Perpetual Futures and Cryptocurrency Market Quality

A Comprehensive Replication and Extension

Agentic Sciences · Cornell University

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Research Question & Data

- How do perpetual futures affect spot market quality?
- Kaiko order book data: 13 cryptocurrencies × 5 exchanges
- Period: March–December 2021 (5,213 trading days)

Variables:

- Quoted spread = $(P_{ask} - P_{bid})$ / Midpoint × 100%
- Depth: total resting quantity at best 5 levels
- Realized volatility, order book imbalance, returns

Finding 1: Funding Cycle Effect Disappears

- Raw 8-hour funding cycle: +4.84% effect on spreads
- After controlling for 24-hour diurnal patterns → ZERO
- The funding rate mechanism is NOT causal identification
- Spectral analysis confirms: 24h cycle dominates 8h cycle

Implication: Previous studies using funding cycle as instrument

- may suffer from confounding with intraday seasonality

Finding 2: Perpetual Markets Have Tighter Spreads

- Perpetual futures markets: 52.9% tighter spreads vs spot
- Perpetual futures markets: 4,400% higher depth vs spot

Quoted spread (median): Spot 0.03% vs Perp 0.014%

- Depth concentration at best levels much higher in perps
- Consistent with derivatives attracting informed traders
- and improving overall price discovery

Finding 3: Huobi Termination DiD

- Natural experiment: Huobi terminated perpetual contracts (Dec 2021)
- DiD coefficient on quoted spread: +0.0026 ($t = 2.38$, $p = 0.017$)

Removing perps WIDENS spot spreads → confirms complementarity

- Robust across 6 control specifications
- Effect concentrated on low-volatility days ($p = 0.005$)
- and late post-treatment period (December, $p = 0.001$)

Finding 4: Staggered Introduction Analysis

- 38 Binance pairs: staggered perpetual futures introduction

Quoted spread reduction: 44.5% (t = 39.13)

Depth increase: 216.8%

- Results hold with and without volatility controls
- Event study shows no pre-trends → clean identification
- Post-introduction effect persists (no mean reversion over 60 days)

Robustness Tests

- Placebo tests: random assignment yields null results
- Wild cluster bootstrap: inference robust to clustering
- Window sensitivity: 30/60/90/120 day windows all significant
- Winsorization at 1%/5%/10%: results stable
- Alternative estimators: Sun-Abraham, Callaway-Sant'Anna
- Inventory channel analysis: spread decomposition
- Heterogeneity by coin size and exchange depth

Conclusion

Perpetual futures IMPROVE spot market quality

- 1. Funding cycle is NOT a valid instrument (24h confound)
- 2. Perps have 52.9% tighter spreads, 4,400% more depth
- 3. Huobi termination: removing perps widens spreads
- 4. Staggered introduction: 44.5% spread reduction

Policy implication: Banning crypto derivatives

- may harm — not help — spot market quality