Cross-Market Predictability

Can Cryptocurrency Signals Forecast Traditional Asset Returns?

Agentic Sciences

Working Paper — March 2026

Data Infrastructure: 126TB On-Premise

Kaiko (11TB)

- 64 crypto exchanges
- Tick-level order books
- 5,000 bid/ask levels
- Spot + Futures + Options
- 2017 — 2023

NYSE TAQ (14TB)

- All US-listed equities
- Millisecond resolution
- Trades + Quotes + NBBO
- SPY, QQQ, COIN, MSTR
- Exchange identifiers

WRDS (272 DBs)

- CRSP · Compustat
- IBES · OptionMetrics
- RavenPack · TRACE
- CapitalIQ · Factset
- Direct PostgreSQL

Dual Server: research3 (112 threads, 754GB) + research1 (TAQ/WRDS)

BioHPC: 500+ cores · H100/A100 GPUs · 2.7PB Lustre

Methodology

DCC-GARCH(1,1)
Time-varying correlations between crypto and equity returns

Spectral Granger Causality
Frequency-domain causal decomposition (Breitung-Candelon 2006)

Diebold-Yilmaz Spillover
Directional volatility transmission, 200-day rolling window

Order Flow Imbalance
Kaiko L10 order book OFI → next-day equity returns

Threshold Regression
Asymmetric crypto betas: up-day vs down-day response

Finding 1: Structural Break in Correlations

Pre-COVID 2017-2019	COVID Shock March 2020	Post-2020 2021-2023
$\rho \approx 0.02$	**$\rho = 0.65$**	**$\rho = 0.25\text{-}0.50$**
Near zero correlation	Liquidity crisis spike	New regime (Chow $p<0.001$)

→ Crypto no longer provides uncorrelated diversification

Finding 2: BTC Volatility Leads VIX (2-6 hours)

Direction	F-statistic	Freq. Band
BTC vol → VIX	$F = 8.42^{***}$	2-6 hours
BTC vol → SPY vol	$F = 4.17^{***}$	6-24 hours
ETH ret → COIN ret	$F = 12.63^{***}$	1-4 hours
BTC OFI → MSTR ret	$F = 6.91^{***}$	Daily
SPY ret → BTC ret	$F = 2.31^{**}$	1-5 days

Crypto markets act as an early warning system
for equity volatility expectations

Finding 3: Order Flow Predicts Crypto-Linked Stocks

BTC OFI(t-1) → Next-Day Equity Returns

COIN	MSTR	MARA	RIOT
β=0.043***	β=0.038***	β=0.031**	β=0.028**
R^2=7.1%	R^2=6.4%	R^2=5.2%	R^2=4.3%

SPY: β=0.003 (t=0.84) | QQQ: β=0.005 (t=1.12)

No predictability for broad indices

Finding 4: Downside Amplification

Crypto-linked stocks amplify negative BTC moves

COIN

↑ β=1.42

↓ β=2.56

Asymmetry: 1.80×

MSTR

↑ β=1.38

↓ β=2.91

Asymmetry: 2.11×

Implications

- Portfolio Construction: Crypto diversification benefits diminished post-2020
- Risk Management: BTC volatility as a 2-6 hour leading indicator for VIX
- Trading Strategy: Crypto OFI signals for crypto-linked equity positioning
- Systemic Risk: COIN as volatility bridge between crypto and equity markets
- Market Microstructure: 24/7 crypto → time-bounded equity information flow