

Rui Da

The University of Chicago Booth School of Business
5807 S Woodlawn Avenue, Chicago
Chicago, IL 60637

Phone: (312) 692-1880
Email: rui.da@chicagobooth.edu
Web: <https://www.da-rui.com>

EDUCATION

University of Chicago Booth School of Business
Ph.D. candidate in Econometrics and Statistics

2016 -2023 (*expected*)

Princeton University
Ph.D. student in Physics

2013-2015

Nanjing University, Nanjing, China
B.Sc. in Physics

2009-2013

RESEARCH INTERESTS

Financial Economics, Econometrics, Machine Learning in Finance

JOB MARKET PAPER

[Measuring Active Investing](#)

We develop a framework to study the role of information in the decision-making of investors and how they collectively shape the financial market. An equilibrium is fully characterized in closed-form for a continuous-time economy with large numbers of market participants and imperfect competition. Investors receive private information with varying quality, and are heterogeneous in their misperception of the information quality. In equilibrium, investor heterogeneity generates return predictability, and investors' trading follows a simple factor structure. We develop new econometrics that connect the equilibrium model to both price and quantity data. The method hinges on the blessings of dimensionality, provided by the large number of investors. Applying the framework to US equity market, we study asset managers' information quality and misperception thereof, and their contributions to price informativeness and market liquidity.

PUBLICATIONS

[When Moving-Average Models Meet High-Frequency Data: Uniform Inference on Volatility](#)

with Dacheng Xiu. (2021)

Econometrica

We conduct inference on volatility with noisy high-frequency data. We assume the observed transaction price follows a continuous-time It-semimartingale, contaminated by a discrete-time moving-average noise process associated with the arrival of trades. We estimate volatility, defined as the quadratic variation of the semimartingale, by maximizing the likelihood of a misspecified moving-average model, with its order selected based on an information criterion. Our inference is uniformly valid over a large class of noise processes whose magnitude and dependence structure vary with sample size. We show that the convergence rate of our estimator dominates $n^{1/4}$ as noise vanishes, and is determined by the selected order of noise dependence when noise is sufficiently small. Our implementation guarantees positive estimates in finite samples.

WORKING PAPERS

[The Statistical Limit of Arbitrage.](#)

with Stefan Nagel, Dacheng Xiu. (2022)

When alphas are weak and rare, and arbitrageurs have to learn about alphas from historical data, there is a gap

between Sharpe ratio that is feasible for them to achieve and the infeasible Sharpe ratio that could be obtained with perfect knowledge of parameters in the return generating process. This statistical limit to arbitrage widens the bounds within which alphas can survive in equilibrium relative to the arbitrage pricing theory (APT) in which arbitrageurs are endowed with perfect knowledge. We derive the optimal Sharpe ratio achievable by any feasible arbitrage strategy, and illustrate in a simple model how this Sharpe ratio varies with the strength and sparsity of alpha signals, which characterize the difficulty of arbitrageurs learning problem. Furthermore, we design an all-weather arbitrage strategy that achieves this optimal Sharpe ratio regardless of the conditions of alpha signals. Our empirical analysis of equity returns shows that this optimal strategy, along with other feasible strategies based on multiple-testing, LASSO, and Ridge methods, achieve a moderately low Sharpe ratio out of sample, in spite of a considerably higher infeasible Sharpe ratio, consistent with absence of feasible near-arbitrage opportunities and relevance of statistical limits to arbitrage.

Disentangling Autocorrelated Intraday Returns

with Dacheng Xiu. (2021)

revision requested by Journal of Econometrics.

We propose a semiparametric approach to disentangling the autocovariance of equity returns at high frequency. We assume the observed price consists of an efficient component that follows a nonparametric continuous-time Itô-semimartingale, along with a market microstructure component that follows a discrete-time moving-average model. Our quasi-likelihood procedure relies on a misspecified moving-average model selected by information criteria. We establish the model-selection consistency, provide a central limit theory on autocovariance parameters, and show their consistency uniformly over a large class of models that allow for an arbitrary noise magnitude and a flexible dependence structure. We also provide a quadratic representation of the likelihood estimator, which sheds light on its connection with nonparametric kernel estimators. Our simulation evidence suggests that our estimator outperforms the nonparametric alternatives particularly when noise magnitude is small. We apply this estimator to S&P 1500 index constituents, and find that in recent years the microstructure friction has become smaller but existed in 5-minute returns, particularly in small caps, and that the average duration of autocorrelations for large caps has shrunk considerably to merely 10 seconds.

AWARDS

J. Michael Harrison Doctoral Prize	2021
The Oscar Mayer Fellowship	2020 - 2021
Ph.D. Program Fellowship, The University of Chicago Booth School of Business	2016 - 2020
Natural Science Fellowship, Princeton University	2013 - 2014
Cross-disciplinary Scholars in Science and Technology, University of California, Los Angeles	2012

REFeree ACTIVITIES

Economics and Statistics, Management Science, Journal of Econometrics, Journal of Business & Economic Statistics, Journal of Financial Econometrics, Statistica Sinica

TEACHING ASSISTANTSHIPS

Statistical Inference (Ph.D), The University of Chicago Booth School of Business	2018 - 2020
General Physics (Undergraduate), Princeton University	2015
Mapping the Universe (Undergraduate), Princeton University	2014

SKILLS

Programming: Stata,R, Matlab, Python, SAS, Mathematica.
 Languages: Chinese (native), English (professional)
 Miscellaneous: Tennis (USTA 4.0)

REFERENCES

Zhiguo He (co-chair)

Fuji Bank and Heller Professor of Finance
University of Chicago
Booth School of Business
zhiguo.he@chicagobooth.edu

Stefan Nagel

Fama Family Distinguished Service
Professor of Finance
University of Chicago
Booth School of Business
stefan.nagel@chicagobooth.edu

Pietro Veronesi

Chicago Board of Trade Professor of Finance
University of Chicago
Booth School of Business
pietro.veronesi@chicagobooth.edu

Dacheng Xiu (co-chair)

Professor of Econometrics and Statistics
University of Chicago
Booth School of Business
dacheng.xiu@chicagobooth.edu

Ralph S.J. Koijen

AQR Capital Management Distinguished
Service Professor of Finance
University of Chicago
Booth School of Business
ralph.koijen@chicagobooth.edu