Price Discovery and Liquidity in Tokenized U.S. Equities: A High-Frequency Microstructure Study

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Abstract

Tokenized shares that mirror U.S. equities began trading 24/7 on public blockchains only in late 2024, yet no peer-reviewed study has quantified their tracking error, price-discovery dynamics, or liquidity costs relative to the underlying stocks. This project asks: *How do price discovery and liquidity on emerging tokenized-equity venues compare with those on NASDAQ, and how do these metrics evolve intraday and overnight?* We propose a high-frequency state-space and Hawkes-process framework combining Bloomberg TAQ data for equities with on-chain logs and WebSocket feeds for tokens. Results will provide the first empirical evidence relevant to regulators, broker-dealers, and DeFi developers evaluating real-world-asset tokenization.

1 Introduction

Tokenization promises 24/7 trading and fractional ownership of real-world assets. In 2024–25, Robinhood EU (Arbitrum), Dinari dShares (Base), and Kraken xStocks launched tokens fully backed by U.S. equities. Regulators have called for market-quality evidence, yet academic literature is silent. This study fills the gap by measuring tracking error, price leadership, and liquidity differences between on-chain tokens and their NASDAQ counterparts using high-frequency econometric tools.

2 Summary of Related Work

Dual listings. American Depository Receipts and cross-listed equities have been analysed with Hasbrouck information-share and VECM methods [1].
Crypto microstructure. Hawkes contagion models explain price discovery between CME BTC futures and spot exchanges [2, 3].
Regulatory reports. SEC (2025) and FSB (2024) white papers highlight the absence of empirical data for tokenized real-world assets. No peer-reviewed research focuses on equity tokens, leaving all key microstructure questions unanswered.

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3 Planned Methodology

3.1 Data Acquisition

- *Underlying stocks*: Tick-by-tick trades and best-bid/ask quotes for AAPL, TSLA, and MSFT via Bloomberg `TICK <GO>` and the `IntradayTickRequest` API (140-day history).
- *On-chain tokens*: ERC-20 `Transfer` events for Robinhood EU tokens (Arbitrum) and Dinari dShares (Base) via Web3 `getLogs`; Kraken xStocks trades and L2 books via Kraken WebSocket.
- *FX rates*: USD/EUR and USD/USDC 1-min BFIX series from Bloomberg.
- *Event calendar*: Earnings announcements and CPI releases from Bloomberg `ECO <GO>`.

3.2 Efficient-Price Filtering

Model observed token and stock prices as noisy signals of a latent efficient price using a bivariate state-space model; estimate via Kalman filter and EM to obtain venue-specific noise ratios.

3.3 Dynamic Information-Share Analysis

Fit rolling 30-minute VECMs and compute Hasbrouck and Gonzalo–Granger shares to identify which venue leads price discovery during U.S. market hours versus overnight/weekend periods.

3.4 Hawkes Trade-Arrival Contagion

Treat trade arrivals on each venue as point processes; estimate a bivariate Hawkes model to quantify cross-excitation and directional branching ratios.

3.5 Liquidity Metrics

Calculate effective spread, realized spread, and Kyle's λ impact coefficient for tokens and NASDAQ quotes; compare distributions.

4 Evaluation Plan

- Basis RMSE, average half-life, and overnight drift.
- Noise-to-signal ratios from the state-space filter.
- Time-varying information-share plots over the 30-day sample.
- Hawkes branching ratios and impulse-response functions.
- Liquidity-cost comparison table across venues.

5 Timeline

Weeks 1–2: scraper development; Weeks 3–4: data cleaning; Weeks 5–6: state-space estimation; Weeks 7–8: VECM & information-share; Week 9: Hawkes estimation; Week 10: liquidity metrics; Weeks 11–12: robustness; Weeks 13–14: paper and presentation.

6 Conclusion

By combining Bloomberg TAQ with on-chain feeds, this project delivers the first high-frequency evidence on the market quality of tokenized U.S. equities. The results will inform regulators, broker-dealers, and DeFi developers while showcasing rigorous econometrics suitable for PhD applications.

References

[1] Hasbrouck, J. (1995). One security, many markets. *Journal of Finance*.

[2] Bacry, E., et al. (2015). Hawkes processes in finance. *Market Microstructure and Liquidity*.

[3] Ahmed, S., et al. (2024). Price discovery between Bitcoin spot and futures: A Hawkes approach. *Finance Research Letters*.