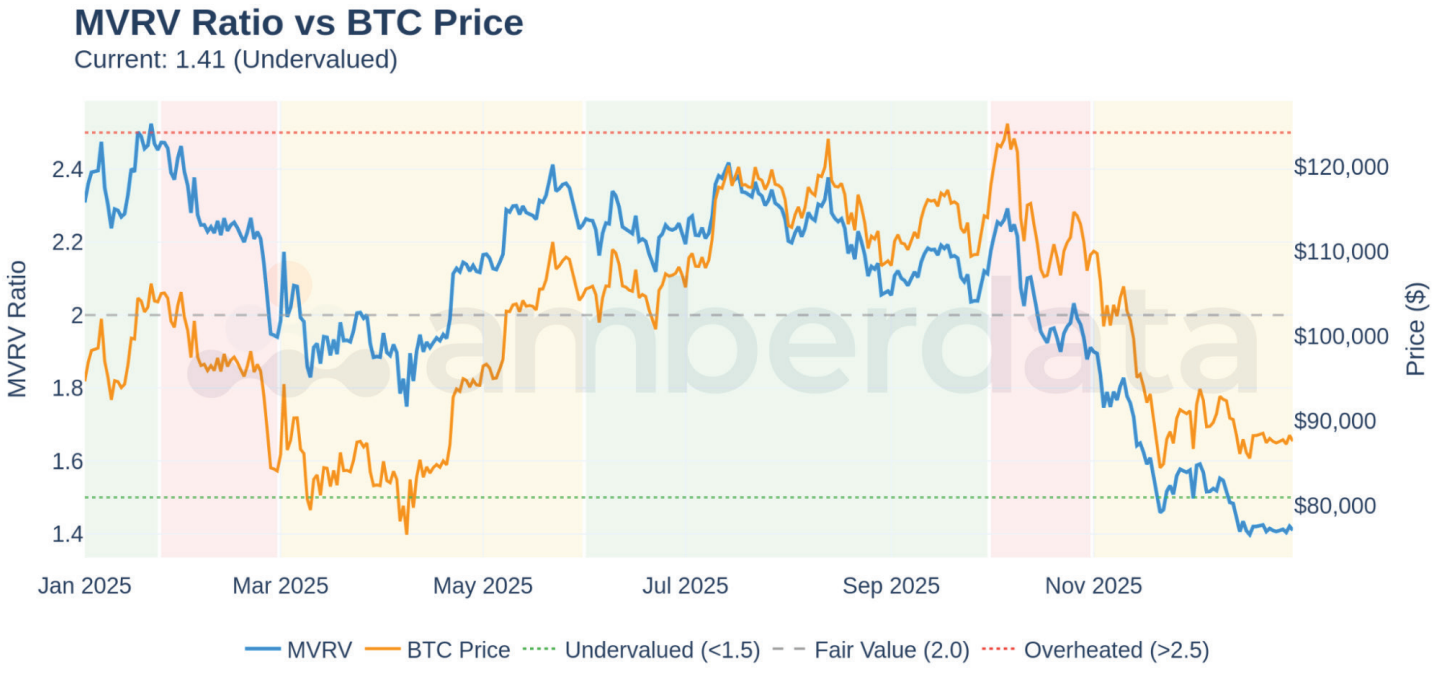


Figure 10.1: MVRV Ratio vs BTC Price - Horizontal bands mark euphoria (>3.5), elevated (2.5), normal (1.5-2.0), and undervalued (<1.5) zones. January peak at 2.524 and current 1.41 both remain well below historical euphoria thresholds.

Historical Context. MVRV above 3.5 has marked every major cycle top in Bitcoin's history. In 2017, MVRV peaked above 4.0 before the subsequent 84% crash from $20,000 to $3,200. In 2021, it touched 3.8 twice - once in April before the 55% correction and again in November before the 77% bear market. These euphoria readings represented 250-300% unrealized gains across the holder base, creating an overwhelming selling incentive that eventually broke each rally. In 2025, the metric peaked at just 2.524 during January's Policy Euphoria - elevated but nowhere near the euphoria threshold. Even at the year's most optimistic moment, valuations remained moderate by historical standards.

Two Interpretations. Either the cycle is structurally different - institutional holders through ETFs have higher price anchors and longer time horizons, permanently compressing MVRV readings - or the cycle simply is not finished. The absence of euphoria suggests more upside may remain before the kind of overvaluation that typically ends bull markets. Section 14 explores both scenarios and their implications for 2026 positioning.

Z-Score Standardization

The MVRV Z-Score measures how many standard deviations current MVRV sits from its 12-month rolling mean. With current MVRV at 1.410, the 12-month mean at 2.071, and standard deviation at 0.279, the Z-Score sits at -2.37. This deep undervaluation reading indicates Bitcoin spent 56 days below -2 standard deviations in 2025 - the longest sustained undervaluation since the 2022 bear market bottom. Z-scores above +7 marked the 2017 and 2021 peaks with months of warning; 2025 never exceeded +1.23.

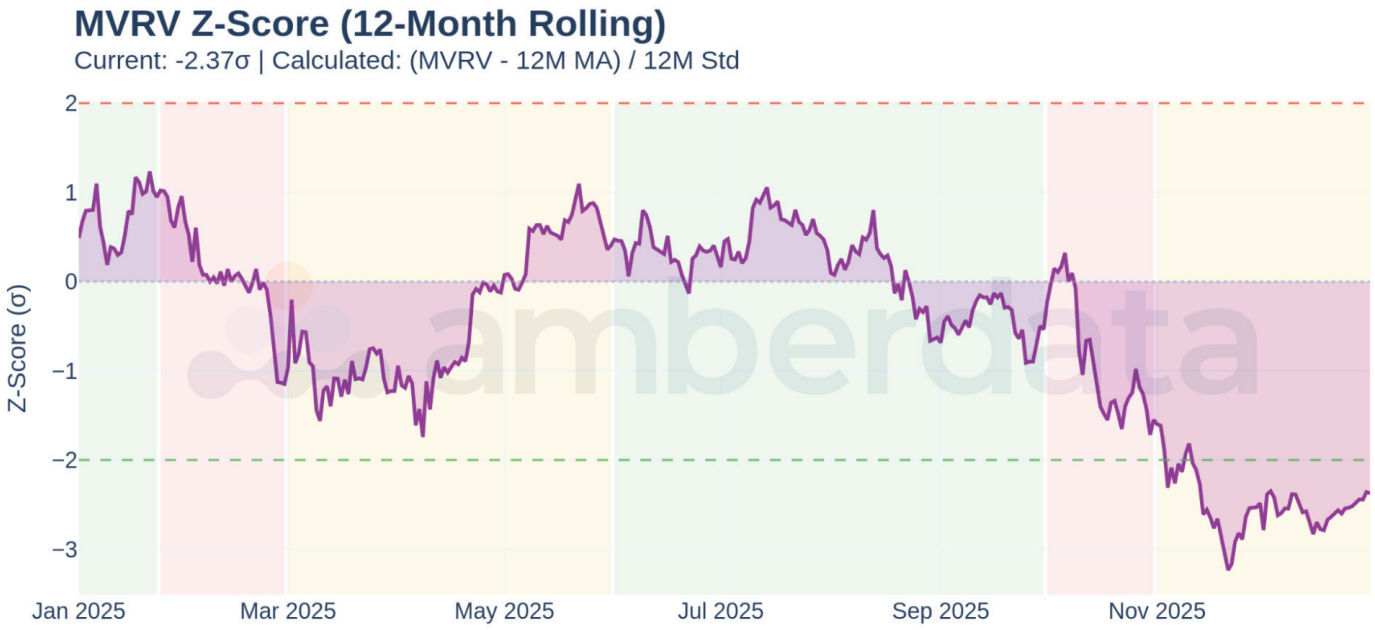


Figure 10.2: MVRV Z-Score (12-Month Rolling) - Current -2.37 standard deviations indicates deep undervaluation relative to trailing 12-month behavior. Prior peaks saw Z-scores above +7; 2025 never exceeded +1.23.

NUPL: The Sentiment Indicator

Mapping Market Psychology. NUPL (Net Unrealized Profit/Loss) measures what percentage of supply is in profit versus loss. The formula maps directly to psychology: NUPL = (Market Cap - Realized Cap) / Market Cap. With market cap at $1.749 trillion and realized cap at $1.241 trillion, current NUPL of 0.291 sits in the Optimism zone (0.25-0.50), meaning 29.1% of market value represents unrealized profit across all holders - healthy but not excessive. Throughout 2025, NUPL ranged from 0.285 (Fear zone during October's crash) to 0.604 (Greed territory in January) - but never entered sustained Euphoria above 0.75 that marked every prior cycle top. The absence of euphoria readings despite prices exceeding $125,000 is the statistical anomaly that demands explanation.

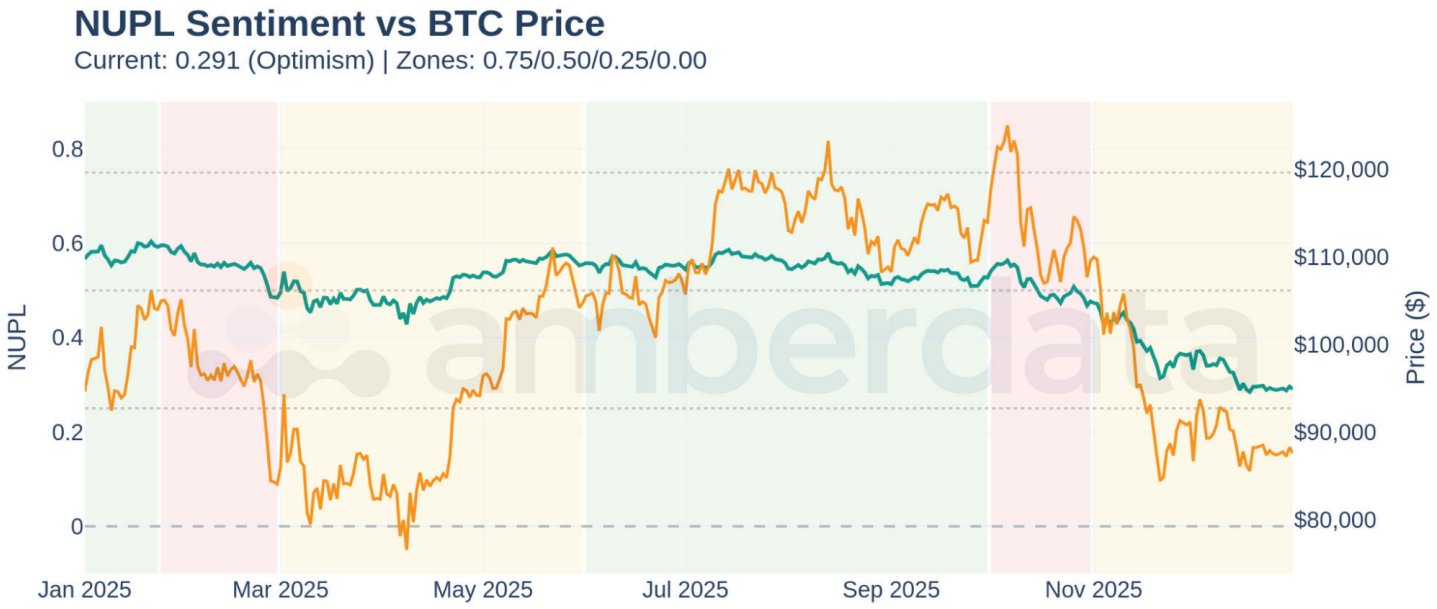


Figure 10.3: NUPL Sentiment vs BTC Price - Color-coded zones track sentiment: Euphoria (>0.75), Greed (0.50-0.75), Optimism (0.25-0.50), Hope (0-0.25), Fear (<0). Current 0.291 sits in Optimism after recovering from October's Fear.

The Missing Euphoria. Prior cycle tops featured months in Euphoria territory before crashing. The 2021 top saw NUPL above 0.75 for weeks before each major leg down, giving attentive observers clear warning that the market had reached unsustainable levels. In 2025, the market crashed without that warning - experiencing Fear-level readings without first reaching Greed extremes. This asymmetry - capitulation without prior euphoria - suggests the cycle may have further to run before exhaustion. The traditional cycle pattern of greed preceding fear appears to have been disrupted, though whether permanently or temporarily remains the key question for 2026.

<3.5

MVRV peak in 2025 - never reached the euphoria threshold that marked prior cycle tops in 2017 and 2021. Either this cycle is structurally different, or it is not finished.

Realized Price: The Structural Floor

Aggregate Cost Basis. Realized price represents the average acquisition cost of all Bitcoin supply - calculated by dividing realized cap by circulating supply. With realized cap at $1.241 trillion and supply at 19,969,787 BTC, realized price sits at $62,120. This metric rose 48% during 2025 (from approximately $42,000 at year-start) as new buyers entered at higher prices - particularly through ETF vehicles that added over $35 billion in net inflows. The rising realized price reflects a healthier cost basis distribution where recent buyers entered at prices well above bear market lows, reducing the overhang of underwater holders who might sell on any rally.

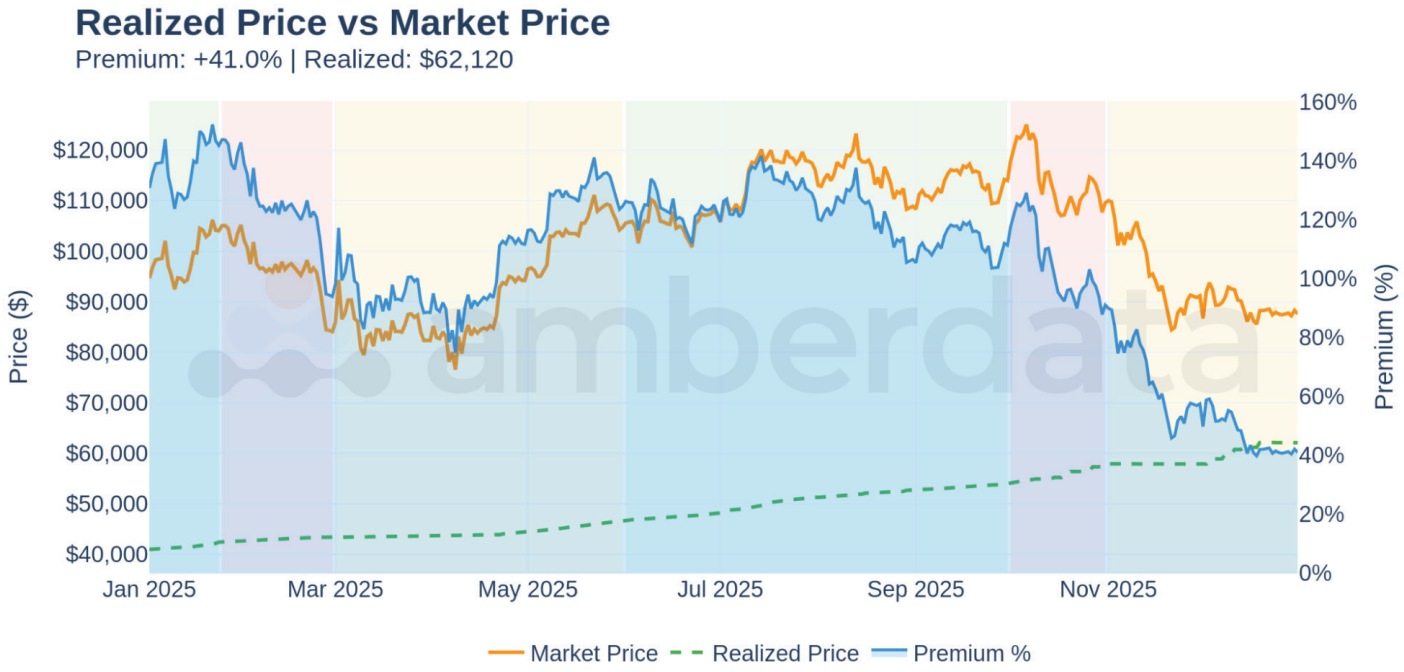


Figure 10.4: Realized Price vs Market Price - Realized price at $62,120 represents aggregate cost basis. Market price at $88,000 trades at +41% premium - elevated but healthy compared to 150%+ premiums seen at 2021 peak.

Premium Analysis. With market price at $88,000 and realized price at $62,120, Bitcoin trades at a +41.0% premium to aggregate cost basis. This premium calculation - (Market - Realized) / Realized - quantifies how much unrealized profit sits in the system. A 41% premium is elevated but moderate by historical standards - the 2021 peak saw premiums exceeding 150%, while bear market bottoms feature premiums approaching zero or briefly turning negative when the average holder is underwater. The current level suggests a market in the middle of its valuation range rather than at either extreme, leaving room for movement in both directions.

Floor Dynamics. Extended periods below realized price are historically rare and mark the best buying opportunities - March 2020's COVID crash and December 2022's FTX aftermath both saw brief dips below realized price that preceded massive rallies. October 2025's crash held above realized price despite $19 billion in liquidations, demonstrating healthier market structure than headlines about capitulation suggested.

$62,120

Realized price - aggregate cost basis of all Bitcoin supply. With market at $88,000, the +41% premium indicates elevated but not excessive valuation above this structural floor.

Miner Economics: Puell, Revenue, and Positioning

Puell Multiple. The Puell Multiple compares daily miner revenue to its 365-day moving average - measuring miner profitability relative to recent history. With current daily issuance at $36.7 million and the annual average at $46.7 million, the Puell Multiple sits at 0.79. This reading below 1.0 indicates miners earn less than their annual average - typical of post-halving adjustment periods. Throughout 2025, Puell ranged from 0.67 (near capitulation during October) to 1.57 (briefly overheated during January). Values above 1.4 signal overheated conditions; below 0.6 indicates miner capitulation.

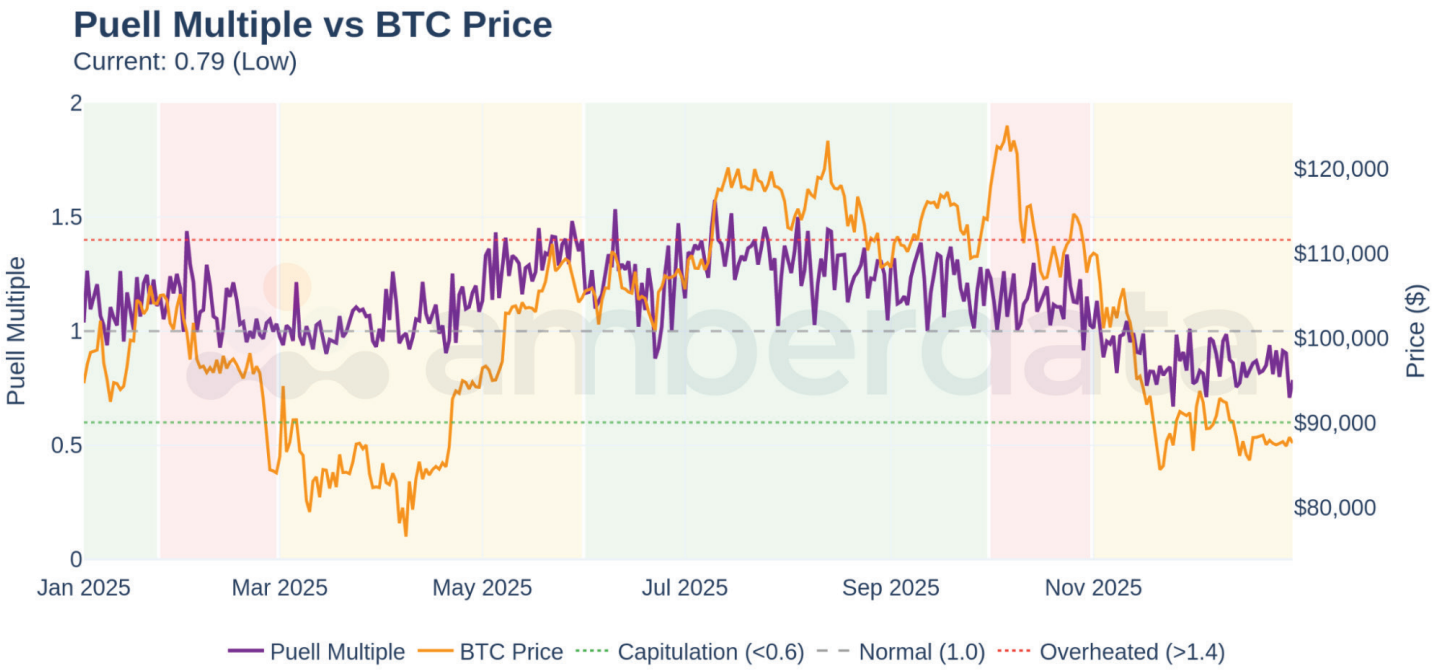


Figure 10.5: Puell Multiple vs BTC Price - Current 0.79 sits below the 1.0 mean. 2025 range: 0.67 to 1.57. Post-halving adjustment appears complete with miners operating at sustainable economics.

Revenue Context. Bitcoin miners generated $17.05 billion in total revenue during 2025, averaging $46.7 million daily. This revenue comes from two sources: block subsidies (3.125 BTC per block following the April 2024 halving) and transaction fees that vary with network congestion. Current daily revenue of $36.7 million sits 21% below the YTD average, with the 30-day moving average at $39.8 million confirming compression. Lower revenue typically reduces selling pressure - miners with compressed margins hold more of their production rather than selling into weakness to cover operational costs. Only the most efficient miners can operate profitably at current revenue levels, which historically has led to hash rate consolidation and reduced selling pressure from the producer cohort.

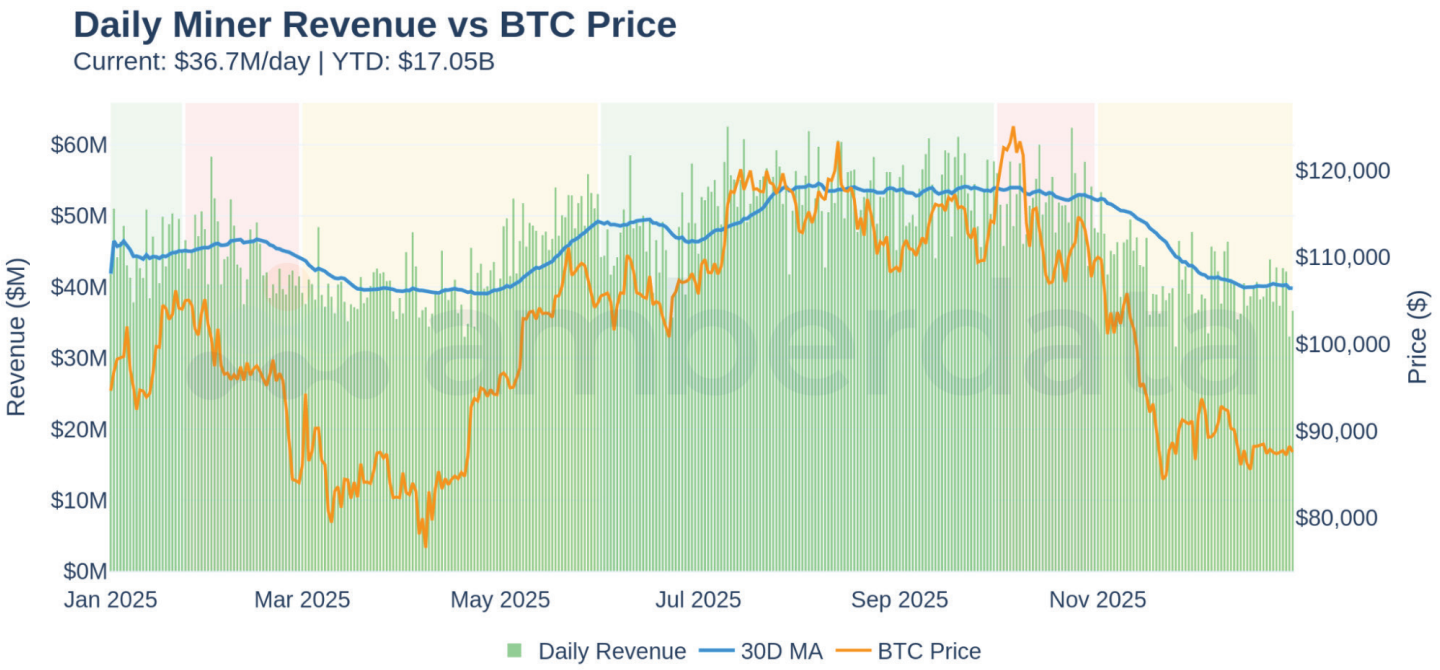


Figure 10.6: Daily Miner Revenue vs BTC Price - Current $36.7M daily sits below 30D MA of $39.8M. YTD total: $17.05 billion. Compressed margins favor efficient miners who can accumulate.

Miner Position Index. MPI tracks whether miners are accumulating or distributing production - revealing the collective decision-making of the most operationally informed participants in the market. Values above 2 indicate heavy distribution where miners aggressively sell production; values near zero represent neutral behavior; negative values signal accumulation. Current MPI of -0.53 indicates miners are in accumulation mode - holding newly mined coins rather than immediately liquidating to cover operational costs. In 2025, MPI ranged from -0.87 (strong accumulation during October's crash when smart money was buying) to 4.78 (heavy distribution during January's peak when prices were elevated). The pattern demonstrates rational behavior: miners sold aggressively at high prices and accumulated at low prices, exactly what sophisticated market participants should do.

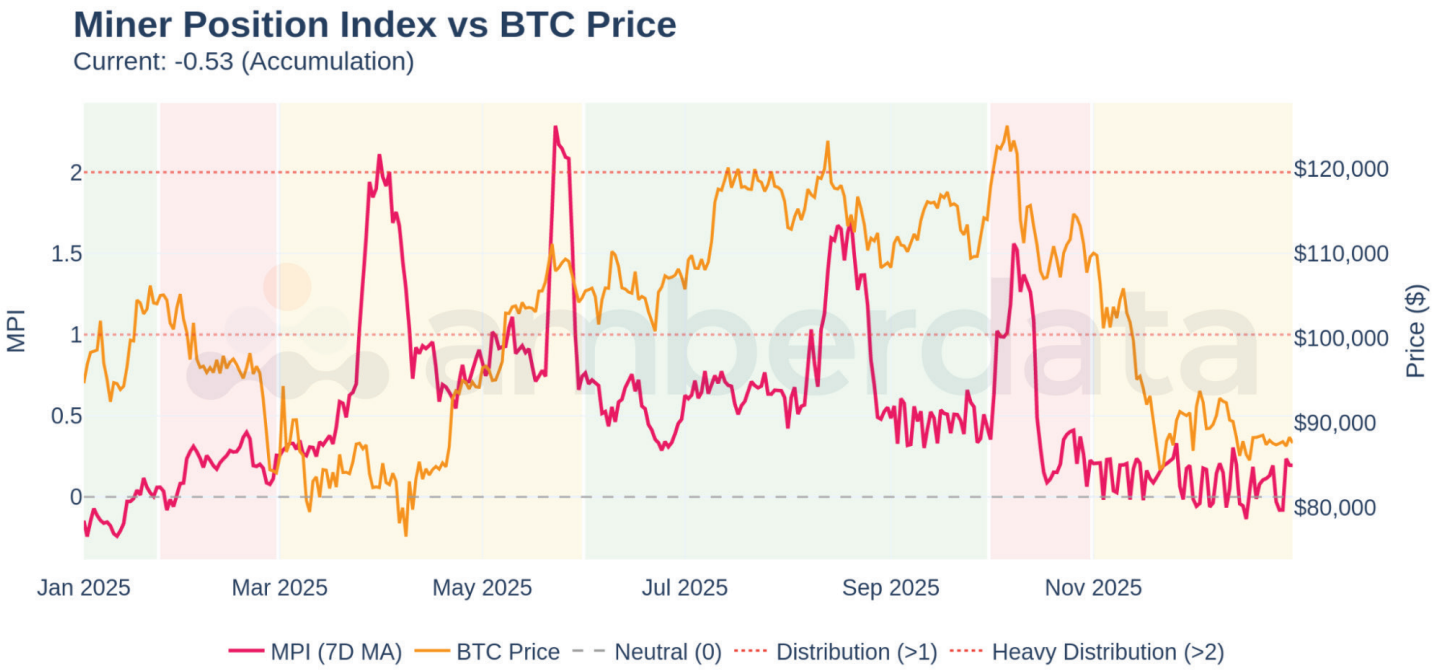


Figure 10.7: Miner Position Index vs BTC Price - Current MPI of -0.53 indicates accumulation mode. 2025 range: -0.87 to 4.78. Miners sold January highs and accumulated October lows.

-0.53

Miner Position Index - indicating accumulation mode. When participants with direct production costs choose to hold rather than sell, it signals conviction in higher future prices.

SO WHAT?

Miner economics tells a coherent story: post-halving adjustment is complete. Puell at 0.79 indicates normalized profitability without distress. MPI at -0.53 shows miners accumulating rather than selling. Combined with $17.05B YTD revenue, the miner cohort appears financially stable. Historically, miner accumulation precedes price appreciation as this sophisticated cohort positions ahead of retail sentiment shifts.

Network Activity: Liveliness and Adoption

Bitcoin Liveliness. Liveliness measures Coin Days Destroyed versus Coin Days Created - tracking whether old coins are being spent (indicating distribution by long-term holders) or new coins being held (indicating accumulation). The metric captures holder behavior at the aggregate level without requiring wallet-level identification. Current liveliness of 0.739 sits near the top of its 2025 range (0.640 to 0.740), indicating moderate long-term holder activity - some distribution but not aggressive selling. The 30-day moving average at 0.740 confirms this steady state. The inverse gives HODL percentage at 26.1% - roughly one-quarter of all Bitcoin supply sits dormant in long-term storage, providing a stable foundation that does not contribute to selling pressure during corrections.

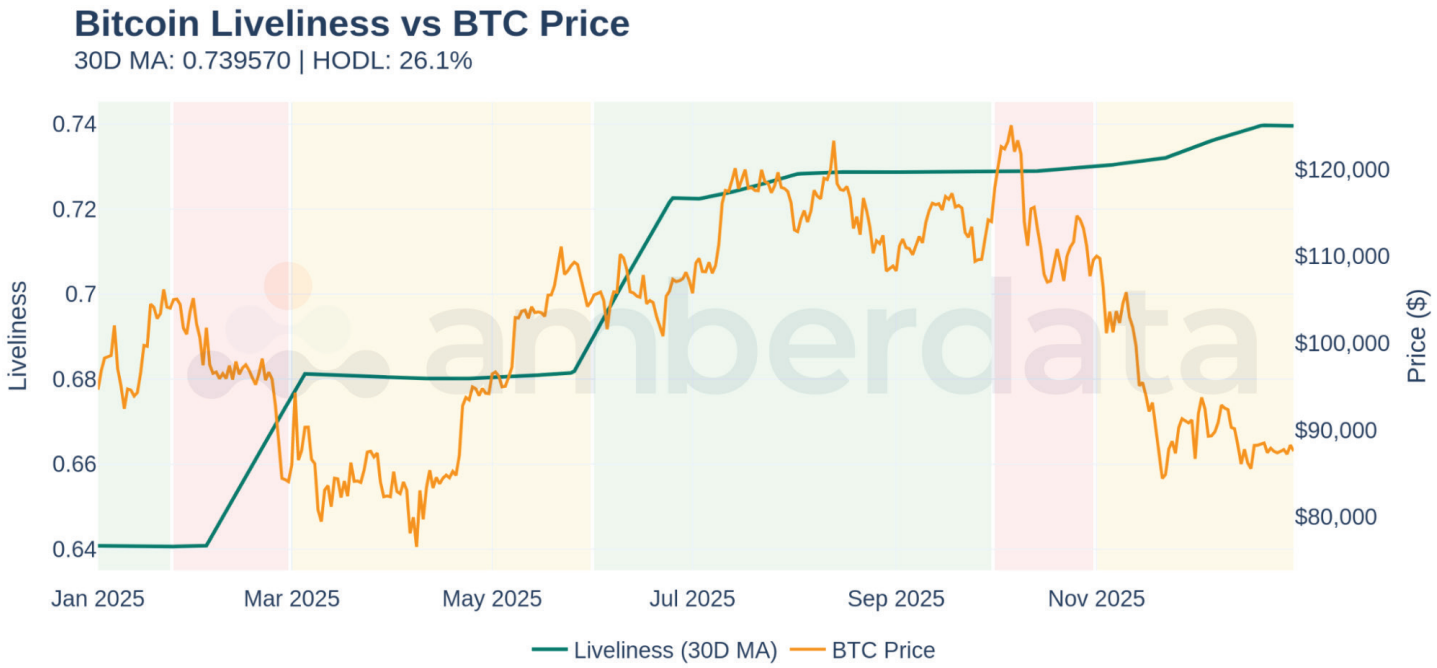


Figure 10.8: Bitcoin Liveliness vs BTC Price - Current 0.739 near top of 2025 range. Lower values suggest holding; higher values indicate old coins moving. HODL percentage at 26.1%.

Active Addresses. Active addresses count unique addresses participating in on-chain transactions daily - a proxy for network usage and market interest. Current activity at 553,981 addresses sits mid-range for 2025 (406,619 to 762,218). Peak activity occurred during January's Policy Euphoria when retail interest surged and ETF launches drove transaction volumes to yearly highs. The October crash saw addresses drop to yearly lows near 406,000 as participants retreated to the sidelines, waiting for clarity before re-engaging. Current mid-range activity suggests normalized usage - neither the extreme speculation of peak euphoria nor the abandonment of true capitulation. The network continues processing transactions at healthy levels consistent with a consolidation phase.

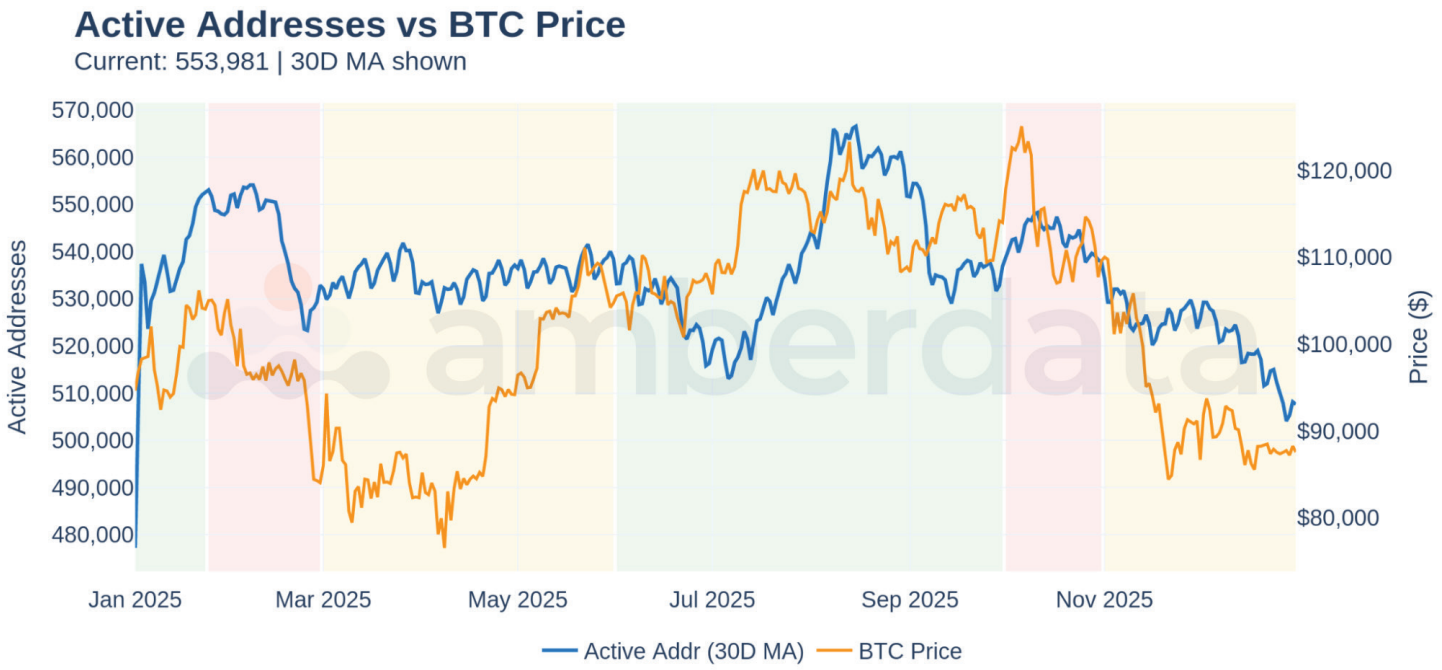


Figure 10.9: Active Addresses vs BTC Price - Current 553,981 sits mid-range for 2025. Peaks during January rally, troughs during October crash. Normalized activity indicates consolidation phase.

Momentum and Adoption. Address Momentum compares short-term new address creation (30-day MA: 306,392) to long-term trends (365-day MA: 316,452). The resulting ratio of 0.968 indicates slightly decelerating growth - new address creation running 3.2% below the annual average. Momentum above 1.0 signals accelerating adoption where growth is expanding; below 1.0 indicates the growth rate is slowing from recent averages. The current neutral reading neither signals explosive growth nor concerning decline. Combined with Adoption Rate at 60.2% (new addresses as percentage of active addresses), the network continues attracting new users even during periods of price consolidation - a healthy sign for long-term fundamentals and future demand.

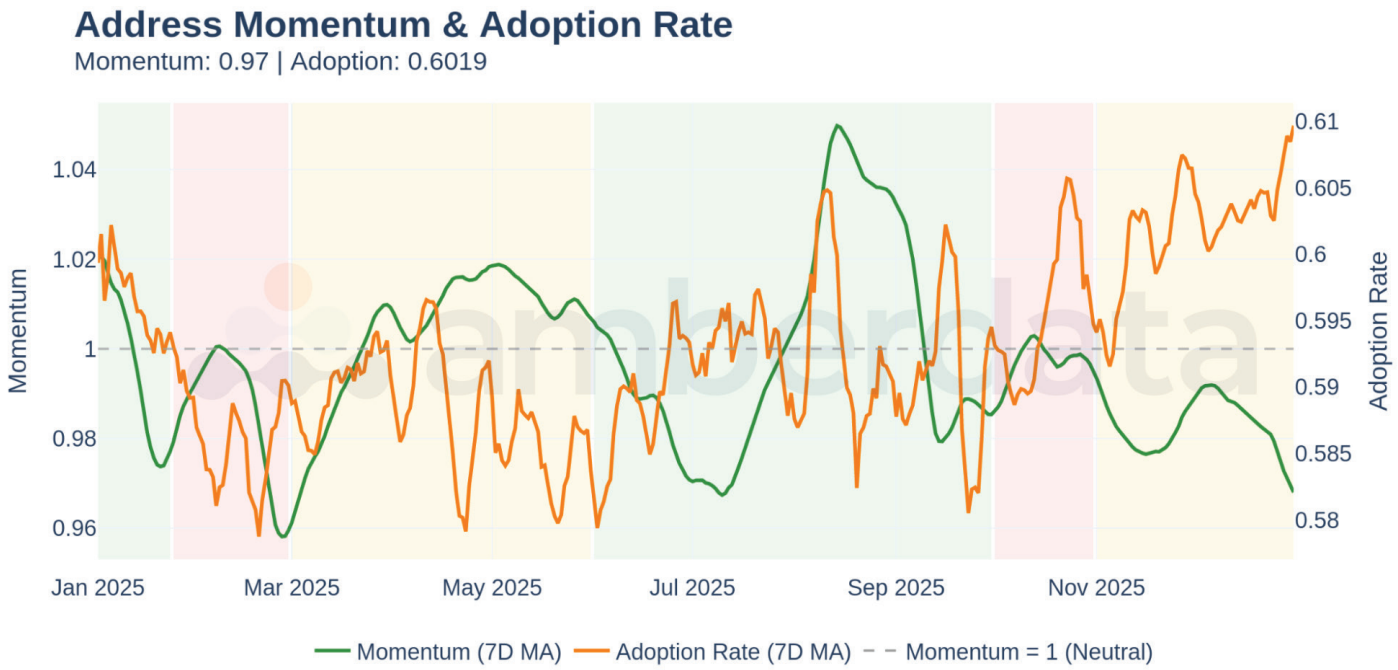


Figure 10.10: Address Momentum and Adoption Rate - Momentum at 0.968 shows slight deceleration. Adoption rate at 60.2% indicates healthy new user onboarding despite price consolidation.

Network activity shows consolidation, not capitulation. Momentum near 1.0, liveliness stable, adoption above 60% - the on-chain foundation remains healthy despite price volatility.

Valuation Across the Six Regimes

Regime Mapping. Mapping metrics to 2025's six regimes reveals how valuations evolved. R1 (Policy Euphoria) produced peak readings: MVRV 2.38, Z-Score 0.73, NUPL 0.580, delivering +9.9% returns. R2 (Security Shock) saw compression after the Bybit hack: MVRV 2.26, Z-Score 0.11, with -19.9% returns. R3 (Infrastructure Build) stabilized: MVRV 2.07, Z-Score -0.43, +21.8% returns. R4 (Institutional Expansion) brought modest recovery: MVRV 2.22, Z-Score 0.14, +8.0% returns.

On-Chain Valuation by Regime

Average values per regime | As of 2025-12-31

Regime	Name	MVRV	Z-Score	NUPL	Puell	Return
R1	Policy Euphoria	2.38	0.73	0.580	1.12	+9.9%
R2	Security Shock	2.26	0.11	0.555	1.10	-19.9%
R3	Infrastructure Build	2.07	-0.43	0.513	1.13	+21.8%
R4	Institutional Expansion	2.22	0.14	0.549	1.26	+8.0%
R5	Macro Shock / Cascade	2.06	-0.87	0.512	1.13	-7.0%
R6	Fragile Recovery	1.56	-2.49	0.355	0.88	-20.4%

Figure 10.11: On-Chain Valuation by Regime - Average MVRV, Z-Score, NUPL, and Puell across six regimes. R1 elevated valuations, R5 crash compression, R6 deep undervaluation.

Crash and Recovery. R5 (Macro Shock) saw rapid valuation compression as October's trade-war-driven crash unfolded: MVRV dropped to 2.06, Z-Score fell to -0.87, NUPL compressed to 0.512, delivering -7.0% returns across 31 chaotic days that saw $19 billion in liquidations. But the reset was proportional to prior expansion - not an overcorrection into capitulation. R6 (Fragile Recovery) shows the current state: deep undervaluation with MVRV at 1.56, Z-Score at -2.49, NUPL at 0.355, and Puell at 0.88. These readings historically precede significant recoveries within 3-6 months, though R6 has delivered -20.4% returns as prices consolidate and the market digests October's volatility.

Pattern Recognition. The regime data confirms what individual metrics suggest: valuations peaked in R1 but never reached euphoria territory, compressed gradually through R2-R5 as the market digested security concerns and institutional expansion, then dropped sharply during October's macro shock. Now in R6, metrics sit in deep undervaluation territory - exactly where they sat before prior major rallies. Prior cycle bottoms featured months of sustained capitulation with MVRV below 1.0 and NUPL in negative territory; October was sharp but brief, lasting only 31 days before stabilization began. The signals that marked every prior top - MVRV above 3.5, NUPL sustained above 0.75, Puell above 1.4 - never arrived in 2025.

2026 Implications

Two Scenarios. Either the cycle continues along historical lines - 2026 sees MVRV push toward 3.5+ and NUPL enters sustained Euphoria above 0.75 before the next major correction arrives - or institutional adoption has structurally changed how these metrics behave. ETF holders with longer time horizons and higher price anchors may permanently compress traditional valuation signals. Corporate treasuries and sovereign wealth funds do not panic sell during 26% drawdowns the way retail speculators did in prior cycles. This new holder composition could mean euphoria (as historically defined) never arrives because the holder base has fundamentally changed. Section 14 explores both scenarios with specific price targets and probability weightings.

Thresholds to Watch. Regardless of which scenario unfolds, certain thresholds provide clear signals that the cycle is approaching completion. Watch for MVRV approaching 3.5 as the first euphoria warning - the level that marked every prior cycle top. Monitor NUPL entering sustained Greed above 0.50, then Euphoria above 0.75 as holders accumulate substantial unrealized gains. Track the Puell Multiple exceeding 1.4 as a sign of overheated miner economics and increasing selling pressure from producers. Pay close attention to MPI - when miners shift from accumulation to heavy distribution above 2.0, sophisticated money with the best operational insight is taking profits. Until these readings arrive, the cycle appears incomplete by historical standards and the on-chain evidence favors continued accumulation.

THE BOTTOM LINE

On-chain valuation metrics remain among the most reliable regime indicators. In 2025, they identified October as a buying opportunity while highlighting the unusual absence of euphoria. Current setup - MVRV at 1.41, Z-Score at -2.37, miners accumulating, network activity stable - historically precedes recoveries. Whether this cycle follows historical patterns or represents structural change from institutional adoption remains the central 2026 question. Watch for MVRV approaching 3.5, NUPL entering Euphoria above 0.75, and Puell exceeding 1.4 as cycle completion signals.

This analysis builds on Section 9's Great Rotation - the 123,173 BTC accumulated by mega whales while retail distributed. Section 3's regime framework establishes the six market phases referenced throughout. Section 14 uses these metrics to construct 2026 scenarios with specific price targets and probability weightings.

DeFi's Year of Exploits: $2B Lost, Lessons Learned

TVL, utilization, liquidations, and the security problem that won't go away

KEY TAKEAWAYS

- **DeFi TVL reached new highs despite exploits.** Total value locked recovered from 2022-2023 lows and continued growing through 2025. Multiple protocols across multiple chains contributed to a resilient ecosystem that absorbed security shocks without systemic collapse. The October stress test proved protocol infrastructure had matured.
- **$388M in DeFi-specific exploits - sophisticated attacks on mature protocols.** Cetus ($220M), Balancer ($128M), and GMX ($40M) fell to novel attack vectors. These weren't simple bugs - they were mathematical edge cases and architectural vulnerabilities that survived multiple audits. The attack sophistication has evolved faster than its defense.
- **Utilization remained robust - lending markets active throughout volatility.** DeFi utilization (borrowed/deposited) spiked during stress events as traders borrowed to hedge or speculate. The market maintained functionality even during the October crash. Liquidation mechanisms worked as designed, clearing over-leveraged positions without protocol failures.
- **DEX volume stable - Uniswap dominance persists.** On-chain trading volume remained consistent despite exploits and volatility. Volume actually spiked during stress events as traders sought on-chain execution when CEX infrastructure was strained. Uniswap maintained market share dominance, though new entrants on alternative L1s gained ground.

$2.07 billion stolen in 2025. Bybit alone lost $1.46B to state-sponsored hackers. DeFi protocols suffered $388M in exploits. And yet, DeFi TVL reached new highs, utilization remained robust, liquidation mechanisms functioned, and the ecosystem kept building. The contradiction defines DeFi's current state: an industry that has grown too large to ignore and too vulnerable to ignore the security problem. The exploits were devastating. The resilience was remarkable. Here's how both coexisted in 2025.

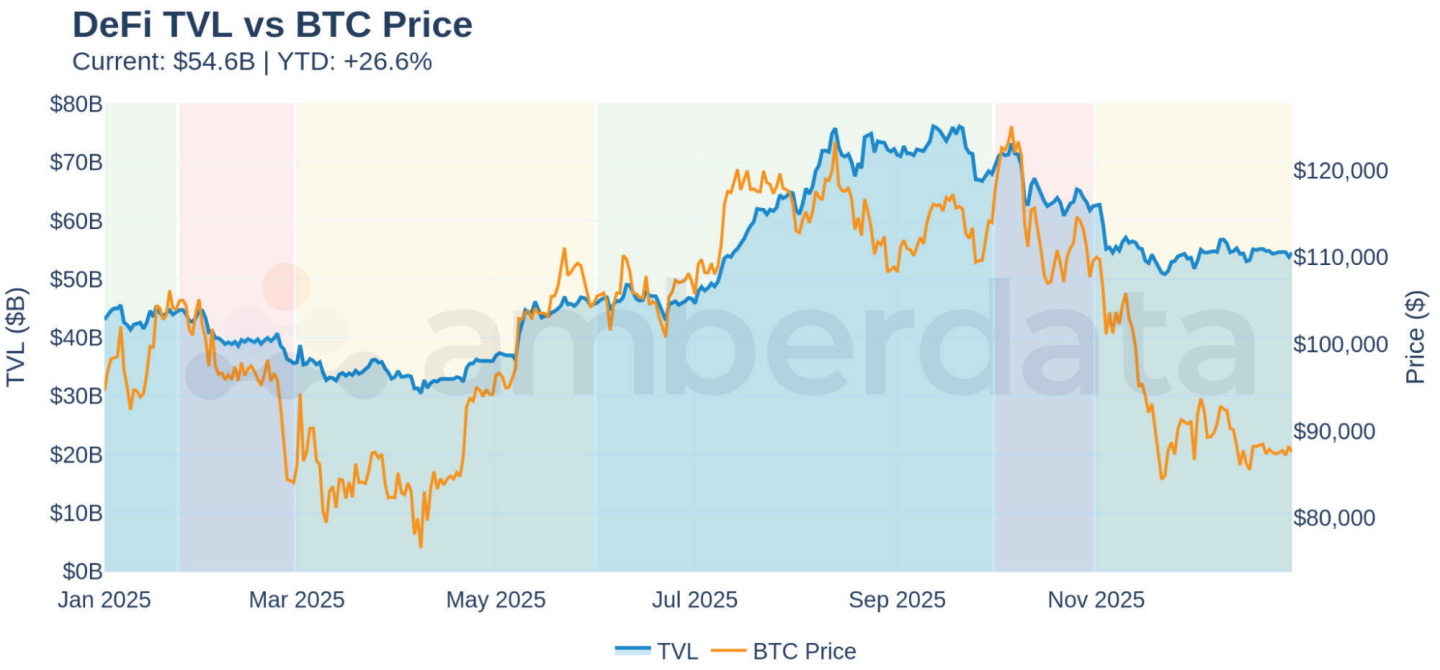


Figure 11.1: DeFi TVL vs BTC Price - TVL tracked BTC price throughout 2025, demonstrating the reflexive relationship between crypto valuations and DeFi capital. The October crash temporarily reduced TVL, but the recovery showed capital returning to protocols rather than fleeing the ecosystem entirely.

The TVL Story: Growth Despite Everything

Resilience Beyond Headlines. DeFi's total value locked tells a story of resilience that the exploit headlines obscure. Capital didn't flee the ecosystem after Cetus lost $220M or Balancer lost $128M. TVL continued growing, driven by yield opportunities, leverage demand, and the fundamental utility that DeFi protocols provide.

Multiple Sources. The growth came from multiple sources. Lending protocols like Aave and Compound saw increased deposits as interest rates attracted yield-seeking capital. Liquid staking derivatives expanded as Ethereum staking participation grew. New L2 ecosystems launched with liquidity mining programs that attracted TVL. The multi-chain thesis played out - capital spread across Ethereum, Arbitrum, Base, Optimism, and newer entrants like Sui and Aptos.

October Stress Test. The October stress test provided the clearest evidence of ecosystem maturity. When BTC dropped sharply during Regime 5, DeFi TVL declined proportionally - but proportionally, not catastrophically. There was no cascade of protocol failures, no systemic unwind, no repeat of the Terra/Luna collapse. Protocols functioned as designed. Liquidations cleared positions. The infrastructure held. This represented meaningful progress from 2022's fragility.

In DeFi-specific exploits during 2025 - Cetus ($220M), Balancer ($128M), and GMX ($40M).
Each attack exploited novel vulnerabilities that had survived multiple security audits.
The sophistication of attacks has outpaced the sophistication of defenses.

The Utilization Picture: Lending Markets Under Pressure

Window Into Stress. DeFi utilization - the ratio of borrowed assets to deposited assets - provides a window into market stress. High utilization indicates strong borrowing demand and potential liquidity stress. Low utilization suggests excess capacity. In 2025, utilization told a story of active markets that functioned through volatility.

Utilization spiked during each stress event. When prices dropped sharply, traders borrowed to hedge existing positions or speculate on further moves. When prices recovered, borrowers repaid or got liquidated. The lending protocols - Aave, Compound, Maker, and others - handled these spikes without protocol failures. Interest rates adjusted dynamically, attracting more deposits when utilization climbed too high.

October Peak. The October crash pushed utilization to yearly highs as leveraged traders scrambled to manage positions. Some were liquidated. Others added collateral. The protocols processed these transactions without failure, demonstrating that DeFi's core infrastructure - automated market makers, lending protocols and liquidation bots - has matured significantly since the chaotic liquidation cascades of earlier years.

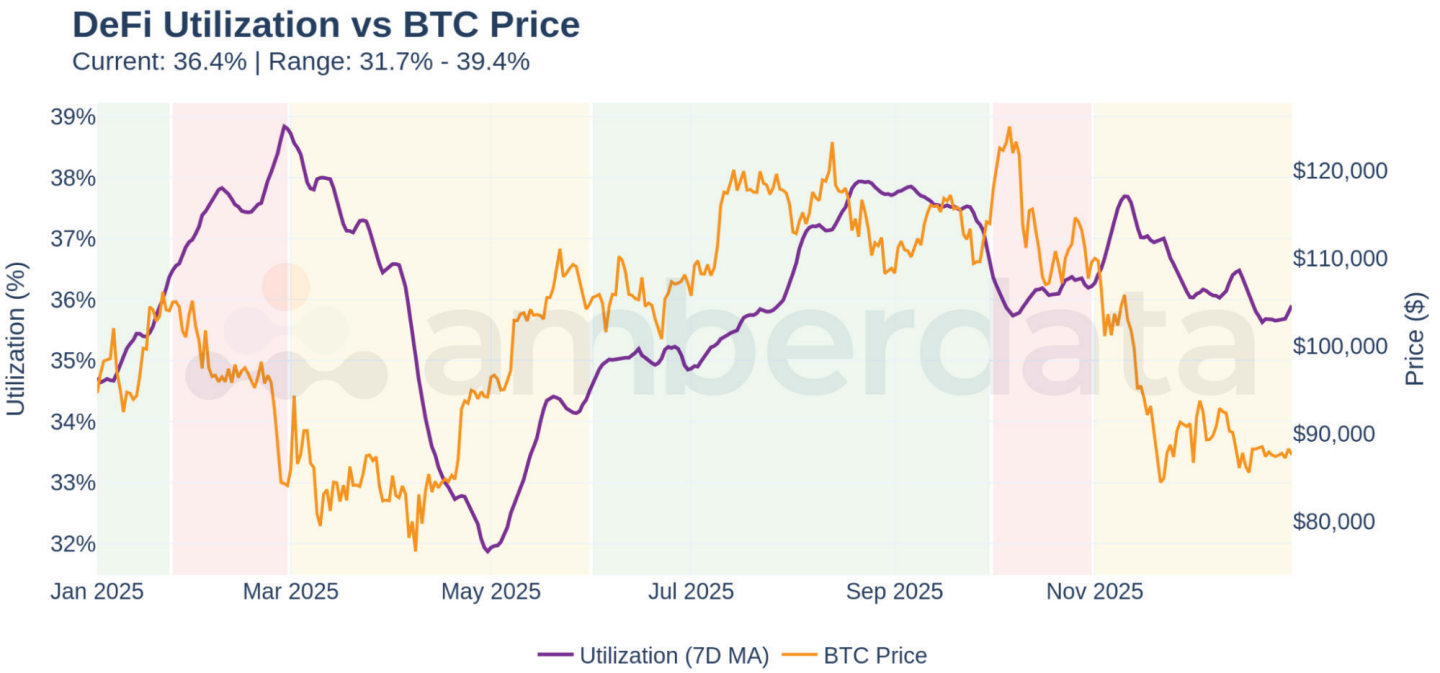


Figure 11.2: DeFi Utilization vs BTC Price - Utilization (borrowed/deposited) spiked during volatility events as traders borrowed to hedge or speculate. The 80% threshold indicates high demand and potential liquidity stress. Note the October spike coinciding with the Regime 5 crash.

DeFi's growth and DeFi's security problems coexist uncomfortably. The ecosystem has grown too large to ignore and too vulnerable to ignore the security problem. Both statements are true simultaneously.

The Liquidations: Stress Testing Protocol Design

Ultimate Stress Test. DeFi liquidations represent the ultimate stress test of protocol design. When collateral values drop below required thresholds, automated liquidation bots step in to close positions and protect protocol solvency. In 2025, this infrastructure was tested repeatedly - and it held.

Liquidations spiked during each major volatility event. The February Security Shock (Regime 2) triggered significant DeFi liquidations as the Bybit hack created market uncertainty. The October Macro Shock (Regime 5) produced the largest liquidation volume of the year as leveraged positions unwound across protocols. Each spike demonstrated the liquidation infrastructure working as designed - positions were closed, bad debt was minimized, and protocols remained solvent.

Contrast with CEX. The contrast with centralized exchange liquidations is instructive. CEX liquidations during the same periods were larger in absolute terms but sometimes created cascading effects as liquidation engines struggled with volume. DeFi liquidations, while smaller, were processed by decentralized networks of bots competing for liquidation profits. This decentralized approach provided resilience - no single point of failure, no liquidation engine overload.

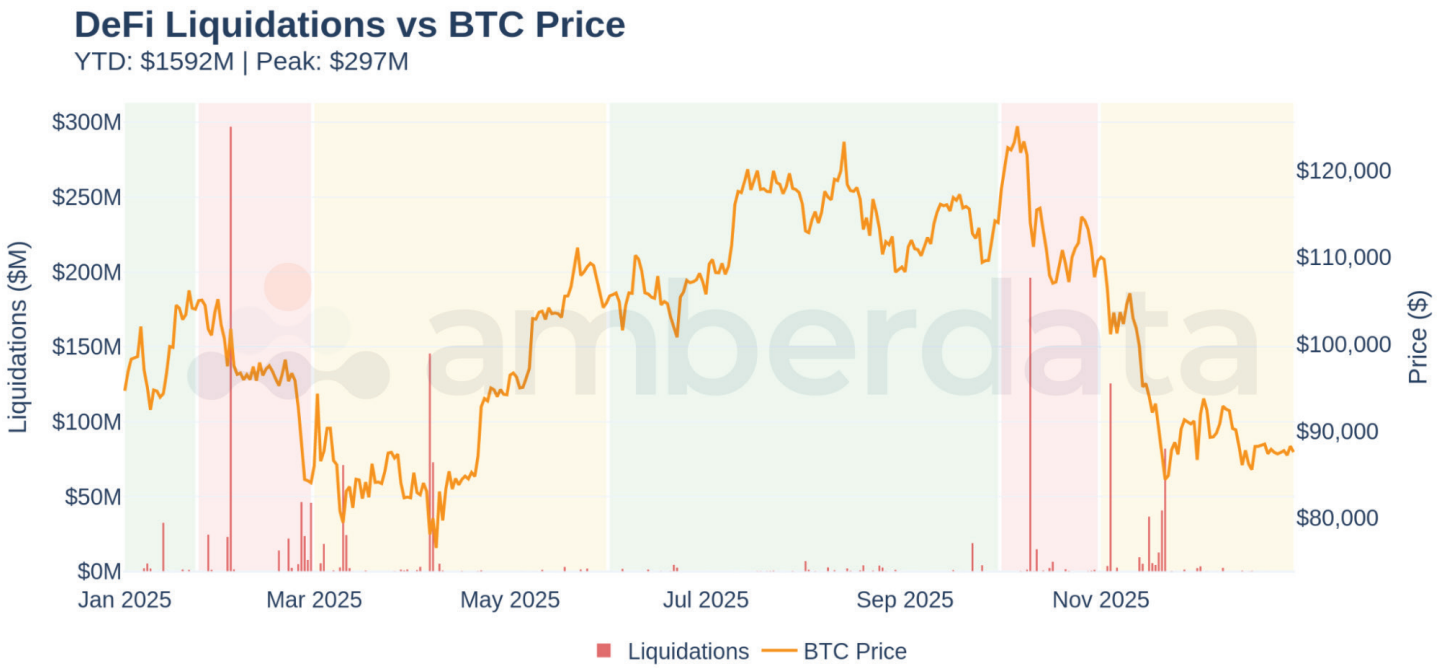


Figure 11.3: DeFi Liquidations vs BTC Price - Liquidation volume spiked during each stress event, with the October crash producing the largest volumes. DeFi liquidations often lead or coincide with CEX liquidations during major market moves.

3

Major DeFi exploits in 2025 - Cetus (May), GMX (July), and Balancer (November). Each exploited different vulnerabilities: fake asset contracts, flash loan attacks, and mathematical rounding bugs. The diversity of attack vectors demonstrates that no single security approach is sufficient.

SO WHAT?

DeFi liquidation infrastructure worked throughout 2025's stress events. Positions were closed, protocols remained solvent, and the ecosystem absorbed shocks that would have caused cascade failures in 2022. The infrastructure has matured - but the security problem hasn't been solved.

The DEX Volume: On-Chain Trading Persists

Permanent Feature. Decentralized exchange volume remained stable throughout 2025, demonstrating that on-chain trading has established itself as a permanent feature of the crypto market structure. Volume actually spiked during stress events as traders sought execution when centralized exchange infrastructure was strained.

Shifting Landscape. Uniswap maintained its dominance of Ethereum DEX volume, but the competitive landscape shifted. New DEXs on alternative L1s - Sui, Aptos, Solana - captured volume that might previously have stayed on Ethereum. Layer 2 DEXs on Arbitrum, Optimism, and Base grew their share as users sought lower gas costs. The multi-chain future that DeFi promised began materializing, with liquidity fragmenting across networks.

Cetus Example. The Cetus exploit highlighted both the opportunity and risk of new chain DEXs. Sui's native DEX had grown rapidly, attracting hundreds of millions in liquidity. The $220M exploit wiped out that progress overnight. But the broader DEX ecosystem absorbed the shock - volume shifted to other platforms, liquidity found new homes, and on-chain trading continued. The resilience came from fragmentation itself.

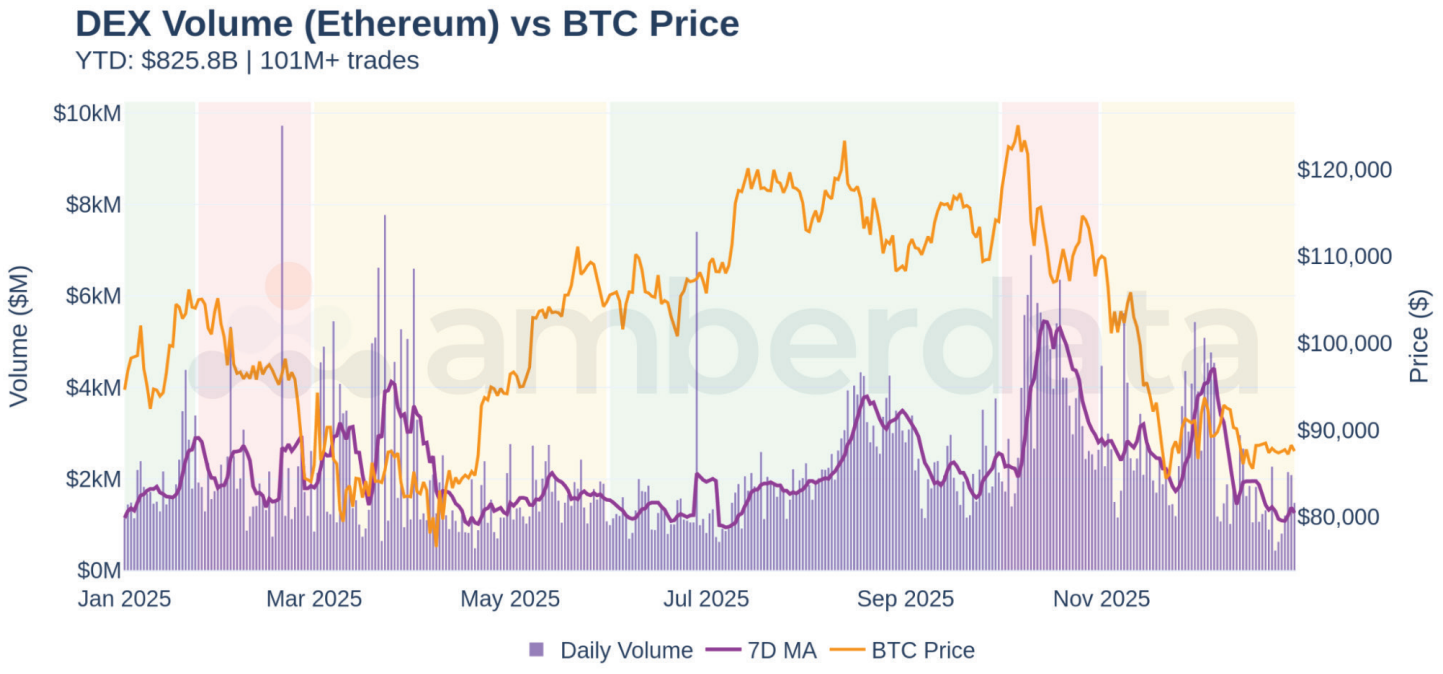


Figure 11.4: DEX Volume (Ethereum) vs BTC Price - Volume remained stable despite exploits, with spikes during volatility as traders sought on-chain execution. The regime shading shows volume patterns across market phases.

The exploits were devastating. The resilience was remarkable. Both statements are true. DeFi processed billions in liquidations, absorbed hundreds of millions in exploit losses, and continued functioning throughout.

The Exploits: Sophistication Meets Scale

Not Simple Bugs. The DeFi exploits of 2025 weren't the simple bugs of crypto's early days. They were sophisticated attacks on mature, audited protocols - attacks that required deep mathematical understanding and patient preparation. Each major exploit represented a new category of vulnerability.

Cetus (May 28, $220M). The Cetus exploit targeted Sui's native DEX through a fake asset contract vulnerability. The attacker created a malicious token contract that the protocol's validation logic incorrectly accepted, allowing them to drain pools of legitimate assets. The exploit required understanding both Sui's unique Move programming language and Cetus's specific implementation - knowledge that suggested either an insider or months of careful reverse engineering.

GMX v1 (July 9, $40M). The GMX exploit combined flash loans with a reentrancy attack in a novel configuration. The attacker borrowed massive amounts, manipulated oracle prices, and extracted value before the protocol could react - all in a single atomic transaction. GMX had been audited multiple times, but the specific attack path had never been considered.

Balancer (November 3, $128M). The Balancer exploit exploited a mathematical edge case in weighted pool rebalancing. The bug had survived three independent audits and two years of production operation. The attacker needed to understand not just the code, but the mathematical model underlying it - then construct a series of transactions that exploited the model's edge cases. This level of sophistication represents the new normal for DeFi attacks.

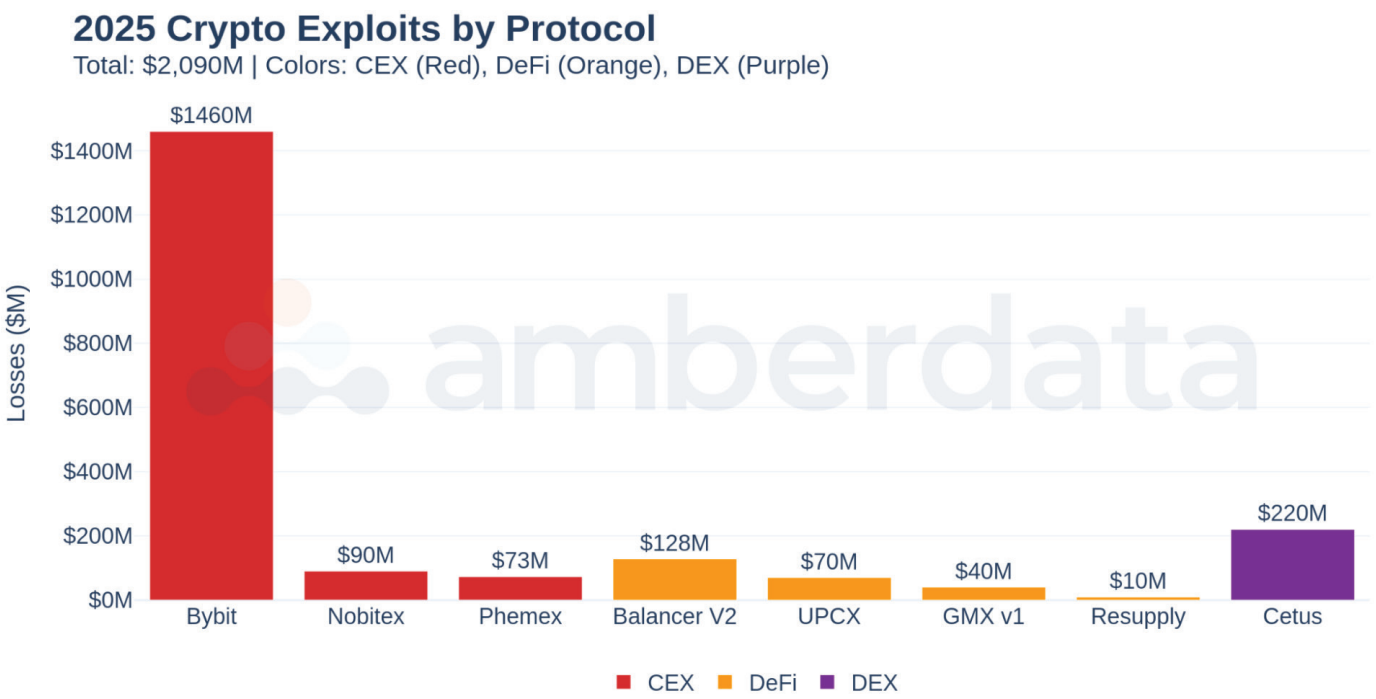


Figure 11.5: 2025 DeFi Exploits - Each triggered temporary DeFi deleveraging and liquidity provider retreat. The November Balancer exploit came during the already fragile Regime 6 recovery.

$2.07B

Total stolen across all crypto in 2025 - the largest year on record. While Bybit ($1.46B) dominated the total, DeFi's $388M in losses represented sophisticated attacks that the ecosystem must address. The Amberdata Crypto Market Review 2025 Section 12 details the complete security picture.

The Regime View: DeFi Through Market Phases

Regime Patterns. Mapping DeFi metrics to 2025's regime structure reveals how the ecosystem responded to each market phase. TVL, utilization, liquidations, and DEX volume all showed distinct patterns across regimes - patterns that provide insight into DeFi's behavior under different market conditions.

Regime 2 (Security Shock). DeFi metrics declined in sympathy with the broader Bybit-driven crash. TVL dropped as capital fled to safety. Utilization spiked as traders borrowed to hedge. Liquidations cleared overleveraged positions. But protocols functioned - there was no DeFi-specific cascade. The Bybit hack was a CEX problem that DeFi weathered without contagion.

Regime 5 (Macro Shock). The October crash provided the more severe test. It produced the highest DeFi liquidation volumes of the year. Utilization spiked past 80% on major lending protocols. TVL declined sharply. But again, protocols held. Liquidation bots cleared positions. Interest rates adjusted to attract deposits. The infrastructure demonstrated that DeFi could survive macro stress without systemic failure.

DeFi & DEX Metrics by Regime

Aggregated per regime | As of 2025-12-31

Regime	Name	Avg TVL	Avg Util	Liquidations	DEX Volume
R1	Policy Euphoria	$43.6B	35.5%	$46M	$46.5B
R2	Security Shock	$40.3B	37.7%	$518M	$76.0B
R3	Infrastructure Build	$37.2B	34.8%	$376M	$190.2B
R4	Institutional Expansion	$61.4B	36.4%	$76M	$249.4B
R5	Macro Shock / Cascade	$65.8B	36.1%	$230M	$118.7B
R6	Fragile Recovery	$54.8B	36.4%	$346M	$145.0B

Figure 11.6: DeFi Summary by Regime - Reference table showing average TVL, total liquidations, and DEX volume per regime. Note R5's liquidation spike and the relative stability of DEX volume across all regimes.

SO WHAT?

DeFi's core infrastructure - lending, liquidations and DEX trading - proved resilient through multiple stress events in 2025. The security problem remains unsolved, but the operational infrastructure has matured. The question for 2026 is whether security can catch up before another major exploit undermines user confidence.

THE BOTTOM LINE

DeFi in 2025 demonstrated both remarkable growth and persistent vulnerability. TVL reached new highs. Utilization remained robust. Liquidation mechanisms functioned through multiple stress tests. But $388M in exploits showed that security remains the ecosystem's Achilles heel. The exploits weren't simple bugs - they were sophisticated attacks on audited protocols. The infrastructure has matured. The security problem hasn't been solved. Both realities will shape 2026. The Amberdata Crypto Market Review 2025 Section 12 provides the complete security analysis, and Section 13 examines how regulatory changes may affect DeFi's future.

This analysis connects to (S6)'s liquidity and leverage analysis across the broader ecosystem, and (S10)'s on-chain valuation metrics that provide context for DeFi's growth trajectory.

From here, (S12) provides the complete security analysis including CEX hacks. (S13) examines how regulatory changes may affect DeFi's future development and adoption.

The $2B Problem: 2025's Security Crisis in Numbers

Bybit, Lazarus Group, and the hack timeline that changed everything

KEY TAKEAWAYS

- **$2.09 billion stolen in 2025 - the largest year on record.** Eight major incidents resulted in total losses exceeding $2 billion. The Bybit hack alone accounted for 70% of that total at $1.46 billion. This surpassed 2022's previous record and demonstrated that crypto's security problem continues to grow with the market.
- **State-sponsored actors dominated.** North Korea's Lazarus Group ($1.46B via Bybit) and Iran's Predatory Sparrow ($90M via Nobitex) were responsible for over 74% of total losses. These nation-state hackers represent a fundamentally different threat than opportunistic attackers - they have unlimited patience, sophisticated capabilities, and no fear of prosecution.
- **Bybit triggered Regime 2 (Security Shock).** The February 21 hack didn't just steal funds - it defined a market regime. BTC dropped 19.6% during R2 as exchange outflows spiked and institutional confidence wavered. The hack demonstrated that even major, regulated exchanges remained vulnerable to sophisticated attacks.
- **Security crisis accelerated regulatory clarity.** Within weeks of Bybit, the SEC paused enforcement actions and accelerated ETF improvements. The security crisis didn't derail institutional adoption - it demonstrated the need for regulated infrastructure and proper custody solutions, pushing regulators toward action rather than litigation.

February 21, 2025: Bybit loses $1.46 billion to North Korea's Lazarus Group - the largest hack in crypto history. Within weeks, the SEC drops enforcement cases against major exchanges and accelerates ETF approvals. The connection wasn't coincidental. The security crisis became a regulatory catalyst. State-sponsored hackers had inadvertently demonstrated what enforcement actions couldn't: crypto's institutional infrastructure needed proper regulation, not litigation. Here's how 2025's $2 billion security problem reshaped both the threat landscape and the regulatory response.

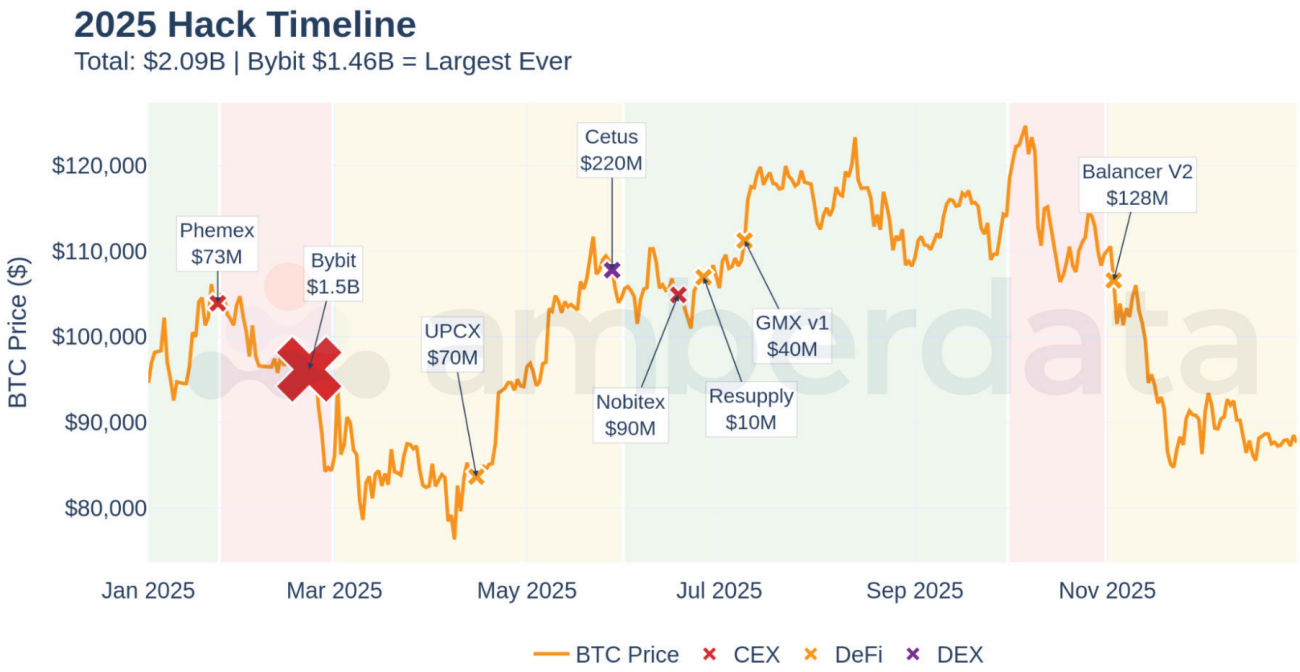


Figure 12.1: 2025 Hack Timeline - Eight major incidents mapped against BTC price with regime shading. The Bybit hack (February 21) stands out both for scale ($1.46B) and impact - it defined Regime 2. Note the clustering of DeFi exploits in the middle of the year and the late-year Balancer incident during the fragile recovery.

The Bybit Attack: February 21, 2025

Largest Hack in History. The largest hack in cryptocurrency history didn't target a vulnerable DeFi protocol or an obscure exchange. It targeted Bybit - one of the world's largest centralized exchanges with sophisticated security infrastructure. The Lazarus Group, North Korea's elite state-sponsored hacking unit, compromised Bybit's hot wallet system and extracted $1.46 billion in a single operation.

Attack Vector. The attack vector was devastating in its sophistication. Lazarus didn't exploit a smart contract bug or trick users with phishing. They compromised the exchange's internal systems directly, gaining access to private keys through a combination of social engineering and zero-day exploits. The funds were immediately routed through a complex web of mixers and cross-chain bridges, making recovery virtually impossible. Within 48 hours, the stolen assets had been laundered through dozens of intermediary wallets and converted to Monero.

Market Response. The market response was swift and severe. BTC dropped over 15% in the week following the hack. Exchange outflows spiked as users moved assets to self-custody. Bybit's trading volume collapsed as liquidity providers and market makers reduced exposure. The incident triggered Regime 2 (Security Shock), which lasted through the end of February. The regime was defined not by macroeconomic factors or regulatory news, but by a single security event that shattered confidence in centralized exchange custody.

Bybit survived, but the industry was changed. The exchange's reserves were sufficient to cover the loss, and they continued operations after implementing emergency security measures.

However, the incident demonstrated that no exchange - regardless of size, reputation, or security investment - was immune to state-sponsored attacks. The question wasn't whether exchanges could be hacked, but whether the industry had proper infrastructure to minimize damage and maintain confidence when hacks occurred.

$1.46B

Stolen from Bybit by North Korea's Lazarus Group - the largest single hack in crypto history. This represented 70% of all funds stolen in 2025 and triggered the Security Shock regime that defined February's market action.

The Attack Vectors: CEX vs DeFi vs DEX

Vulnerability Hierarchy. The 2025 hack distribution revealed a clear hierarchy of vulnerability:

CEX: $1.62B (78% of total) - dominated by private key compromise
DeFi: $248M (12%) - mathematical edge cases and architectural vulnerabilities
DEX: $220M (10%) - fake asset contracts and validation logic exploits

CEX Vulnerabilities. CEX losses were dominated by a single attack vector: private key compromise. Bybit, Phemex ($73M in January), and Nobitex ($90M in June) all fell to variations of the same fundamental vulnerability - hot wallet keys that could be accessed through sophisticated attacks on exchange infrastructure. The industry's solution has been clear for years: cold storage, multi-signature schemes, and reduced hot wallet balances. But operational requirements create persistent tension between security and functionality.

DeFi Sophistication. DeFi exploits showed increasing sophistication. The UPCX attack ($70M) exploited a mathematical rounding error in the protocol's pricing mechanism. GMX v1 ($40M) fell to a flash loan attack that manipulated oracle prices. Balancer V2's $128M loss came from a subtle bug in the pool rebalancing logic that had survived multiple audits. These weren't simple reentrancy attacks or unverified contracts - they were novel exploits that required deep protocol understanding to execute.

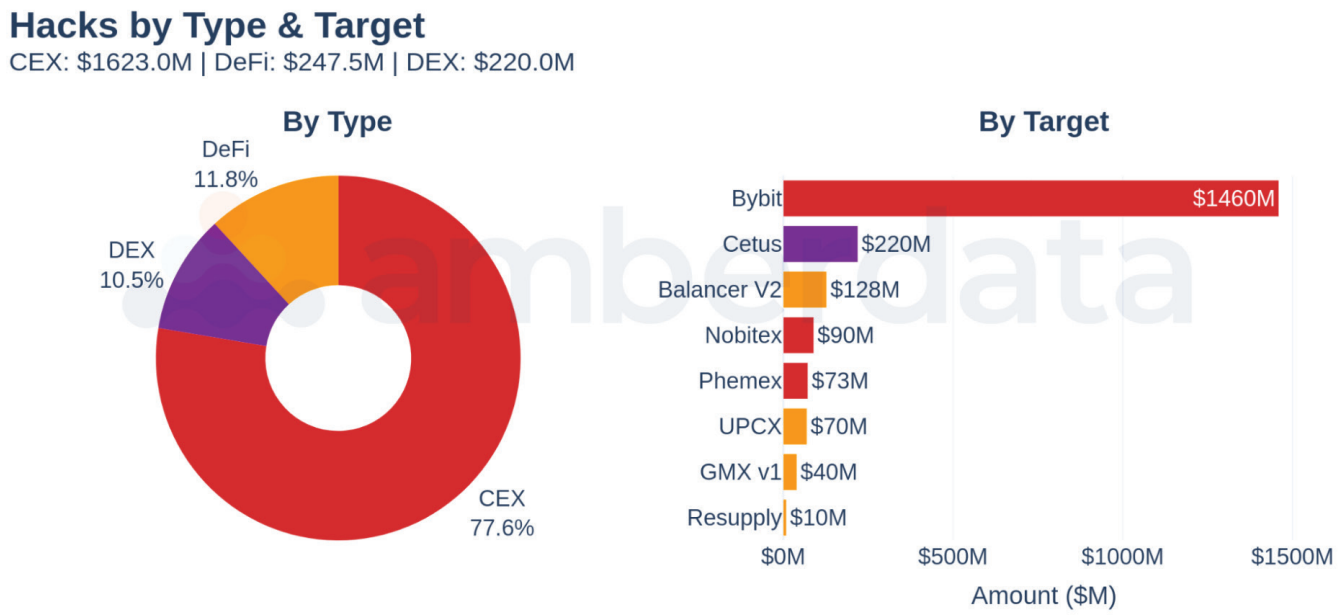


Figure 12.2: Hacks by Type & Target - The pie chart shows category distribution (CEX 78%, DeFi 12%, DEX 10%). The bar chart ranks individual incidents by size. Bybit's dominance is immediately visible - it dwarfs all other incidents combined.

Hot wallet keys remain the industry's Achilles heel. Every major CEX hack in 2025 came from the same fundamental vulnerability - keys that could be accessed through sophisticated attacks on exchange infrastructure.

The State Actors: Lazarus and Predatory Sparrow

Nation-State Threat. Two nation-state hacking groups were responsible for 74% of 2025's total losses. North Korea's Lazarus Group and Iran's Predatory Sparrow represent a threat category that the crypto industry had acknowledged but never fully experienced at this scale. These aren't opportunistic hackers looking for quick profits - they're state intelligence operatives with geopolitical motivations.

Lazarus Group. Lazarus Group has been stealing cryptocurrency since 2017, but 2025 marked a step-change in capability and ambition. The $1.46 billion Bybit hack represented more than North Korea's entire estimated cryptocurrency theft from 2017-2024 combined. The stolen funds reportedly flow into the regime's weapons programs, including nuclear and ballistic missile development. For North Korea, cryptocurrency theft isn't cybercrime - it's a strategic national security operation that circumvents international sanctions.

Predatory Sparrow. Predatory Sparrow, linked to Iranian intelligence services, targeted Nobitex - an Iranian exchange that served as a sanctions evasion tool for the regime. The $90M hack was as much a geopolitical message as a theft. The attack demonstrated that even sanctioned exchanges operating outside Western regulation remained vulnerable. The stolen funds' final destination remains unclear, but the incident highlighted how crypto theft has become a tool of inter-state conflict.

2025 Major Hacks Summary

Total: $2.09B | 8 incidents

Date	Target	Amount	Type	Attribution
Jan 23	Phemex	$73M	CEX	Unknown
Feb 21	Bybit	$1460M	CEX	Lazarus Group
Apr 15	UPCX	$70M	DeFi	Unknown
May 28	Cetus	$220M	DEX	Unknown
Jun 18	Nobitex	$90M	CEX	Predatory Sparrow
Jun 26	Resupply	$10M	DeFi	Unknown
Jul 09	GMX v1	$40M	DeFi	Unknown
Nov 03	Balancer V2	$128M	DeFi	Unknown

Figure 12.3: 2025 Major Hacks Summary - Reference table showing all eight incidents with dates, targets, amounts, types, and attribution. The attribution column reveals that only two groups (Lazarus, Predatory Sparrow) are identified - the remaining $540M came from unknown actors.

74%

Of 2025 losses came from state-sponsored hackers - North Korea's Lazarus Group ($1.46B) and Iran's Predatory Sparrow ($90M). These nation-state actors represent a fundamentally different threat than opportunistic attackers.

SO WHAT?

State-sponsored hackers don't respond to SEC lawsuits, industry blacklists, or international condemnation. They respond only to technical security improvements and institutional-grade custody infrastructure. The Bybit hack demonstrated that regulatory enforcement was the wrong tool - what the industry needed was regulated infrastructure that made attacks harder and recovery more likely.

The Regime Analysis: When Hacks Defined Markets

Security's Role. Mapping security incidents to 2025's regime structure reveals which hacks moved markets and which were absorbed without regime-defining impact. The Amberdata Crypto Market Review 2025 Section 3 details the regime framework; here we focus on security's role.

Regime 2 (Security Shock). This regime was explicitly triggered by the Bybit hack. The February 21 incident created a distinct market phase characterized by exchange outflows, elevated volatility, and negative institutional sentiment. BTC returned -19.6% during this regime - the second-worst performance of the year. The regime lasted until the end of February, only ending when exchange flows stabilized and the market processed the security implications.

Regime 4 (Institutional Expansion). This regime absorbed three incidents totaling $140M without market disruption. The Nobitex, Resupply, and GMX attacks occurred during a period of strong institutional inflows and positive sentiment. BTC returned +8.0% despite the security events. The market had developed resilience - smaller hacks no longer triggered regime changes. Only Bybit-scale events could shift market structure.

Regime 5 (Macro Shock). Notably, this regime had zero security incidents. The October crash that triggered this regime was entirely macro-driven - Federal Reserve policy uncertainty and broader market stress. This distinction matters: October proved that crypto could crash without security catalysts, while February proved that security alone could trigger crashes. The industry faced multiple independent risk vectors.

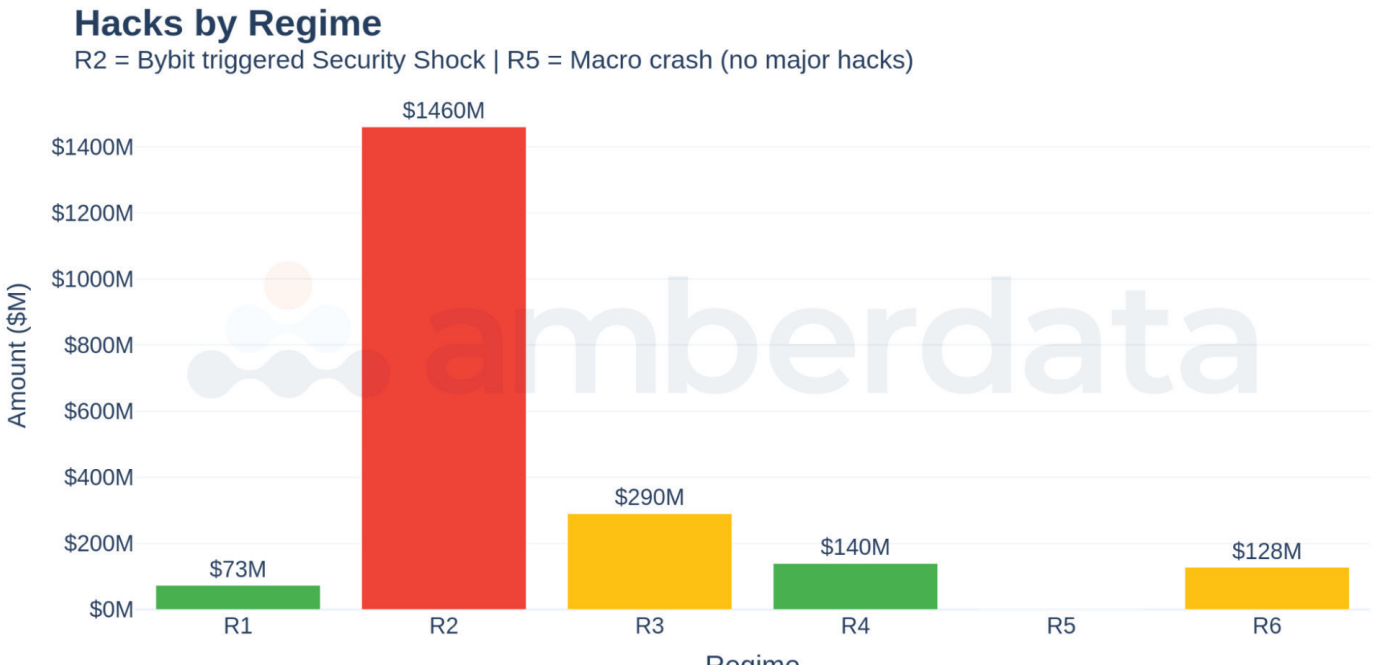


Figure 12.4: Hacks by Regime - Bar chart showing total losses per regime alongside BTC returns. R2's $1.46B concentration and negative return stand out. R4 absorbed $140M with positive returns - demonstrating market resilience to smaller incidents.

Bybit-scale hacks define market regimes. Smaller incidents get absorbed. The industry has developed resilience to $100M events - but not to billion-dollar attacks from state-sponsored actors.

The DeFi Exploits: Sophistication Meets Scale

Evolution in Sophistication. While CEX hacks dominated total losses, DeFi exploits in 2025 revealed an evolution in attack sophistication. These weren't the simple reentrancy bugs of 2021 or the unverified contracts of 2022. They were novel attacks that required deep mathematical understanding and patient preparation.

Cetus DEX ($220M, May). The Cetus attack exploited a vulnerability in Sui's native liquidity protocol. The attacker created a fake asset contract that the protocol's validation logic accepted, allowing them to drain pools of legitimate assets. The exploit required understanding both Sui's unique architecture and Cetus's specific implementation - knowledge that suggested either an insider or extensive reverse engineering.

Balancer V2 ($128M, November). This loss came from a mathematical edge case in the protocol's weighted pool rebalancing mechanism. The bug had survived three independent audits and two years of production operation. The attacker needed to understand not just the code, but the mathematical model underlying it - then construct a series of transactions that exploited the model's edge cases. This level of sophistication represents the new normal for DeFi attacks.

Security Incidents by Regime

R2 triggered by Bybit | R5 was macro-driven

Regime	Name	Hacks	Amount	Targets	BTC Return
R1	Policy Euphoria	1	$73M	Phemex	+9.9%
R2	Security Shock	1	$1460M	Bybit	-19.6%
R3	Infrastructure Build	2	$290M	UPCX, Cetus	+21.5%
R4	Institutional Expansion	3	$140M	Nobitex, Resupply, GMX v1	+8.0%
R5	Macro Shock / Cascade	0	$0M	-	-7.6%
R6	Fragile Recovery	1	$128M	Balancer V2	-20.4%

Figure 12.5: Security Incidents by Regime - Reference table showing hack counts, amounts, targets, and BTC returns per regime. Note R2 (triggered BY Bybit), R4 (absorbed multiple incidents), and R5 (zero security incidents during macro crash).

Major security incidents in 2025 - averaging one every six weeks. The industry operated under constant security pressure, with no extended period free from significant exploits. This cadence demands continuous vigilance, not periodic security reviews.

The Regulatory Connection: Crisis as Catalyst

Paradox of 2025. The paradox of 2025 was that the worst security year in crypto history accelerated rather than derailed institutional adoption. The mechanism was regulatory: security failures demonstrated the inadequacy of the enforcement-based approach and the necessity of proper infrastructure.

Within weeks of the Bybit hack, the SEC paused its enforcement campaign against major exchanges. The agency's new leadership recognized that suing Coinbase and Binance wouldn't stop North Korean hackers. What would stop them - or at least minimize damage - was institutional-grade custody infrastructure that banks could provide, but only if SAB 121 was rescinded. The security crisis made the regulatory argument concrete and urgent.

Causation. The Amberdata Crypto Market Review 2025 Section 13 details the regulatory transformation. Here, the key point is causation: Bybit's $1.46B loss created political space for regulatory action that industry lobbying alone had failed to achieve. The hack demonstrated that crypto's security problem was a national security problem - state-sponsored actors were stealing billions. The solution wasn't more enforcement against US exchanges; it was building infrastructure that made attacks harder and recovery more likely.

SO WHAT?

Security crises can be regulatory catalysts. The Bybit hack demonstrated what years of industry lobbying couldn't: crypto needed regulated infrastructure, not litigation. The 2025 regulatory transformation - SAB 121 rescission, ETF improvements, 401(k) access - was accelerated by security failures that made the case for proper institutional involvement undeniable.

THE BOTTOM LINE

2025's $2.09 billion security crisis was defined by scale, state actors, and unintended consequences. The Bybit hack ($1.46B) represented 70% of losses and triggered Regime 2. State-sponsored hackers (Lazarus Group, Predatory Sparrow) accounted for 74% of total theft. But the crisis accelerated regulatory clarity rather than derailing adoption. The industry's worst security year became a catalyst for its most significant regulatory progress. The Amberdata Crypto Market Review 2025 Section 13 details how this connection reshaped the institutional landscape.

This analysis connects to (S3)'s complete regime analysis, which details the Security Shock period triggered by Bybit. (S11) provides DeFi exploit details and protocol-level analysis.

From here, (S13) details the regulatory transformation that followed the security crisis. (S14) incorporates 2026 security outlook and risk projections into forward scenarios.

The Regulatory Transformation: How 2025 Changed Everything

SAB 121, GENIUS Act, in-kind ETF redemptions, 401(k) access - the before and after

KEY TAKEAWAYS

- **SAB 121 rescinded - banks can now custody crypto**. The January 23 rescission removed the accounting treatment that had prevented traditional banks from holding digital assets on behalf of clients. Major financial institutions can now offer institutional-grade crypto custody services, fundamentally changing the competitive landscape.
- **GENIUS Act passed - first US federal stablecoin framework.** The May 26 passage created clear regulatory requirements for stablecoin issuers, reserve backing standards, and consumer protections. This ended years of regulatory uncertainty that had constrained US stablecoin development and banking relationships.
- **In-kind ETF redemptions approved - eliminated NAV premiums.** The July 29 SEC approval allowed Bitcoin ETFs to create and redeem shares using actual Bitcoin rather than cash. This improved tracking efficiency, reduced trading costs, and tightened spreads for institutional and retail investors alike.
- **401(k) access enabled - unlocking $40+ trillion in retirement assets.** The August 7 executive order allowed retirement plans to offer crypto investment options. This represents the largest potential demand pool in history - American retirement accounts hold over $40 trillion in assets that can now allocate to Bitcoin through regulated channels.

On January 1, 2025, crypto existed in a regulatory gray zone. Banks couldn't custody it. Stablecoins had no federal framework. ETFs required inefficient cash-only redemptions. Retirement accounts couldn't touch it. The SEC was actively suing major exchanges. By December 31, every single one of those barriers had fallen. Banks could custody crypto. Stablecoins had federal legislation. ETFs had in-kind redemptions. 401(k)s could allocate to Bitcoin. The SEC had paused its enforcement campaign. The transformation was faster and more comprehensive than anyone predicted. Here's how it happened, and what it means for 2026.

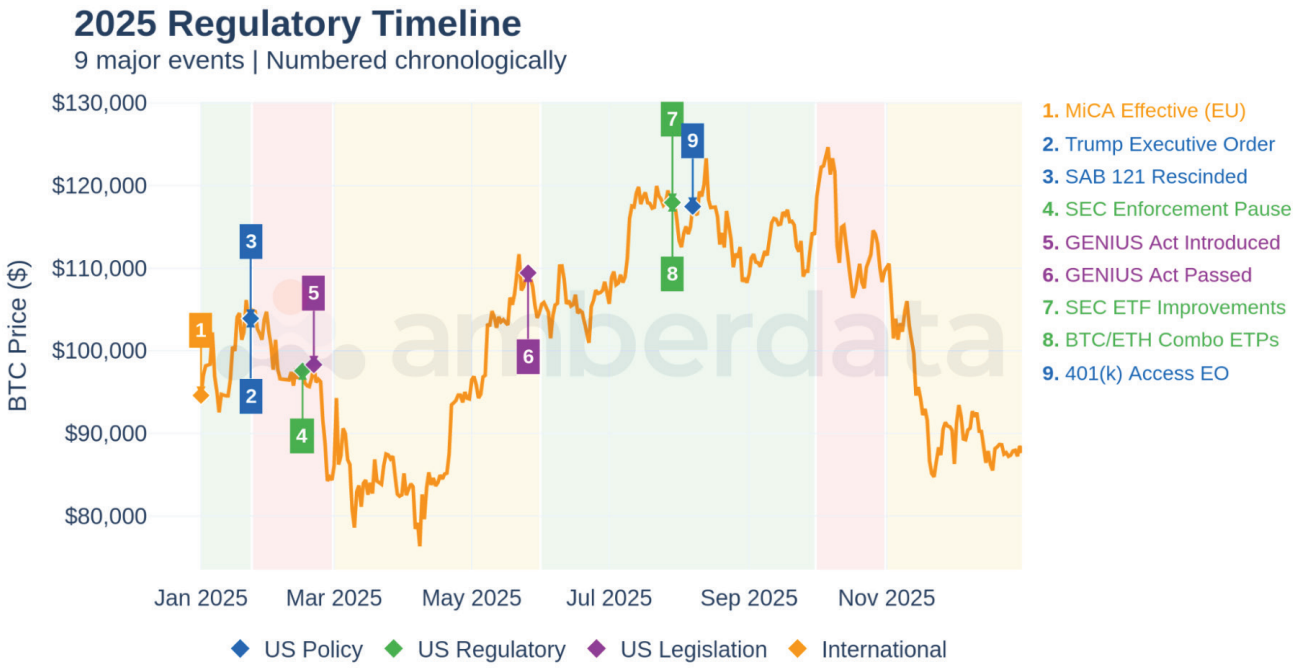


Figure 13.1: 2025 Regulatory Timeline - Nine major regulatory events mapped against BTC price. Note the clustering in January (executive orders, SAB 121) and the summer (GENIUS passage, ETF improvements, 401(k) access). The regime shading shows how regulatory catalysts aligned with market phases.

The Foundation: January 2025

MiCA Effect. The regulatory transformation began immediately. On January 1, the European Union's Markets in Crypto-Assets (MiCA) regulation went into full effect, creating the world's first comprehensive crypto regulatory framework for a major economy. USDC gained market share against USDT in European markets as Circle's compliance with MiCA requirements gave it a structural advantage. The significance extended beyond Europe - it demonstrated that clear regulatory frameworks could coexist with thriving crypto markets.

January 23 Double Impact. Three weeks later, January 23 delivered a one-two punch that transformed the US regulatory landscape. The Trump administration's executive order affirmed crypto rights and explicitly protected self-custody - a sharp reversal from the previous administration's approach. The order established that Americans have the right to hold and transact in digital assets without government interference, and specifically prohibited the creation of a central bank digital currency that could compete with private cryptocurrencies.

SAB 121 Rescinded. The same day, SAB 121 was formally rescinded. This single change unlocked traditional banking infrastructure for crypto custody. Banks like JPMorgan, Bank of America, and Citigroup could now compete directly with Coinbase Custody and BitGo for institutional assets. The competitive implications were immediate and significant. Traditional banks brought balance sheet strength, regulatory relationships, and existing client bases that crypto-native custodians couldn't match. The custody landscape was fundamentally reshaped.

Major regulatory milestones in 2025 - the most consequential year for crypto policy in history. Three US policy changes, three US regulatory actions, two pieces of US legislation, and one international framework created the foundation for institutional-scale adoption.

The Enforcement Shift: February 2025

Philosophy Change. The SEC's February 15 enforcement pause marked a fundamental shift in regulatory philosophy. Cases against Coinbase, Binance, and other major exchanges were paused or dropped. The agency's new leadership signaled that enforcement actions were not the right tool for establishing regulatory clarity - legislation was. This pivot freed exchanges from the legal uncertainty that had constrained their operations and product development for years.

Security Crisis Context. The timing was notable. The enforcement pause came just days before the Bybit hack - the largest in crypto history at $1.46 billion. The security crisis could have triggered regulatory crackdown. Instead, it accelerated the recognition that crypto's problems required infrastructure solutions, not enforcement actions. State-sponsored hackers don't respond to SEC lawsuits. They respond to institutional-grade custody and security infrastructure - exactly what the new regulatory framework was designed to enable.

GENIUS Introduction. Five days after the enforcement pause, on February 20, the GENIUS Act was formally introduced in Congress. The bill proposed the first federal framework for stablecoin issuance, reserve requirements, and consumer protections. Unlike previous crypto legislation attempts, GENIUS had bipartisan support from the outset - a direct result of industry lobbying efforts and the growing recognition that stablecoin regulation was a matter of dollar dominance, not just financial innovation.

The 2025 Regulatory Transformation

Every major barrier to institutional adoption removed

Category	Before 2025	After 2025
Bank Custody	Prohibited (SAB 121)	Allowed
ETF Redemptions	Cash only (inefficient)	In-kind (efficient)
Stablecoins	Regulatory limbo	Federal framework (GENIUS)
401(k) Access	Not permitted	Allowed
EU Framework	Fragmented	MiCA unified
SEC Stance	Enforcement actions	Paused/dropped

Figure 13.2: Before/After 2025 Comparison - Six categories of institutional barriers that existed on January 1 and were resolved by December 31. Every major impediment to traditional finance's engagement with crypto was addressed in a single year.

On January 1, 2025, every major barrier to institutional crypto adoption was still standing. By December 31, they had all fallen. Banks can custody. Stablecoins have a framework. ETFs have in-kind redemptions. Retirement accounts can allocate. The SEC has paused enforcement. The transformation was complete.

The Legislation: GENIUS Act

Watershed Moment. The GENIUS Act's May 26 passage represented a watershed moment for US crypto policy. For the first time, stablecoin issuers had clear federal guidelines covering reserve composition, audit requirements, redemption rights, and operational standards. The legislation established that stablecoins backed by US dollars and held to federal standards would not be considered securities - resolving a classification question that had plagued the industry since Tether's early days.

Immediate Implications. The practical implications were immediate and far-reaching. Banks could now issue their own stablecoins under a clear regulatory framework. Circle's USDC gained additional legitimacy as a GENIUS-compliant stablecoin. New entrants, including traditional financial institutions, began developing stablecoin products with regulatory certainty. PayPal expanded its stablecoin efforts. Visa and Mastercard announced blockchain-based settlement pilots. The infrastructure for a dollar-denominated digital payment system - running on public blockchains but with full regulatory oversight - was now in place.

Geopolitical Dimension. The geopolitical dimension was equally significant. China had launched a digital yuan. Europe had MiCA. The US had been falling behind in digital currency infrastructure. GENIUS positioned the dollar to maintain its global reserve currency status in an increasingly digital financial system. This national interest framing helped secure bipartisan support that pure financial innovation arguments had failed to achieve in previous legislative attempts. Dollar dominance, not crypto enthusiasm, drove the legislation across the finish line.

2025 Regulatory Events

9 major milestones | Row color = category

Date	Event	Impact	Category
Jan 01	MiCA Effective (EU)	USDC gains vs USDT in Europe	International
Jan 23	Trump Executive Order	Affirmed crypto rights, self-custody	US Policy
Jan 23	SAB 121 Rescinded	Banks can now custody crypto	US Policy
Feb 15	SEC Enforcement Pause	Coinbase, Binance cases dropped	US Regulatory
Feb 20	GENIUS Act Introduced	Stablecoin framework proposed	US Legislation
May 26	GENIUS Act Passed	Federal stablecoin framework	US Legislation
Jul 29	SEC ETF Improvements	In-kind redemptions approved	US Regulatory
Jul 29	BTC/ETH Combo ETPs	Multi-asset ETFs approved	US Regulatory
Aug 07	401(k) Access EO	Retirement accounts can hold crypto	US Policy

Figure 13.3: 2025 Regulatory Events - All nine major regulatory milestones with dates, categories, and market impact descriptions. Note the progression from foundation-laying (January-February) through legislation (May) to implementation (July-August).

$40T+

In US retirement assets now eligible for crypto allocation following the August 7 executive order. This represents the largest potential demand pool ever opened to Bitcoin - a structural shift that will unfold over years as 401(k) plans add crypto options and participants make allocation decisions.

SO WHAT?

The GENIUS Act demonstrates that crypto can achieve regulatory clarity through legislation rather than enforcement. The bipartisan coalition that passed stablecoin reform could be the template for broader crypto legislation in 2026. Market structure bills, custody standards, and exchange regulations may follow the same path - Congressional action rather than SEC rulemaking by enforcement.

The ETF Evolution: July 2025

Structural Limitation Resolved. Bitcoin ETFs launched in January 2024 with a structural limitation: cash-only creation and redemption. When authorized participants wanted to create new ETF shares, they had to deliver cash, which the ETF then used to buy Bitcoin. This introduced friction, timing risk, and tracking error. The July 29 approval of in-kind creation and redemption resolved all three issues simultaneously.

Operational Standard. Under the new framework, authorized participants can deliver Bitcoin directly to create shares or receive Bitcoin directly when redeeming. This mirrors how equity ETFs operate and represents the operational standard for efficient exchange-traded products. The practical benefits are measurable: tighter NAV tracking, reduced spreads, lower operational costs, and more efficient arbitrage. For institutions executing large trades, the improvement in execution quality was immediate and significant.

Combined Products. The same day brought approval for combined BTC/ETH exchange-traded products. For the first time, investors could gain exposure to both major cryptocurrencies through a single regulated product. This simplified portfolio construction for advisors and institutions who wanted diversified crypto exposure without managing multiple positions. The product innovation signaled that the SEC was now facilitating, not impeding, legitimate crypto investment vehicles.

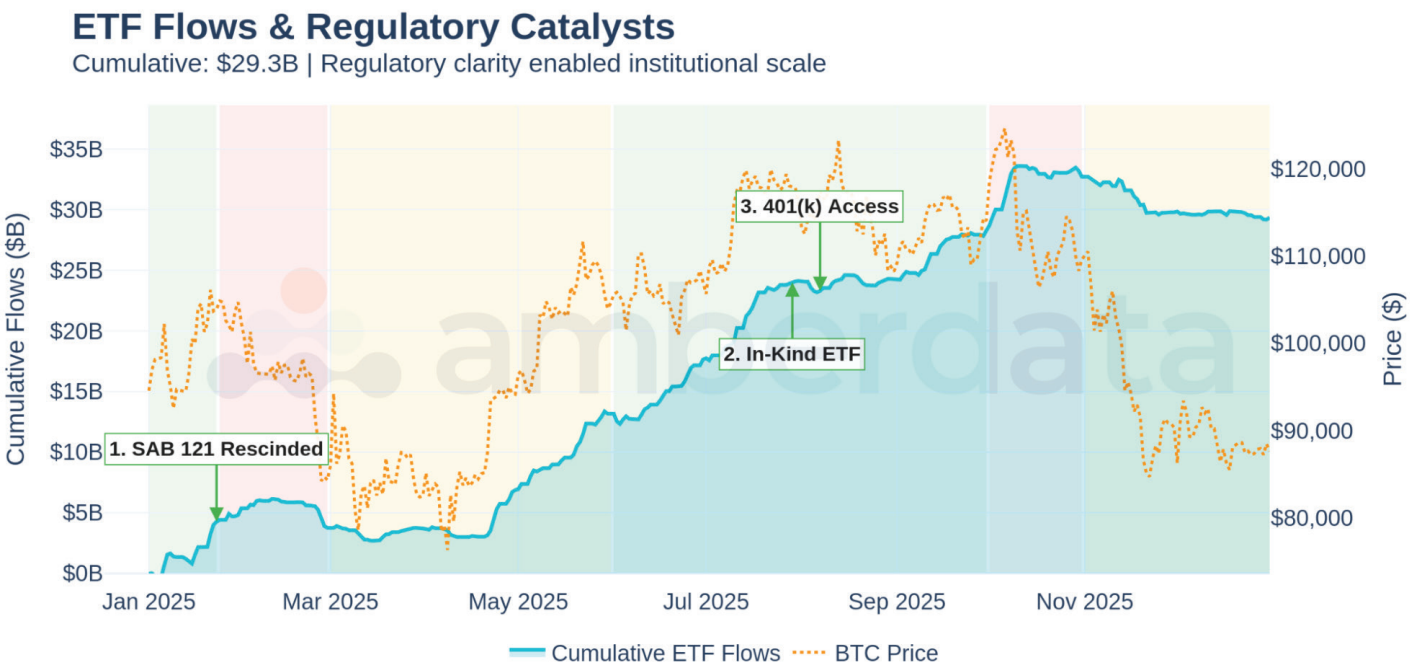


Figure 13.4: ETF Flows & Regulatory Catalysts - Cumulative ETF flows reached $29.3 billion by year end. The vertical lines mark key regulatory catalysts: SAB 121 rescission (January 23), in-kind redemption approval (July 29), and 401(k) access (August 7). Note how flows accelerated following positive regulatory developments.

Regimes with positive regulatory developments saw strong ETF inflows. Regimes without them saw flat or negative flows. The correlation between regulatory progress and institutional capital commitment was unmistakable throughout 2025.

The Retirement Revolution: August 2025

Long-Term Implications. The August 7 executive order permitting 401(k) crypto allocation may prove to be 2025's most consequential regulatory development - not for immediate impact, but for long-term structural implications. American retirement accounts hold over $40 trillion in assets. Even a 1% average allocation to Bitcoin would represent $400 billion in demand - roughly equal to total ETF inflows since launch.

Gradual Implementation. The implementation will be gradual but inevitable. Plan sponsors need to add crypto options to their investment menus. Recordkeepers like Fidelity, Vanguard, and Charles Schwab need to build infrastructure for tracking crypto holdings within retirement accounts. Participants need to make allocation decisions within their plans. Each step takes time. But the direction is now clear - retirement accounts will include crypto, and over the next decade, hundreds of billions in retirement assets will likely flow into Bitcoin through regulated channels.

Demographic Shift. This represents a fundamental expansion of the potential investor base beyond active traders and institutions to passive, long-term retirement savers. The demographic shift matters. Retirement savers are not trying to time markets or trade volatility. They are building long-term wealth with multi-decade time horizons.

The demand characteristics differ markedly from existing channels. Retirement contributions are regular and automatic - payroll deductions flow into allocated funds regardless of market conditions. This creates steady, non-speculative demand that is less sensitive to price volatility than active trading. The holder profile shifts toward patient capital. This structural change in the investor base may reduce Bitcoin's volatility over time, though the effect will take years to materialize fully as retirement plans gradually add options and participants make allocations.

Categories of institutional barriers removed in 2025: bank custody, ETF efficiency, stablecoin framework, retirement access, EU regulatory clarity, and SEC enforcement posture. Each represented a structural impediment to traditional finance engaging with crypto. All six are now resolved.

Regulatory Progress by Regime

Positive regulation correlated with stronger flows

Regime	Name	Events	Key Events	ETF Flow	BTC Return
R1	Policy Euphoria	3	MiCA Effective (EU) Trump Executive Order SAB 121 Rescinded	$4.3B	+9.9%
R2	Security Shock	2	SEC Enforcement Pause GENIUS Act Introduced	$-0.5B	-19.6%
R3	Infrastructure Build	1	GENIUS Act Passed	$9.4B	+21.5%
R4	Institutional Expansion	3	SEC ETF Improvements BTC/ETH Combo ETPs 401(k) Access EO	$15.2B	+8.0%
R5	Macro Shock / Cascade	0	—	$4.4B	-7.6%
R6	Fragile Recovery	0	—	$-3.4B	-20.4%

Figure 13.5: Regulatory Progress by Regime - Regime-by-regime regulatory events alongside ETF flows and BTC returns. Note the correlation: regimes with positive regulatory catalysts (R1, R3, R4) saw stronger flows and returns than regimes without (R5, R6). Policy momentum translated directly to institutional capital.

The Regime Connection

Unmistakable Relationship. The relationship between regulatory developments and market performance in 2025 was unmistakable. Regimes with positive regulatory catalysts saw strong ETF inflows and positive returns. Regimes without regulatory news saw flat or negative flows. The pattern suggests that institutional capital responds directly to policy clarity - not just price momentum.

Positive Catalysts. Regime 1 (Policy Euphoria) and Regime 4 (Institutional Expansion) both featured significant regulatory developments and both saw strong ETF inflows. Regime 3 (Infrastructure Build) included the GENIUS Act passage and maintained healthy flow levels. By contrast, Regime 5 (Macro Shock) and Regime 6 (Fragile Recovery) had no major regulatory catalysts and saw the weakest flow performance of the year.

2026 Implications. This pattern has significant implications for 2026. If regulatory momentum continues - additional crypto legislation, further SEC clarity, state-level adoption frameworks - institutional flows should follow. If regulatory progress stalls, flows may plateau regardless of price action. The correlation was too consistent to ignore.

SO WHAT?

2025 built the regulatory infrastructure. 2026 will test whether adoption follows. The barriers are gone - banks can custody, ETFs are efficient, stablecoins have rules, retirement accounts can participate. What remains is execution: will institutions actually use this infrastructure? Will retirement plans actually add crypto? Will banks actually launch custody services? The policy work is done. The implementation work is just beginning.

Looking Ahead: The 2026 Regulatory Landscape

Foundation Not Finished. The regulatory transformation of 2025 created a foundation, not a finished structure. Several major policy questions remain unresolved and will shape 2026's landscape.

Market Structure. Market structure legislation is pending. Bills addressing exchange regulation, custody standards, and investor protection frameworks have been introduced but not yet passed. Whether Congress can replicate GENIUS Act's bipartisan success on broader crypto legislation remains uncertain. The absence of comprehensive market structure rules means exchanges still operate under inconsistent and overlapping regulatory frameworks from the SEC, CFTC, and state regulators.

State-Level. State-level regulation continues to evolve independently. While federal frameworks addressed many issues, states retain significant authority over money transmission, consumer protection, and certain financial services. The patchwork of state licensing requirements creates operational complexity for firms serving customers nationwide. New York's BitLicense remains controversial. Texas has emerged as a crypto-friendly jurisdiction. Federal preemption of state crypto regulation is actively debated but not yet resolved.

Tax Treatment. Tax treatment questions persist and create friction. The IRS has provided guidance on crypto taxation, but significant ambiguities remain around staking rewards, DeFi transactions, wrapped tokens, and NFT classifications. Clearer tax rules would reduce the compliance burden and encourage broader participation. Tax legislation addressing digital assets specifically may advance in 2026 as the industry pushes for clarity.

THE BOTTOM LINE

2025 will be remembered as the year crypto achieved regulatory legitimacy in the United States. Every major barrier to institutional adoption - bank custody, ETF efficiency, stablecoin rules, retirement access, enforcement uncertainty - was addressed in twelve months. The speed and comprehensiveness of the transformation exceeded even optimistic predictions. The framework is now in place. The question for 2026 is whether adoption will follow at the pace the infrastructure now enables. The Amberdata Crypto Market Review 2025 Section 14 projects scenarios for how this regulatory foundation may translate to flows, prices, and market structure in the year ahead.

This analysis connects to (S12)'s examination of the security crisis that accelerated regulatory clarity. (S8) provides ETF flow dynamics and institutional capital patterns that demonstrate regulatory impact.

From here, (S14) projects 2026 regulatory and adoption scenarios. (S3) provides the complete regime analysis connecting regulation to market structure throughout the year.

2026 Outlook: The End of the Four-Year Cycle

BTC Institutional flows have replaced halving as the dominant price driver - here's what that means

KEY TAKEAWAYS

- **The halving cycle is dead.** ETFs now move 12x daily mining supply, making institutional flows the marginal price driver - not miner selling.
- **Base case: range-bound.** 50% probability of $90K-$120K until macro catalyst. Bull case (25%): $120K-$180K on 401(k) launches and Fed cuts. Bear case (20%): $60K-$80K on macro deterioration. Expected value: ~$109K.
- **De-risked but fragile.** October's leverage purge created healthier positioning, but order book depth remains 40% below pre-crash levels.
- **Watch for regime change**. Basis APR >8%, depth recovery, consistent ETF inflows >$1B/week, and 401(k) allocation announcements signal the next leg.

For a decade, Bitcoin's price followed a four-year halving cycle with religious predictability. The supply shock of each halving - block rewards cut in half - created bull markets that peaked roughly 12-18 months later. The 2012 halving preceded the run to $1,000. The 2016 halving preceded the run to $20,000. The 2020 halving preceded the run to $69,000. Traders built entire strategies around this cycle. Institutions timed entries to post-halving windows. The halving was the fundamental driver of Bitcoin's long-term price appreciation, and anyone who understood this simple fact outperformed those who didn't.

In 2025, that paradigm broke. The mathematics changed fundamentally, and the old models stopped working.

12x

ETF daily flows vs daily mining supply. The halving reduced new supply by $40M/day. ETFs routinely move $500M+ daily.

ETF flows now move more capital in a month than miners produce in a year. The April 2024 halving reduced new supply by approximately 450 BTC per day - roughly $40 million at current prices. This sounds significant until you compare it to ETF flows. In 2025, ETFs routinely saw daily flows of $500 million or more. On peak days, ETF inflows topped $1 billion, equivalent to 25 days of mining supply absorbed in 24 hours.

The mathematics are unambiguous: institutional flows have superseded mining supply as the marginal price driver. When ETFs are buying, prices rise regardless of mining output. When ETFs are selling, prices fall regardless of the halving's supply constraint. The halving cycle is over. The institutional flow cycle has begun.

This article synthesizes the full Amberdata Crypto Market Review 2025 analysis into a 2026 outlook: the current market setup, scenario analysis with probability-weighted outcomes, the watchlist indicators that will signal regime changes, and the catalysts that could accelerate or derail each scenario.

As context for this outlook, the full Amberdata Crypto Market Review 2025 and 2026 Outlook identifies six distinct market regimes:

- **Regime 1: Policy Euphoria (Jan-Feb)** - Post-election rally, regulatory optimism
- **Regime 2: Security Shock (Feb-Mar)** - Bybit hack, confidence crisis
- **Regime 3: Infrastructure Build (Mar-Jul)** - Quiet accumulation, regulatory progress
- **Regime 4: Institutional Expansion (Jul-Oct)** - ETF inflows surge, rally to highs
- **Regime 5: Macro Shock (Oct)** - Tariff headlines, liquidation cascade
- **Regime 6: Fragile Recovery (Nov-Dec)** - De-risked but impaired liquidity

The year's arc, from euphoria through crisis to fragile equilibrium, sets the stage for 2026.

Current Setup: De-Risked but Fragile

Bitcoin enters 2026 in a peculiar state: de-risked by October's leverage purge but still showing signs of structural fragility. The market has corrected from Regime 4's euphoric highs, leverage has been flushed from the system, and valuations have reset to more sustainable levels. But the recovery remains tentative, with liquidity impaired and the carry trade unattractive. Understanding this setup is essential for positioning in the year ahead.

The October correction wasn't a random event - it was a necessary reset. Open interest had reached unsustainable levels. The basis trade was overcrowded. Funding rates signaled excessive leverage. When the tariff headlines hit, the overleveraged market couldn't absorb the selling pressure. The cascade that followed, detailed in Section 7, purged weak hands and reset positioning. What emerged is a market that's healthier structurally but waiting for direction.

Current Setup Dashboard: De-Risked but Fragile

BTC: $86,000 - $90,000 | 1 Bullish | 4 Neutral | 2 Bearish

Indicator	Current	Status	Threshold
Basis APR	5.4%	🔴	>10% Bullish, <6% Bearish
Open Interest	-43% vs peak	🟡	Deleveraging complete
Funding Rate	4.4% APR	🟡	>8% Bullish, <-5% Bearish
Order Book Depth	~40% below peak	🔴	Fragility persists
ETF Flows (30d)	$-0.4B	🟡	>$2B Bullish, <-$2B Bearish
HODL Waves (LTH)	Accumulating	🟢	Strong hands buying
MVRV	2.39	🟡	>3.5 Overheated, <1.0 Undervalued

Figure 14.1: Current Setup Dashboard - Note the basis APR compression below 6% (carry trade dead) while HODL waves show accumulation (strong hands buying). This divergence is the setup.

Key Indicator Status:

Basis APR: Compressed below 6% - carry trade unattractive, leverage demand subdued
Open Interest: Down significantly from September peaks - deleveraging complete
Funding Rates: Oscillating around neutral - no directional conviction
Order Book Depth: Impaired, ~40% below pre-crash levels - fragility persists
ETF Flows: Volatile, neither consistently positive nor negative - institutional uncertainty
HODL Waves: Long-term holders accumulating - strong hands buying weakness
MVRV: Below 3.0, not euphoric - room to run before overvaluation

SO WHAT?

The market is coiled but not ready to spring. Strong hands are accumulating while speculative capital waits on the sidelines. The carry trade that powered 2025's rally (basis APR >15%) is absent. Until it returns, expect range-bound price action. The catalyst will likely be external: Fed cuts, 401(k) launches, or a macro risk-on shift.

The Flow Cycle: Why the Halving No Longer Matters

The April 2024 halving reduced Bitcoin's daily new supply from approximately 900 BTC to 450 BTC - roughly $40 million per day at $90,000 prices. This was historically significant: previous halvings created supply shocks that took months to absorb, driving prices higher as demand exceeded new supply.

But ETFs changed the calculus entirely. In 2025, ETF daily flows regularly exceeded $500 million - more than 12x the daily mining supply. On peak days, ETF inflows topped $1 billion. The marginal price driver is no longer the trickle of new mining supply but the tsunami of institutional flows. When ETFs are buying, prices rise regardless of mining output. When ETFs are selling, prices fall regardless of the halving's supply constraint.

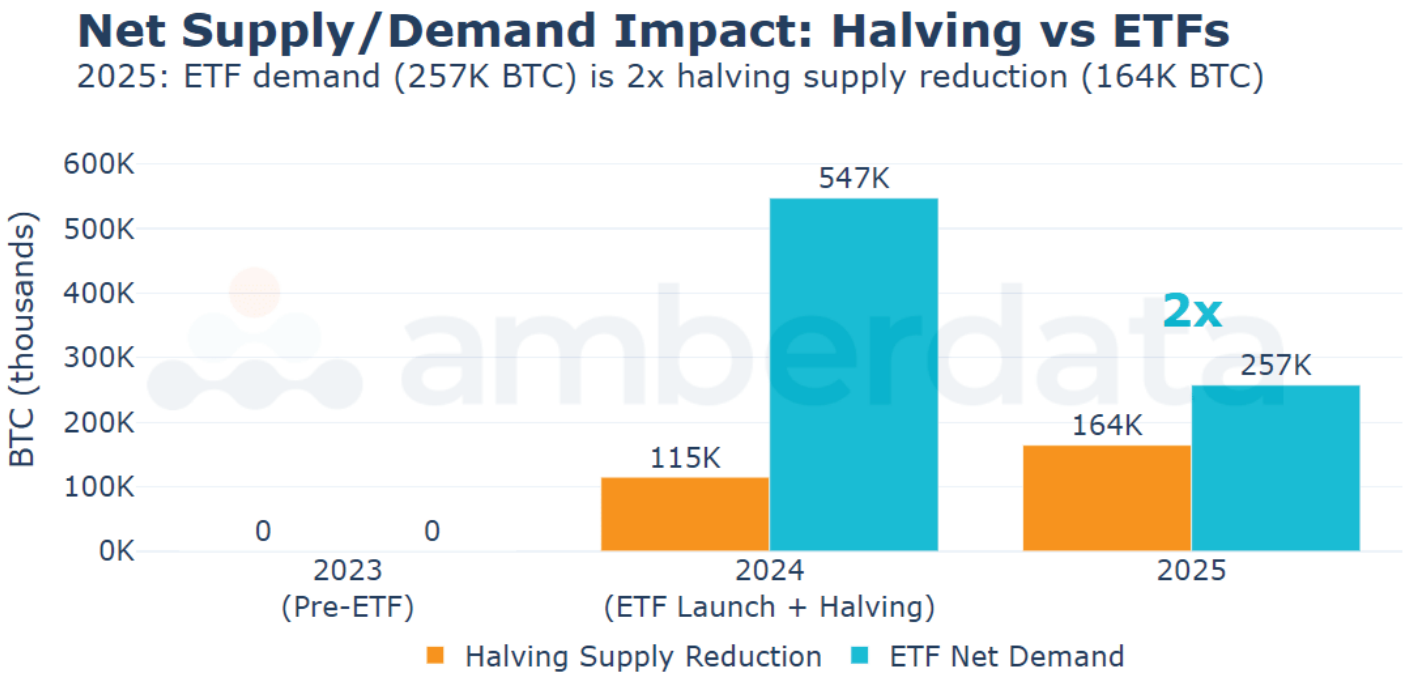


Figure 14.2: Net Supply/Demand Impact. ETF demand is 2x the halving's supply reduction. The flow cycle has replaced the halving cycle.

On peak days, ETF inflows topped $1 billion - equivalent to 25 days of mining supply absorbed in 24 hours.

New Cycle Drivers: The new cycle drivers operate on different timescales than the four-year halving rhythm:

Fed Policy: Rate cuts support risk assets; rate hikes pressure them. Fed cycles don't align with halvings

ETF Flow Momentum: Flows self-reinforce - inflows beget more inflows. Momentum cycles last months, not years

Regulatory Catalysts: Policy decisions unlock or restrict capital pools. 401(k) access could dwarf historical ETF volumes

Macro Conditions: Risk-on vs risk-off positioning affects institutional allocation independent of Bitcoin-specific factors

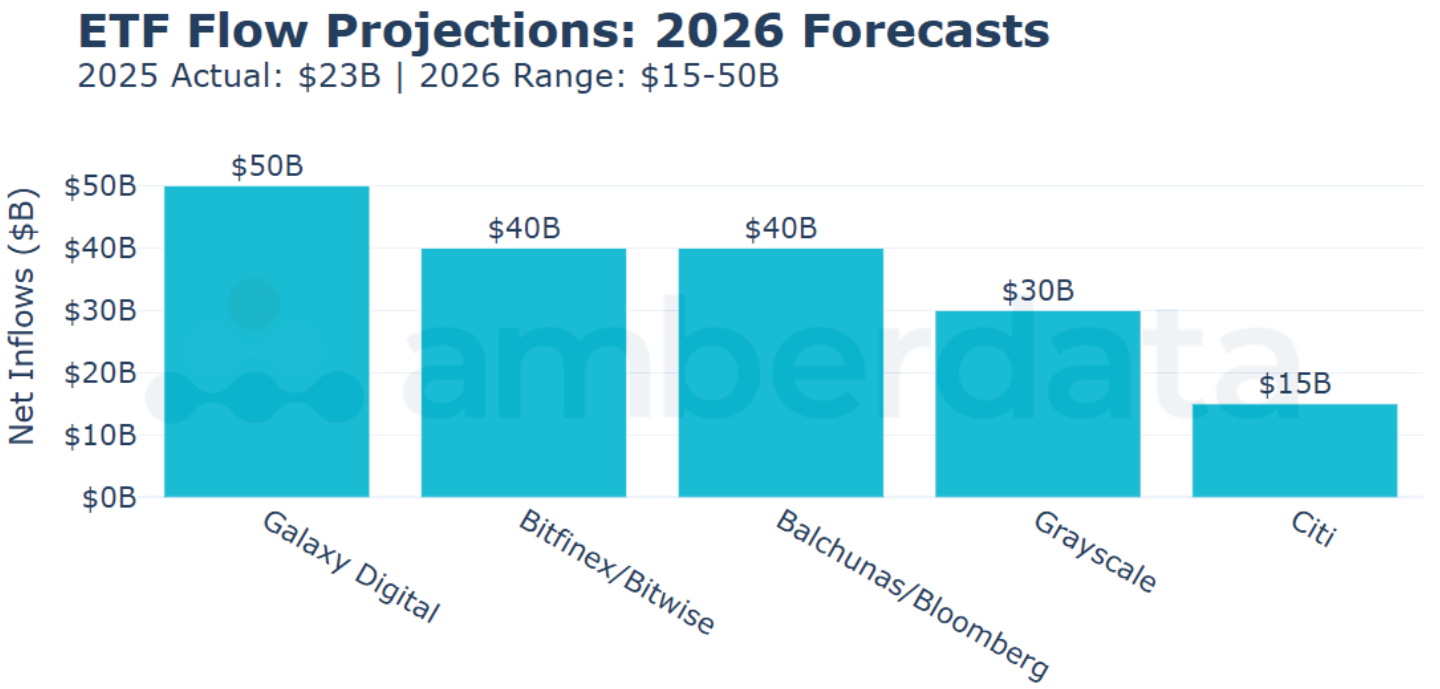


Figure 14.3: ETF Flow Projections. 2026 forecasts range $15-50B vs $23B actual in 2025. Galaxy most bullish; Citi conservative.

The Cost Basis Floor. The ETF cost basis around $80,000 creates a psychological and practical floor. Institutional investors who allocated via ETFs in 2024-2025 have an average cost basis in this range. These investors are unlikely to panic sell at losses - institutional mandates typically don't permit realizing losses without a fundamental thesis change, and the regulatory clarity thesis has only strengthened. The floor isn't absolute - severe macro stress like a 2008-style crisis could breach it - but it represents a new structural feature of Bitcoin's market dynamics.

2026 Scenario Analysis: Probability-Weighted Outcomes

The scenario framework assigns probabilities to distinct market outcomes, each with specific assumptions and early warning signals. Use these scenarios not as predictions but as a framework for thinking about potential paths and positioning appropriately for multiple outcomes.

2026 Scenario Details

Current: $88K | Monitor triggers for regime transitions

Scenario	Prob	Price Range	vs Now	Setup
Bull Case	25%	$120K - $180K	+71%	Institutional FOMO + sovereign adoption
Base Case	50%	$90K - $120K	+20%	Institutional accumulation, macro stabilizes
Chop	5%	$75K - $110K	+6%	Extended consolidation with swings
Bear Case	20%	$60K - $80K	-20%	Demand slowdown like 2017/2021

Figure 14.4: 2026 Scenario Analysis - Scenario Probability Distribution - Base case dominates at 50%, but note the asymmetric upside: bull case ($120-180K) has higher expected return than bear case downside ($60-80K).

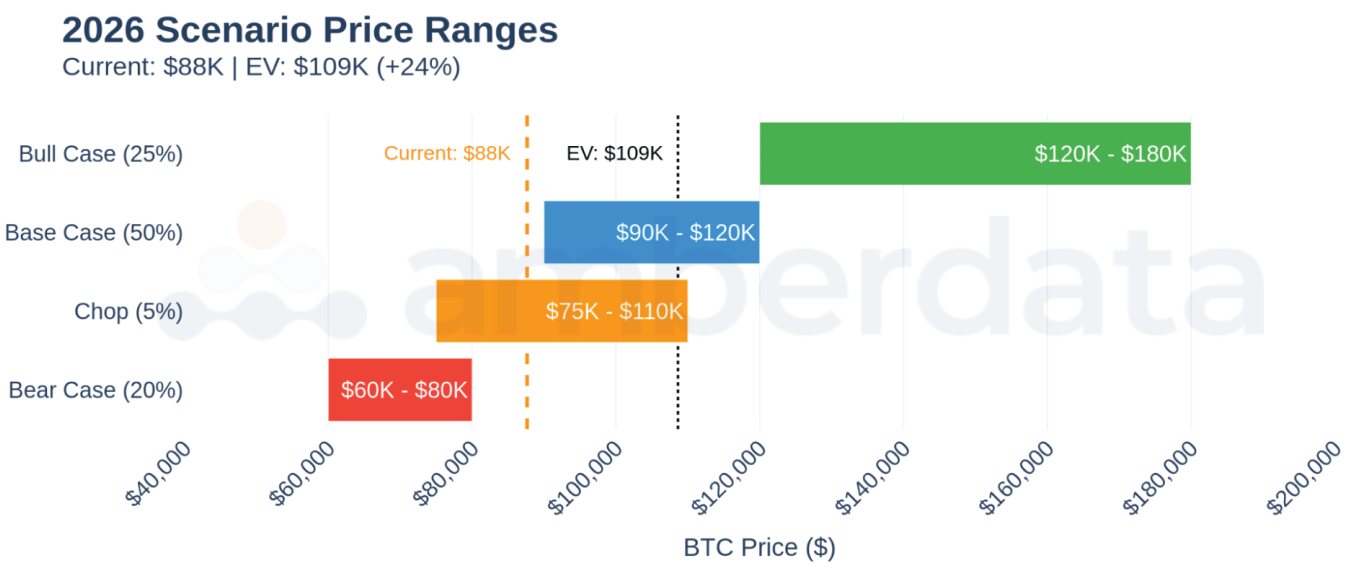


Figure 14.5: 2026 Price Scenario Ranges - Current price shown as horizontal line. Note the $80K ETF cost basis floor providing structural support in all scenarios except severe macro stress.

BTC Base Case (50% Probability): $90,000 - $120,000

Setup: Range-bound consolidation until macro catalyst arrives. This is the 'muddle through' scenario where conditions don't deteriorate significantly but don't improve dramatically either. The market trades in a wide range, frustrating both bulls waiting for breakouts and bears expecting collapse. Volatility compresses. Interest fades. Then something changes.

Key Assumptions: Federal Reserve eventually cuts rates in H1 2026, providing risk-asset support but not unleashing euphoria. ETF flows stabilize around neutral, neither persistently positive nor negative. Liquidity gradually recovers as market makers rebuild positions over months. No major security incidents or regulatory reversals disrupt the fragile equilibrium.

Early Signals: Basis APR recovering to 8-10% would indicate carry trade revival. ETF flows turning consistently positive would show institutional re-engagement. Order book depth improving toward pre-crash levels would reduce fragility. Funding stabilizing in positive territory would confirm directional conviction returning.

Probability-weighted expected value:

(50% x $105K) + (25% x $150K) + (20% x $70K) + (5% x $92.5K) = ~$109K

BTC Bull Case (25% Probability): $120,000 - $180,000

Setup: Institutional re-engagement accelerates alongside sovereign adoption. Multiple bullish catalysts align, creating momentum that feeds on itself. The flow cycle enters its expansion phase.

Key Assumptions: Fed cuts aggressively as inflation concerns fade, unleashing risk appetite across all markets. 401(k) products launch at scale, opening the $40 trillion retirement capital pool. Additional sovereign nations announce Bitcoin reserve allocations following the precedent set in 2024-2025. Ethereum ETF staking approved, validating the broader crypto institutional framework and attracting yield-seeking capital.

Early Signals: ETF inflows accelerating above $1B weekly would confirm institutional FOMO returning. Basis APR expanding to 15%+ would indicate aggressive leverage demand. New accumulation cohorts appearing in HODL wave data would show fresh capital entering at scale.

$40 trillion in U.S. retirement accounts.
Even 1% allocation = $400 billion in potential demand.

BTC Bear Case (20% Probability): $60,000 - $80,000

Setup: Macro conditions deteriorate beyond current expectations, and risk-off sentiment dominates global markets. Crypto correlation to traditional risk assets increases during the selloff.

Key Assumptions: Trade war escalates beyond current tariff levels, impacting global growth and corporate earnings. Recession fears materialize with employment weakness and consumer pullback becoming evident in the data. A major exchange failure or security incident destroys confidence in the space. Regulatory reversal (unlikely given 2025's transformation but remains a tail risk) undermines the institutional framework.

Early Signals: Persistent ETF outflows exceeding $1B weekly would confirm institutional capitulation. Basis collapsing below 3% would indicate carry trade is fully unwound. Stablecoin redemptions would show capital fleeing the ecosystem entirely. The $80K ETF cost basis could be tested, though institutional holders are unlikely to panic sell at losses without a fundamental thesis change.

BTC Volatility/Chop Case (5% Probability): $75,000 - $110,000

Setup: Extended range with violent swings in both directions, no clear trend emerges. This scenario is frustrating for directional traders but potentially profitable for volatility and range-bound strategies. Market participants lose conviction in either direction.

Early Signals: High funding rate volatility swinging between positive and negative extremes. Open interest spikes followed by rapid collapses as positions get liquidated in both directions. ETF flows showing no consistent pattern - inflows one week, outflows the next.

Institutional BTC Price Targets (2026)

28 institutions | Consensus: $143K-$170K | Bear floor: $70K-$78K

Institution	Bear	Base	Bull
Citi	$78K	$143K	$189K
Standard Chartered	$72K	$150K	—
JPMorgan	$94K	$170K	—
Bernstein	—	$150K	$200K
Galaxy Digital	$50K	—	$250K
CryptoQuant	$56K	—	$180K
TD Cowen	$55K	$128K	$155K
VanEck	—	$180K	—

Figure 14.6: Institutional BTC Price Targets. Base cases cluster $150-170K, skewing bullish. Forecasts vary widely; caution is warranted.

2026 Catalysts: What Could Move the Market

$15T

Assets managed by major wirehouses. If they enable 1-3% crypto allocation, that's $150-450B in potential demand.

Q1-Q2: DOL 401(k) Guidance. Final Department of Labor guidance enabling 401(k) crypto allocation could arrive in the first half. This guidance is the critical implementation step following the August 2025 Executive Order. Once the DOL finalizes rules, plan sponsors gain the legal clarity needed to offer Bitcoin options without fear of fiduciary liability. Early adopter plans - likely from crypto-forward companies - could launch by mid-year. This is the single most important regulatory catalyst for 2026 given the scale of potential flows.

Q1-Q3: Bank Custody Launches. Major banks, including BNY Mellon, State Street, and potentially JPMorgan, are expected to launch crypto custody services following SAB 121's rescission. Bank custody provides the institutional-grade infrastructure that pension funds, endowments, and sovereign wealth funds require. These institutions have fiduciary obligations that demand regulated, insured custody with established counterparties. Each major bank custody launch represents a catalyst as their client base gains access to crypto allocation for the first time.

Ongoing: Market Structure Legislation. Comprehensive legislation defining token classification (security vs commodity) and establishing jurisdictional boundaries between the SEC and CFTC remains pending in Congress. Progress would complete the regulatory framework that 2025 started. This isn't essential for the bull case - the foundation already exists - but passage would remove remaining uncertainty.

Potential: ETH Staking ETF. SEC approval of staking within ETF wrappers would make Ethereum ETFs significantly more attractive with ~3-4% yield. More importantly, it would validate Ethereum's commodity status definitively. This is a wildcard catalyst that could arrive anytime or not at all in 2026.

2026 Regulatory Timeline

CLARITY Act Q1 | GENIUS regs Jul | 50+ altcoin ETFs

Date	Event	Impact	Category
Jan 2026	BofA Opens ETF Access	15,000+ advisors enabled	Adoption
Q1 2026	CLARITY Act Senate Vote	BTC under CFTC oversight	Legislation
H1 2026	Hong Kong Stablecoin Licenses	First batch of licenses	International
Jul 2026	GENIUS Act Final Regs	Stablecoin framework complete	Regulation
H2 2026	UK FCA Framework	Comprehensive crypto rules	International
2026	50+ Altcoin ETFs Launch	LTC, XRP, ADA, SOL products	Products

Figure 14.7: 2026 Regulatory Timeline - Key dates and expected announcements. Each represents a potential catalyst; clustering of positive announcements could trigger bull scenario.

Wealth Platform Adoption: The Structural Driver. Morgan Stanley, Merrill Lynch, UBS, Wells Fargo Advisors, and other major wealth platforms collectively manage approximately $15 trillion in client assets. Their adoption of crypto products - allowing financial advisors to recommend Bitcoin allocations to clients - would represent a structural demand transformation unlike anything the market has seen. Currently, most platforms restrict or prohibit advisor crypto recommendations. That's changing as regulatory clarity improves and custody solutions mature.

The math is compelling. If platforms enable 1-3% crypto allocation recommendations - a conservative range for alternative assets in diversified portfolios - that represents $150-450 billion in potential demand. Even if only 10% of eligible clients adopt the allocation recommendation in the first year, that's $15-45 billion in new flows. For context, Bitcoin ETFs accumulated approximately $35 billion in their first year. Wirehouse adoption could match or exceed ETF flows.

Wealth Platform Adoption

BofA Jan 2026 | Vanguard 50M clients | "Early innings"

Platform	Access	Allocation	Timeline
Bank of America	15,000 advisors	TBD	Jan 2026
Morgan Stanley	Full platform	Up to 4%	Active
Vanguard	50M clients	ETF access	2025 reversal
Merrill Lynch	Wealth clients	Limited	Q1 2026
Ivy League Endowments	50% predicted	1-5%	2026

Figure 14.8: Major wirehouses collectively manage ~$15T in client assets. Green = active, Yellow = pending 2026.

Stablecoin Dry Powder. Stablecoin market capitalization exceeded $200 billion in 2025, representing capital already on-chain but not yet deployed into volatile assets. This dry powder provides potential fuel for rallies if sentiment shifts. Conservative estimates suggest 30-50% of the stablecoin supply could deploy into crypto assets if conditions warranted - $60-100 billion in potential flows. The GENIUS Act's regulatory clarity could accelerate stablecoin growth beyond current trajectories as institutional treasurers gain confidence in the framework.

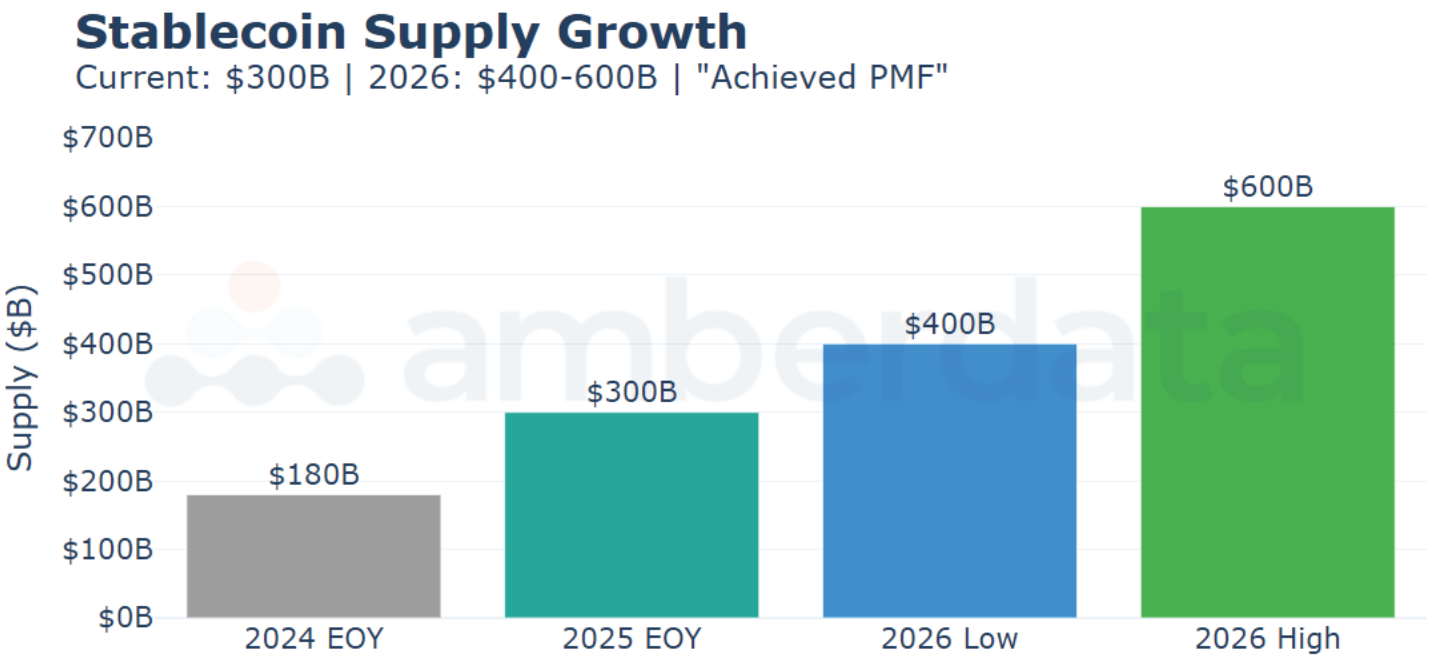


Figure 14.9: Stablecoin Supply Growth. Stablecoins doubled in 2025 to $300B. 2026 forecasts range $400-600B as GENIUS Act provides regulatory clarity.

The 2026 Watchlist: Early Warning Indicators

Use this watchlist to detect regime changes early. When three or more bullish triggers fire simultaneously, bull scenario probability increases. When three or more bearish triggers fire, bear scenario probability increases.

2026 Watchlist Dashboard

Bull needs 4+ signals | Bear needs 3+

Indicator	Current	Bullish	Bearish
ETF Flows (7d)	$-367M	>$500M inflow	>$500M outflow 4+ wks
Basis APR	5.4%	>10%	<3%
Funding (30d)	4.4%	>8% APR	Negative sustained
OI vs Peak	-43%	Rebuilding >20%	New lows
MVRV	2.39	>3.0	<1.0
LTH Supply	Decreasing	Increasing	Distribution
Stablecoin Supply	~$300B	>$350B	<$280B
Wirehouse Access	Limited	BofA/Merrill active	Delayed

Figure 14.10: 2026 Watchlist Dashboard - Color-coded current status. Green = bullish signal firing. Red = bearish. Yellow = neutral. Currently mostly yellow - base case in effect.

Bullish Triggers (look for 3+ firing):

ETF Inflows: Exceeding $1B per week consistently
Basis APR: Recovering above 10% (carry trade revival)
Funding Rates: Consistently positive above 8% APR
Open Interest: Rebuilding toward pre-crash levels
Order Book Depth: Recovering toward September 2025 levels

Bearish Triggers (look for 3+ firing):

ETF Outflows: Exceeding $1B per week consistently
Basis APR: Collapsing below 3%
Funding Rates: Persistently negative
Open Interest: Collapsing further
LTH Distribution: Long-term holder distribution accelerating

The question isn't whether institutions can participate - that's been answered. The question is how quickly they will.

Key Takeaways: Positioning for 2026

1. The Paradigm Has Shifted. The four-year halving cycle has been superseded by institutional flow dynamics. ETFs move more capital than miners produce. The halving still matters for long-term supply dynamics, but it's no longer the marginal price driver. Watch flows, not halvings. The institutional flow cycle operates on different timescales driven by Fed policy, risk appetite, and regulatory catalysts.

2. The Infrastructure Is Built. Bank custody enabled. Stablecoins regulated. ETFs optimized with in-kind redemptions. Retirement access pathway opened. The regulatory transformation of 2025 was comprehensive. The question isn't whether institutions can participate - that's been definitively answered. The question is how quickly they will move through the newly-opened doors. The adoption phase begins in 2026.

3. The Market Is De-Risked but Fragile. October's leverage purge created healthier positioning. Open interest flushed. Weak hands liquidated. Funding rates normalized. But liquidity remains impaired - order book depth hasn't recovered to pre-crash levels. Violent moves remain possible in either direction on thin order books. This fragility cuts both ways.

4. Strong Hands Are Accumulating. HODL waves show long-term holders buying weakness throughout Q4 2025. This accumulation pattern - where patient capital buys what weak hands sell - historically precedes major rallies. But the timing can vary from months to years. The signal is bullish for direction, not necessarily for immediate timing.

5. Valuation Metrics Say 'Room to Run'. MVRV below 3.0 - not in euphoria territory. NUPL not in the distribution zone. Realized price at $62,000 providing a structural floor. The market isn't overvalued by historical standards. If anything, it's reset to levels that preceded appreciation in previous cycles, not major corrections.

6. The Watchlist Is Clear. Basis APR above 8% signals carry trade revival. Depth recovery to pre-crash levels resolves fragility concerns. Consistent ETF inflows above $1B weekly confirm institutional conviction. 401(k) allocation announcements activate a new capital pool. Until these conditions align, the Fragile Recovery regime continues. When they align, bull case probability increases significantly.

THE BOTTOM LINE

2025 proved crypto's market structure has fundamentally changed. The halving cycle is over. The institutional flow cycle has begun. The regulatory infrastructure is built. The adoption phase starts now. The timing is uncertain, but the direction of the structural trend is not. Institutional adoption is expanding, not contracting. 2026 will reveal how quickly the market moves through the doors that 2025 opened.

This analysis synthesizes findings from (S3)'s regime framework, (S5)'s carry trade mechanics, (S7)'s leverage analysis, and (S8)'s ETF flow dynamics into forward-looking scenarios.

The valuation thresholds draw from (S10)'s on-chain metrics. The regulatory catalyst timeline builds on (S13)'s transformation analysis. The security risk assessments incorporate (S12)'s crisis findings.

Full-Market Research. Institutional Depth. *Derivatives, ETFs, on-chain, DEXs, microstructure, risk signals—and more. Subscribe at the bottom of our page for research that covers every corner of crypto and visit the* **Amberdata Research Blog.**

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LINKS & RESOURCES

Platform

- Research Library
- Intelligence Platform
- Developer Docs
- Contact Us

RECOMMENDED NEXT READS

ETF Cost Basis Series

- Part 1/3: The $80,000 Floor (ETF Cost Basis)
- Part 2/3: Who Breaks First (ETF Cost Basis)
- Part 3/3: The Stress Test (ETF Cost Basis)

More Key Reads

- The ETF Exodus Decoded: Basis Arbitrage, Not Capitulation
- Bitcoin's Great Rotation: Who Bought the Dip and Why It Matters
- October 2025 Crash (7 charts): How $3.21B Vanished in 60 Seconds
- Beyond the Spread - Understanding Market Impact and Execution

AMBERDATA 2025 YEAR-END REVIEW

Data Methodology

January 2026

Overview

This document describes the data sources, calculations, methodology, and visual specifications used in the Amberdata 2025 Year-End Review. All data is sourced from Amberdata's institutional-grade data infrastructure, providing comprehensive coverage across spot markets, derivatives, on-chain analytics, and institutional flows.

Analysis Period

Parameter	Value
Report Coverage	January 1, 2025 - December 31, 2025
Rolling Calculation Lookback	December 1, 2024 (for 30-day metrics)
Z-Score Lookback	January 1, 2024 (365-day rolling window)
Primary Granularity	Daily
Intraday Analysis	Hourly (October stress events)

Six-Regime Framework

The analysis segments 2025 into six distinct market regimes based on dominant market drivers:

Regime	Name	Period	Days	Characterization
R1	Policy Euphoria	Jan 1-23	23	Trump EO, SAB 121 rescinded, pro-crypto policy
R2	Security Shock	Jan 24-Feb 28	36	Bybit $1.46B hack, risk-off
R3	Infrastructure Build	Mar 1-May 31	92	GENIUS Act, regulatory clarity, Mt. Gox/FTX orderly
R4	Institutional Expansion	Jun 1-Sep 30	122	In-kind ETF approval, 401(k) access, peak positioning
R5	Macro Shock / Cascade	Oct 1-31	31	Trade war crash, $19B liquidations, deleveraging
R6	Fragile Recovery	Nov 1-Dec 31	61	Cautious rebuilding, reduced leverage, Fusaka upgrade

Regime Color Coding

Table rows and chart backgrounds use regime-specific colors to provide visual continuity:

Signal	Chart Color	Table Color	Interpretation
Risk-On	#4CAF50	#C8E6C9	Bullish conditions (R1, R4)
Risk-Off	#F44336	#FFCDD2	Bearish/capitulation (R2, R5)
Accumulation/Cautious	#FFC107	#FFF9C4	Transitional periods (R3, R6)

Spot Market Data

Price Data

Parameter	Specification
Primary Asset	BTC/USDT
Secondary Asset	ETH/USDT (for correlation analysis)
Primary Exchange	Binance
Granularity	Daily close prices
Volume	USD-converted using real-time FX rates

Market Depth & Liquidity

Parameter	Specification
Assets	BTC/USDT
Exchanges	All major venues (31+ exchanges)
Depth Levels	10, 50, 100, 200 basis points from mid-price
Metrics	Two-sided depth (bid + ask) in USD
Aggregation	Daily average, 7-day rolling mean applied

Volume Analysis

Parameter	Specification
Assets	All BTC trading pairs
Exchanges	All major spot venues
Exclusions	BitMEX (data quality)
Metrics	Daily volume, market share by exchange

Derivatives Market Data

Futures Basis & Term Structure

Parameter	Specification
Assets	BTC perpetual and dated futures
Exchanges	Deribit, Binance, OKX, Bybit
Tenors	7-day, 30-day, 90-day, 180-day constant maturity
Metrics	Annualized basis APR, term premium
Aggregation	Equal-weighted average across exchanges
Data Format	APR returned as decimals (multiply by 100 for %)

Open Interest

Parameter	Specification
Assets	BTC derivatives (all contract types)
Exchanges	All major derivatives venues (14+ exchanges)
Granularity	End-of-day snapshots
Metrics	USD notional value using contract multipliers
Smoothing	7-day rolling mean applied
Aggregation Mode	use_aggregated=True

Funding Rates

Parameter	Specification
Assets	BTC perpetual swaps
Exchanges	All major perpetual venues (13+ exchanges)
Granularity	8-hourly snapshots (native funding frequency)
Annualization	8-hour rate x 3 periods x 365 days
Aggregation	Daily average of 8-hourly snapshots

Liquidations

Parameter	Specification
Assets	ALL crypto assets (not just BTC)
Exchanges	All major derivatives venues
Granularity	Event-level, aggregated to daily/hourly
Metrics	USD notional, long vs short breakdown
Note	Bybit data normalized to standard side conventions

Long/Short Ratio

Parameter	Specification
Assets	BTC perpetual swaps
Exchanges	Binance, Bybit
Metrics	Account-level positioning (% long vs % short)

Institutional Flow Data

US Spot Bitcoin ETF Flows

Parameter	Specification
Products	All 11 US spot Bitcoin ETFs
Issuers	BlackRock (IBIT), Fidelity (FBTC), Grayscale (GBTC), ARK/21Shares (ARKB), Bitwise (BITB), VanEck (HODL), Invesco (BTCO), Franklin (EZBC), Valkyrie (BRRR), WisdomTree (BTCW), Hashdex (DEFI)
Granularity	Daily flows
Metrics	USD and BTC flow amounts, cumulative totals
Aggregation	Entity-level and market-wide totals

On-Chain Analytics

Bitcoin Valuation Metrics

Metric	Calculation
Market Cap	Current price x circulating supply
Realized Cap	Sum of each UTXO valued at price when last moved
MVRV Ratio	Market Cap / Realized Cap
MVRV Z-Score	(Current MVRV - 365-day rolling mean) / 365-day rolling std dev
Realized Price	Realized Cap / circulating supply
NUPL	(Market Cap - Realized Cap) / Market Cap

MVRV Threshold Interpretation

MVRV Value	Signal	Interpretation
>= 2.5	Overheated	Historically elevated, caution warranted
2.0 - 2.5	Elevated	Above average, approaching extended
1.5 - 2.0	Normal	Healthy market conditions
< 1.5	Undervalued	Trading near or below realized cost

NUPL Sentiment Zones

NUPL Range	Sentiment	Market Phase
> 0.75	Euphoria	Extreme greed, potential top
0.50 - 0.75	Belief	Strong bull market
0.25 - 0.50	Optimism	Recovery phase
0.00 - 0.25	Hope	Uncertainty
< 0.00	Capitulation	Fear, potential bottom

Miner Economics

Puell Multiple

Parameter	Specification
Calculation	Daily Miner Revenue (USD) / 365-day MA of Miner Revenue
Data Source	Issuance value from Bitcoin blockchain
Purpose	Measures miner profitability relative to historical average

Puell Multiple Thresholds:

Puell Value	Signal	Interpretation
>= 1.4	Overheated	High revenue, potential selling pressure
1.0 - 1.4	Normal	Healthy miner economics
0.6 - 1.0	Low	Below average revenue
< 0.6	Capitulation	Miner stress, potential accumulation

Miner Position Index (MPI)

Parameter	Specification
Purpose	Measures miner selling pressure vs historical norms
Smoothing	7-day moving average applied

MPI Thresholds:

MPI Value	Signal	Interpretation
> 2	Heavy Distribution	Significant miner selling
1 - 2	Distribution	Moderate miner selling
0 - 1	Neutral	Normal activity
< 0	Accumulation	Miners holding, bullish signal

Miner Revenue

Parameter	Specification
Metric	Daily issuance value in USD
Smoothing	30-day moving average applied
Purpose	Track miner economics and selling pressure

Network Activity Metrics

Liveliness

Parameter	Specification
Calculation	Coin-days destroyed / Coin-days created ratio
Interpretation	Higher = more old coins moving; Lower = HODLing behavior
Smoothing	30-day moving average applied

Active Addresses

Parameter	Specification
Metric	Daily count of unique active addresses
Smoothing	30-day moving average applied
Purpose	Network usage and adoption indicator

Address Momentum

Parameter	Specification
Calculation	New Addresses (30-day MA) / New Addresses (365-day MA)
Adoption Rate	New Addresses / Active Addresses
Interpretation	> 1.0 = accelerating adoption; < 1.0 = decelerating

HODL Waves (Supply Age Distribution)

Parameter	Specification
Asset	Bitcoin
Methodology	UTXO age analysis
Age Bands	12 bands from <1 day to >10 years
STH (Short-Term Holders)	Supply held < 6 months
MTH (Medium-Term Holders)	Supply held 6-12 months
LTH (Long-Term Holders)	Supply held > 1 year

Balance Bucket Analysis

Cohort	Balance Range
Plankton	< 0.1 BTC
Shrimp	0.1 - 1 BTC
Crab	1 - 10 BTC
Fish	10 - 100 BTC
Shark	100 - 1,000 BTC
Whale	1,000 - 10,000 BTC
Mega Whale	> 10,000 BTC

Stablecoin Data

Parameter	Specification
Assets	USDT, USDC, FDUSD, FRAX, PYUSD, DAI, and others
Chains	All major blockchains (Ethereum, Tron, Solana, etc.)
Granularity	Daily end-of-day supply snapshots
Metrics	Circulating supply, market share

DeFi & DEX Data

DeFi Lending

Parameter	Specification
Protocols	Major lending protocols (Aave, Compound, MakerDAO, etc.)
Chains	Ethereum and major L2s
Metrics	TVL, borrowed amounts, liquidations
Utilization	Total Borrowed / Total Deposited x 100
Smoothing	7-day rolling mean for TVL and utilization

DEX Volume

Parameter	Specification
Protocols	Major Ethereum DEXs
Chain	Ethereum mainnet
Granularity	Daily aggregate volume
Smoothing	7-day rolling mean applied

Security Events Data

Parameter	Specification
Source	Manual compilation from security reports and announcements
Categories	CEX (centralized exchange), DeFi (protocols), DEX (decentralized)
Tracked Fields	Date, target, amount (USD), type, attribution
Attribution	Known threat actors (e.g., Lazarus Group) where identified

Exploit Category Colors:

Category	Color	Hex Code
CEX	Red	#D32F2F
DeFi	Orange	#FF9800
DEX	Purple	#7B1FA2

Regulatory Events Data

Parameter	Specification
Source	Manual compilation from regulatory filings and announcements
Categories	US Policy, US Regulatory, US Legislation, International
Tracked Fields	Date, event, impact description, category

Forward-Looking Data Sources

Section 14 (2026 Forward Look) uses the following data sources:

Institutional Price Targets

Parameter	Specification
Source	Published research from major institutions
Institutions	Citi, Standard Chartered, JPMorgan, Bernstein, Galaxy Digital, CryptoQuant, TD Cowen, VanEck
Metrics	Bear, Base, Bull price targets for 2026

Scenario Framework

Scenario	Probability	Price Range	Color	Setup
Bull	25%	$120,000 - $180,000	#4CAF50	Institutional FOMO
Base	50%	$90,000 - $120,000	#2196F3	Steady accumulation
Chop	5%	$75,000 - $110,000	#FF9800	Extended consolidation
Bear	20%	$60,000 - $80,000	#F44336	Demand slowdown

Calculations & Transformations

Annualized Rates

The following rates are annualized for comparability:

Metric	Native Frequency	Annualization Method
Funding Rate	8-hourly	Rate x 3 (periods/day) x 365 (days/year)
Basis APR	Already annualized	Displayed as percentage (x100)
Realized Volatility	Daily returns	Std Dev x sqrt(365) x 100

Rolling Window Calculations

Rolling windows smooth noisy data and provide trend context:

Metric	Window	Purpose
Realized Volatility	30-day	Standard risk measurement period
BTC-ETH Correlation	30-day	Medium-term relationship tracking
MVRV Z-Score	365-day	Full-year rolling for mean and std dev
Carry Score	7-day	Smooth daily noise in positioning signal
Liquidity Score	7-day	Reduce snapshot-to-snapshot variation
Orderbook Depth	7-day	Smooth intraday liquidity fluctuations
Open Interest	7-day	Reduce end-of-day timing effects
DEX Volume	7-day	Smooth weekend/weekday patterns
Liveliness	30-day	Smooth coin-day volatility
Active Addresses	30-day	Smooth daily usage variation
MPI	7-day	Smooth miner behavior signals
Miner Revenue	30-day	Smooth block reward variation

Derived Metrics

The following metrics are calculated from underlying data:

Metric	Calculation	Interpretation
Daily Return	(Close_t / Close_{t-1}) - 1	Single-day price change
Cumulative Return	(Price_t / Price_Jan1) - 1	YTD performance
Drawdown	(Price_t / Running Max) - 1	Decline from peak
Term Premium	Basis APR (90d) - Basis APR (7d)	Curve slope; negative = stress
Excess Return	Basis APR (30d) - T-Bill Rate (4.5%)	Return above risk-free
Carry Score	(Excess Return / Volatility) x Sign(Term Premium), 7d MA	Risk-adjusted carry attractiveness
Liquidity Score	(Depth at 100bps / Daily Volume) x 100	Market resilience measure
Liquidation Intensity	(Daily Liquidations / Open Interest) x 100	Leverage stress indicator
Address Momentum	New Addresses (30d MA) / New Addresses (365d MA)	Adoption acceleration
Adoption Rate	New Addresses / Active Addresses	Network growth rate

Liquidation Intensity Thresholds

Intensity	Signal	Interpretation
> 5%	Extreme	Cascade risk, systemic stress
2% - 5%	Elevated	Heightened deleveraging
0.5% - 2%	Normal	Routine liquidations
< 0.5%	Quiet	Low leverage activity

Benchmarks & Thresholds

Metric	Threshold	Interpretation
T-Bill Rate (Carry Benchmark)	4.5%	Risk-free rate comparison
Attractive Basis	> 10% APR	Compelling carry opportunity
Excellent Basis	> 15% APR	Exceptional risk-adjusted return
Marginal Basis	5% - 7.5% APR	Borderline attractive
Unattractive Basis	< 5% APR	Insufficient risk compensation
Breakeven Basis	~6% APR	T-bill + execution + financing costs
Carry Score Excellent	> 5	Strong risk-adjusted opportunity
Carry Score Good	2 - 5	Favorable conditions
Carry Score Marginal	0 - 2	Limited opportunity
Carry Score Avoid	< 0	Negative expected return

Exchange Coverage Summary

Market Type	Primary Exchanges	Coverage
Spot Price	Binance	Primary reference price
Spot Volume	All major venues	31+ exchanges
Spot Depth	All major venues	Full market liquidity
Derivatives Basis	Deribit, Binance, OKX, Bybit	4 exchanges
Derivatives OI	All major venues	14+ exchanges
Derivatives Funding	All major venues	13+ exchanges
Derivatives Liquidations	All major venues	Full market coverage

Data Quality Notes

- All timestamps normalized to UTC
- 30-day lookback period (from December 1, 2024) ensures valid rolling calculations from January 1
- 365-day lookback (from January 1, 2024) for MVRV Z-Score calculations
- 7-day smoothing applied to reduce noise in liquidity, depth, and positioning metrics
- End-of-day snapshots used for open interest and stablecoin supply to ensure consistency
- Equal-weighted averaging across exchanges for basis and funding (not volume-weighted)

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