Tianyao Deng

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EDUCATION EXPERIENCE

University of North Carolina at Chapel Hill **Chapel Hill, NC**
Ph.D. in Economics | Graduate Fellowship 08/2020 - 05/2026

- Courses: Econometrics, Time Series, Empirical Finance, Probability Theory, Statistical Theory, Macroeconomics, Microeconomics

University of California, Berkeley **Berkeley, CA**
B.A. in Economics | GPA: 3.778/4.0 (*with Distinction, top 10%*) 08/2017 - 05/2019

- Courses: Financial Economics, Linear Algebra, Behavioral Economics, Numerical Analysis, Econometrics, Macroeconomics, Microeconomics
- Transferred from Santa Monica College (08/2015 - 05/2017)

QUANTITATIVE RESEARCH EXPERIENCE

University of North Carolina at Chapel Hill **Chapel Hill, NC**
Graduate Researcher & Teaching Assistant | Econometrics, Time Series 08/2020 - present

- Developed end-to-end research pipelines in Python for high-frequency equity data analysis, including data cleaning, feature engineering, statistical modeling, and automated reporting
- Implemented robust correlation estimators and score-driven time series models with rigorous out-of-sample validation and systematic robustness testing
- Optimized computational performance through vectorization and memory-efficient design; reduced complexity from $O(N^2)$ to $O(N)$ for pairwise calculations where applicable
- Authored working papers and delivered research presentations; maintained clean, well-documented code for reproducibility and extensibility

Intraday Dynamics of Market Correlation and Impact of Macroeconomic Announcements (Job Market Paper)

- Constructed high-frequency panel dataset from TAQ and CRSP for S&P 500 constituents: 1-second sampled prices on NASDAQ aggregated to 15-minute rolling-window returns across extended trading hours (7:00am - 7:00pm ET, 2009 - 2023)
- Developed computationally efficient average quadrant correlation estimator with pair-free algorithm
- Quantified intraday correlation term structure and measured macroeconomic announcement effects using event-study methodology with multiple robustness specifications

A Score-Driven Model for Market Correlation (work in progress)

- Designed score-driven (GAS) model for time-varying intraday correlation with guaranteed positive-definiteness via unconstrained parameterization and bijective transformation to correlation space
- Implemented maximum likelihood estimation with likelihood score updates and numerical stability safeguards
- Built diagnostic framework evaluating model fit, parameter stability & multi-horizon forecasting accuracy

Intraday Price Discovery of Bitcoin between Binance U.S. and Coinbase (2023)

- Processed and synchronized minute-level Bitcoin prices from Binance U.S. and Coinbase (May 2018 - April 2020, 731 trading days) with quote-currency normalization and statistical outlier detection
- Applied Johansen cointegration and VECM framework to measure relative price discovery contributions via Information Share and Component Share metrics
- Estimated time-varying cross-venue leadership patterns through intraday subsample analysis and kernel smoothing

SKILLS

- *Programming & Software*: Python (NumPy, pandas, SciPy), SQL, R, Linux, LaTeX
- *Quantitative Methods*: time series, econometrics, forecasting, score-driven (GAS) model, state-space methods, PCA, high-dimensional covariance/correlation, factor analysis, optimization
- *Finance*: market microstructure, high-frequency data, intraday returns analysis, equities data (TAQ, CRSP), volatility modeling, correlation modeling, derivative pricing, portfolio analysis
- *Behavioral Skills*: teamwork and collaboration, communication, presentation, time management, adaptability, resilience under pressure
- *Languages*: Chinese (Mandarin and Cantonese), English