Sentiment Without Structure

Differential Liquidity Response to Infrastructure vs Regulatory Events in Cryptocurrency Markets

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Abstract

We investigate differential liquidity responses to infrastructure versus regulatory events in cryptocurrency markets using perpetual futures funding rates and computed liquidity metrics (Amihud illiquidity, Roll spread, Corwin-Schultz spread). Analyzing five major events (2021–2024) for BTC and ETH, we find that **infrastructure events** (exchange failures, protocol collapses) produce significantly larger liquidity deterioration than **regulatory events** (enforcement actions, policy announcements).

The Corwin-Schultz spread increases 65.1% following infrastructure events versus *decreasing* 11.4% following regulatory events ($p = 0.0009$). Roll spread effects are even more pronounced: +463.9% for infrastructure versus +28.3% for regulatory ($p = 0.028$). All five liquidity metrics show infrastructure > regulatory direction, with two achieving statistical significance at $p < 0.05$.

These findings extend Farzulla (2025)'s volatility asymmetry result to market microstructure: cryptocurrency markets respond to infrastructure disruptions through both volatility *and* liquidity channels, while regulatory events primarily affect sentiment without triggering structural liquidity responses. We interpret this through the lens of *enforcement capacity*—regulators can shape expectations but cannot directly affect decentralized market structure.

Keywords: cryptocurrency, liquidity, market microstructure, funding rate, event study, Amihud illiquidity, infrastructure risk

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Companion Paper

This paper extends Farzulla (2025), which established 5.7× larger volatility responses to infrastructure versus regulatory events in cryptocurrency markets. The current paper investigates the *liquidity channel*—whether this asymmetry extends to market microstructure.

1 Introduction

Why do cryptocurrency markets respond so differently to infrastructure failures versus regulatory announcements? Farzulla (2025) document a striking asymmetry: infrastructure events (exchange collapses, protocol exploits) generate 5.7 times larger volatility shocks than regulatory events (enforcement actions, policy changes). This paper investigates whether this asymmetry extends to market microstructure.

Market microstructure theory predicts that uncertainty-generating events should affect liquidity through multiple channels: increased adverse selection from informed trading (Glosten & Milgrom, 1985), inventory risk for market makers (Ho & Stoll, 1981), and direct regulatory impacts on market access (Chordia et al., 2001). In traditional equity markets, regulatory announcements typically widen spreads and reduce liquidity.

We hypothesize that cryptocurrency markets exhibit *differential* liquidity responses:

- **Infrastructure events** trigger genuine liquidity deterioration because they directly affect market infrastructure (exchange solvency, protocol integrity, counterparty risk).
- **Regulatory events** produce muted liquidity responses because regulators cannot directly enforce changes to decentralized market structure—they affect sentiment and expectations, not infrastructure.

1.1 Contributions

This paper makes three contributions:

1. We develop a liquidity event study methodology using perpetual futures funding rates and computed spread estimators (Amihud, Roll, Corwin-Schultz), avoiding measurement issues in quoted spread approximations.
2. We find statistically significant differential responses: infrastructure events cause 65–464% larger liquidity deterioration than regulatory events ($p < 0.05$).
3. We provide microstructure evidence for the *enforcement capacity* hypothesis: regulation affects cryptocurrency markets through sentiment channels rather than structural channels.

2 Methodology

2.1 Liquidity Metrics

We use four complementary liquidity measures:

1. Funding Rate (Binance Perpetual Futures): The funding rate reflects market positioning and stress:

$$F_t = \text{Rate paid by longs to shorts (or vice versa)} \tag{1}$$

Extreme funding rates indicate market imbalance; changes around events capture microstructure stress.

2. Amihud Illiquidity (Amihud, 2002): Price impact per unit volume:

$$\text{ILLIQ}_t = \frac{|r_t|}{V_t} \times 10^6 \tag{2}$$

Higher values indicate lower liquidity (larger price impact per dollar traded).

3. Roll Spread (Roll, 1984): Effective spread from return autocorrelation:

$$\text{Spread}_{\text{Roll}} = 2\sqrt{-\text{Cov}(r_t, r_{t-1})} \tag{3}$$

Valid when autocovariance is negative (bid-ask bounce).

4. Corwin-Schultz Spread (Corwin & Schultz, 2012): Spread from high-low prices:

$$\alpha = \frac{\sqrt{2\beta} - \sqrt{\beta}}{3 - 2\sqrt{2}} - \sqrt{\frac{\gamma}{3 - 2\sqrt{2}}} \tag{4}$$

where β and γ are functions of daily high-low ratios.

2.2 Event Sample

We analyze five major events (Table 1), classified by type:

Table 1: Event Sample

Event	**Date**	**Type**
BTC ETF Approval	2024-01-10	Regulatory
SEC Enforcement	2023-06-05	Regulatory
China Crypto Ban	2021-09-24	Regulatory
FTX Collapse	2022-11-10	Infrastructure
Terra/UST Collapse	2022-05-09	Infrastructure

2.3 Statistical Tests

For each event and metric, we compute:

$$\Delta\text{Metric} = \frac{\bar{M}_{\text{post}} - \bar{M}_{\text{pre}}}{\bar{M}_{\text{pre}}} \times 100\% \qquad (5)$$

We test: (1) pre/post changes via t-test, and (2) infrastructure vs regulatory differences via pooled comparison.

3 Results

3.1 Infrastructure vs Regulatory Comparison

Table 2 presents the primary findings.

Table 2: Liquidity Response: Infrastructure vs Regulatory

Metric	**Infra.**	**Reg.**	p**-value**
CS Spread (%)	+65.1	−11.4	0.0009***
Roll Spread (%)	+463.9	+28.3	0.028**
Amihud (%)	+32.3	+11.7	0.091*
Funding Rate	+0.00	−0.00	0.328
Abn. Volume (%)	−104.7	−229.5	0.536

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Key findings:

1. **All five metrics** show Infrastructure > Regulatory direction.
2. **Two metrics** achieve significance at $p < 0.05$: Corwin-Schultz spread ($p = 0.0009$) and Roll spread ($p = 0.028$).
3. **Effect magnitudes** are economically significant: infrastructure events cause 65% spread widening while regulatory events cause 11% spread *compression*.

3.2 Event-Level Detail

Infrastructure Events:

- **FTX Collapse**: Massive liquidity deterioration—CS spread +113%, Roll spread +747%, Amihud +23% (all $p < 0.05$).
- **Terra/UST**: Similar pattern with CS spread +17%, Roll spread +181%, Amihud +42%.

Regulatory Events:

- **BTC ETF Approval**: Liquidity *improved*—CS spread −46%, Amihud −13%. Funding rate dropped significantly ($p < 0.0001$).
- **SEC Enforcement**: Mixed response with minimal net effect.
- **China Ban**: Amihud increased 18%, but spreads unchanged.

4 Discussion

4.1 The Enforcement Capacity Hypothesis

Our results support an *enforcement capacity* interpretation: regulatory events affect cryptocurrency markets differently than infrastructure events because regulators lack capacity to directly alter decentralized market structure.

Infrastructure events (exchange failures, protocol exploits):

- Directly destroy market infrastructure
- Trigger counterparty risk concerns
- Force liquidations and margin calls
- Create genuine liquidity crises

Regulatory events (enforcement, policy):

- Affect expectations and sentiment
- Cannot force protocol-level changes
- Market makers remain operational
- Liquidity providers adapt, not exit

4.2 Implications for Policy

The finding that regulatory events produce muted microstructure effects suggests:

1. **Limited regulatory reach:** Traditional market structure tools (circuit breakers, position limits) may be ineffective for decentralized markets.

2. **Infrastructure focus:** Regulatory resources may be better allocated to exchange supervision and custody requirements than to trading rule enforcement.

3. **Risk differentiation:** Infrastructure risk and regulatory risk require different hedging approaches.

5 Limitations

Sample size: Five events provide limited statistical power; expanded analysis with 20+ events is needed for robust inference.

Cross-sectional scope: Analysis limited to BTC and ETH; smaller cryptocurrencies may show different patterns.

Liquidity proxies: Computed metrics (Amihud, Roll, CS) are proxies for true quoted spreads; tick-level data would provide more precision.

6 Conclusion

This paper documents differential liquidity responses to infrastructure versus regulatory events in cryptocurrency markets. Using funding rates and computed spread estimators, we find that infrastructure events trigger significantly larger liquidity deterioration than regulatory events: Corwin-Schultz spreads widen 65% following infrastructure failures versus 11% compression following regulatory announcements ($p = 0.0009$).

These findings extend the volatility asymmetry documented by Farzulla (2025) to market microstructure, supporting an *enforcement capacity* interpretation: regulators can shape cryptocurrency market sentiment but cannot directly affect decentralized market structure. Infrastructure failures, by contrast, constitute genuine structural disruptions with corresponding liquidity effects.

The distinction between sentiment-dominated and structure-dominated market responses has implications for regulation, risk management, and market design in decentralized financial systems.

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