# Tianyao Deng

Chapel Hill, NC | https://tianyaodeng.github.io/web | tdeng@unc.edu

## Education

**University of North Carolina at Chapel Hill** Aug 2020 - May 2026 (Expected)
Ph.D. in Economics | Focus: Financial Econometrics, Time Series, Volatility, Correlation

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

**Santa Monica College** Aug 2015 - May 2017
Transfer program | GPA: 4.0/4.0

## Experience

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

- Built reproducible pipelines in Python for high-frequency equity data, from cleaning and feature construction to paper-ready reporting.
- Implemented robust correlation estimators and score-driven (GAS) time series models; validated performance with out of sample evaluation and systematic robustness checks.
- Optimized computations for scale (vectorization, memory-aware design; avoided pairwise $O(N^2)$ constructions where possible) and automated diagnostics.
- Communicated results through working papers and presentations; wrote clean, documented research code for reuse and extension.

## Research & Quantitative Projects

- *Intraday Dynamics of Market Correlation and Impact of Macroeconomic Announcements (Job Market Paper)*
  - Built a high-frequency panel for S&P 500 constituents using NASDAQ TAQ trade prices; sampled 1-second prices and constructed 15-minute returns with rolling windows across 7:00am - 7:00pm ET (2009 - 2023).
  - Proposed an average quadrant correlation measure with a pair-free estimator; measured intraday term structure and macro-announcement effects via event-study tests and robustness checks.
- *A Score-Driven Model for Market Correlation (work in progress)*
  - Designed a score-driven (GAS) model for intraday correlation dynamics with stable unconstrained parameterization and transforms back to valid correlation space.
  - Implemented likelihood score updates and MLE calibration with numerical safeguards; built diagnostics for fit, stability, and forecasting performance.
- *Intraday Price Discovery of Bitcoin between Binance U.S. and Coinbase (2023)*
  - Cleaned and aligned minute-level BTC prices across venues (May 2018 - Apr 2020; 731 days), including quote-currency harmonization and outlier handling.
  - Implemented cointegration/VECM price discovery (Information Share; Component Share) and estimated intraday leadership via time-of-day subsamples and smoothing.

## Skills

**Tools**: Python (NumPy, pandas, SciPy), SQL, R, Linux, LaTeX
**Quantitative Methods**: time series, econometrics, forecasting, score-driven (GAS) model, state-space representation, high-dimensional covariance and correlation, factor analysis, PCA, optimization
**Finance**: market microstructure, high-frequency data, intraday returns, equities (TAQ/CRSP), volatility modeling, correlation modeling, portfolio analysis, factor analysis
**Languages**: Chinese (Mandarin and Cantonese), English