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David Leather

Quantitative Researcher / Economist

Portfolio: daveleather.com
github.com/dleather
linkedin.com/in/davleather

Quantitative researcher with expertise in data-driven decision-making, computational modeling, and machine learning. Skilled in designing large-scale pricing models, forecasting risk, and optimizing financial strategies using high-performance numerical methods. Proven ability to apply deep learning and econometric modeling to solve real-world challenges in finance and real estate. Passionate about leveraging data science to drive strategic decision-making in industry.

Skills

Programming Languages	Julia, Python, R, MATLAB, STATA, STAN
Machine Learning	TensorFlow, Scikit-learn, Keras
Statistics	Bayesian Methods, Time Series Analysis, Monte Carlo, MCMC
Scientific Computing	Numerical Optimization, Stochastic Processes, Asset Pricing Models, Simulation-based Inference, Regime-switching Models
Software Development	Git, GitHub Actions, Unit Testing, Documentation Generation, Code Coverage, CI/CD
Data Analysis & Tools	NumPy, Pandas, Polars, data.table, SQL, Git, Unix, HPC Clusters
Languages	English (Fluent), Spanish (Novice)

Experience

Assistant Professor — **August 2020 — Present**
Chapman University, Argyros College of Business and Economics — *Orange, CA*

- Conducted research on real estate market dynamics, including pricing, risk management, and the impact of monetary policy on commercial real estate values; housing affordability; the link between zoning uncertainty and the real option value to redevelop; and the effect of height limitations on construction costs. **[Research Portfolio]**
- Designed and implemented a large-scale Monte Carlo deep learning experiment on a high-performance computing cluster to estimate likelihood surfaces in a 55-dimensional parameter space, simulating over 1.5 million targets using TensorFlow and optimized Julia code.
- Developed a novel empirical methodology to understand the impact of real estate height limitations on development costs, estimating potential additional square footage from relaxed restrictions and identifying areas with high excess demand. **[Paper]**
- Constructed a comprehensive NYC real estate panel dataset with 48M+ quarterly observations across 118 variables from five sources, tracking property characteristics, redevelopments, transactions, zoning changes, and demographic data to support multiple research projects. **[Paper]**
- Presented research at prestigious institutions such as the Massachusetts Institute of Technology, the University of California Los Angeles, the University of California Irvine, and the Federal Reserve Board of Governors.
- Teaching graduate and undergraduate courses in Real Estate Economics and Macroeconomics to graduate and undergraduate students.

Research Affiliate — **August 2020 — Present**
Kenan Flagler Business School, University of North Carolina at Chapel Hill — *Chapel Hill, NC*

Dissertation Fellow — **Summer 2019**
Federal Reserve Board of Governors - Research & Statistics Division — *Washington, DC*

- Presented research findings to senior economists, contributing to discussions on policy implications for financial stability related to commercial real estate markets.

Visiting Researcher — **Summer 2018**
NYU Center for Urban Science + Progress — *New York, NY*

Projects

QuadraticKalman.jl - Open Source Scientific Computing Package
*Julia Package for Quadratic State-Space Models **[Github]***

- Developed and maintain a high-performance Julia package for Kalman filtering with quadratic measurement equations, achieving a **10x–60x speedup** over existing implementations.
- Implemented automatic differentiation for **gradient and Hessian** computation, enabling efficient likelihood estimation.
- Built a comprehensive **CI/CD pipeline** with unit testing, documentation generation, and code coverage using GitHub Actions.
- Designed numerically stable algorithms for parameter estimation in high-dimensional state spaces.

Education

Doctorate of Philosophy in **Economics**, *University of North Carolina at Chapel Hill* 2020
Master of Science in **Economics**, *University of North Carolina at Chapel Hill* 2018
Bachelor of Business Administration in **Finance**, *University of Massachusetts at Amherst* 2013