

Yi Ding

CURRICULUM VITAE

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EDUCATION

Hong Kong University of Science and Technology

Ph.D. in Business Statistics

Tsinghua University

B.Sc. in Mathematics and Applied Mathematics

ACADEMIC EXPERIENCE

The Hong Kong Polytechnic University, Research Assistant Professor, Department of Applied Mathematics, 2020 –

RESEARCH INTEREST

Financial econometrics; High-dimensional statistics; Financial technology; Statistical learning; Portfolio optimization; Asset allocation; High-frequency financial data

RESEARCH PAPERS

- **Ding, Yi** and Li, Yingying and Zheng, Xinghua, “High dimensional minimum variance portfolio under statistical factor model” (2021), *Journal of Econometrics*, 2021, 222(1): 502-515.

Abstract: We propose a high dimensional minimum variance portfolio estimator under statistical factor models, and show that our estimated portfolio enjoys sharp risk consistency. Our approach relies on properly integrating ℓ_1 constraint on portfolio weights with an appropriate covariance matrix estimator. In terms of covariance matrix estimation, we extend the theoretical results of POET (Fan et. al (2013)) to a setting that is coherent with principal component analysis. Simulation and extensive empirical studies on S&P 100 Index constituent stocks demonstrate favorable performance of our MVP estimator compared with benchmark portfolios.

- **Ding, Yi** and Li, Yingying and Song, Rui, “Statistical learning for individualized asset allocation” (2022), Third round review for *Journal of the American Statistical Association*

Abstract: We establish a high-dimensional statistical learning framework for individualized asset allocation. Our proposed methodology addresses continuous-action decision-making with a large

number of characteristics. We develop a discretization approach to model the effect from continuous actions and allow the discretization frequency to be large and diverge with the number of observations. The value function of continuous-action is estimated using penalized regression with our proposed generalized penalties that are imposed on linear transformations of the model coefficients. We show that our proposed Discretization and Regression with generalized fOlded concaVe penalty on Effect discontinuity (DROVE) approach enjoys desirable theoretical properties and allows for statistical inference of the optimal value associated with optimal decision-making. Empirically, the proposed framework is exercised with the Health and Retirement Study data in finding individualized optimal asset allocation. The results show that our individualized optimal strategy improves individual financial well-being.

- **Ding, Yi** and Li, Yingying and Guoli Liu and Zheng, Xinghua, “Stock Co-jump Networks” (2022), review for *Journal of Econometrics*

Abstract: We propose a network model with communities to study the stock co-jump dependency. To estimate the community structure, we extend the SCORE algorithm in Jin (2015) and develop a Spectral Clustering On Ratios-of-Eigenvectors for networks with Dependent Multivariate Poisson edges (SCORE-DMP) algorithm. We prove that SCORE-DMP enjoys strong consistency in community detection for the proposed co-jump network with dependent edges. Empirically, using high-frequency data of S&P 500 constituents, we identify two co-jump networks according to whether the market jumps or not and show that the identified community structure helps in predicting stock returns.

- **Ding, Yi** and Zheng, Xinghua, “High Dimensional Covariance Matrix Estimation under Dynamic Volatility Models” (2022), manuscript

Abstract: We study the estimation of unconditional covariance matrix and its spectral distribution under high-dimensional dynamic volatility models. Data under such models have nonlinear dependency both cross-sectionally and temporally. We first investigate the empirical spectral distribution (ESD) of the sample covariance matrix under scalar BEKK models and establish conditions under which the limiting spectral distribution (LSD) is either the same as or different from the i.i.d. case. We then propose a time-variation adjusted (TV-adj) sample covariance matrix and prove that its LSD follows the same Marcenko-Pastur law as the i.i.d. case. Based on the LSD of the TV-adj sample covariance matrix, we obtain a consistent population spectrum estimator. We further develop a TV-adj nonlinear shrinkage estimator that consistently estimates the asymptotically optimal shrinkage estimator.

- **Ding, Yi** and Engle, Robert and Li, Yingying and Zheng, Xinghua, “Factor modeling for volatility” (2022), manuscript

Abstract: Under a high-frequency and high-dimensional setup, we establish a framework to estimate the factor structure in idiosyncratic volatility, and more importantly, stock volatility. We provide explicit conditions for the consistency of conducting principal component analysis on realized volatilities in identifying the factor structure in volatility. Empirically, we confirm the factor structure in idiosyncratic volatilities of S&P 500 Index constituents. Furthermore, with

strong empirical evidence, we propose a simplified single factor model for stock volatility, where volatility is represented by a common volatility factor and a multiplicative lognormal idiosyncratic component. We further utilize the simplified single factor model for volatility forecasting and show that our proposed approach outperforms various benchmark methods.

PRESENTATIONS

Conference Presentations

14th annual meeting of the Society for Financial Econometrics (**SoFiE 2022**), “*Stock Co-jump Networks*”, Cambridge, UK (June. 2022)

NSFC-UST FinTech Symposium (**FinTech Symposium 2021**) , invited talk, “*Statistical learning for individualized asset allocation*”, Hong Kong (Dec. 2021)

The 11th ICSA International Conference (**ICSA 2019**), invited talk, “*Factor modeling for volatility*”, Hangzhou (Dec. 2019)

The 3rd International Conference on Econometrics and Statistics (**EcoSta 2019**), invited talk, “*Factor modeling for volatility*”, Tai Wan (June 2019)

The 2nd International Conference on Econometrics and Statistics (**EcoSta 2018**), invited talk, “*Statistical learning of personalized wealth management*”, Hong Kong (June 2018)

The 1st International Conference on Econometrics and Statistics (**EcoSta 2017**), invited talk, “*High dimensional minimum variance portfolio under factor model*”, Hong Kong (June 2017)

China Meeting of Econometric Society 2017 (**CMES 2017**), invited talk, “*High dimensional minimum variance portfolio under factor model*”, Wuhan (June 2017)

The 2017 Asia Meeting of the Econometrics Society 2017 (**AMES 2017**), “*High dimensional minimum variance portfolio under factor model*”, Hong Kong (June 2017)

Invited Seminar Presentations

Hong Kong University (2020)

City University of Hong Kong (2019)

Shenzhen University (2019)

HONORS AND REWARDS

NSFC Young Scholar Fund from National Science Foundation of China (2022-2024)

General Research Fund (GRF) from Hong Kong Research Grants Council (2022-2024)

Research startup fund from Hong Kong Polytechnic University (2021-2024)

Dean's PhD Fellowship for Research Excellence from Hong Kong University of Science and Technology (2019-2020)

SoFiE 2019 Shanghai Conference Travel Grant from New York University (2019)

Dean's PhD Fellowship from Hong Kong University of Science and Technology (2016–2017)

Research Travel Grant from Hong Kong University of Science and Technology (2016–2017)

Post Graduate Studentship from Hong Kong University of Science and Technology (2015–2020)

Various scholarships from Tsinghua University (2005–2009)

TEACHING EXPERIENCE

Instructor: *Econometrics*, AMA 481/4381, Hong Kong Polytechnic University, undergraduate course, Fall 2020, Fall 2021, instructor rating: 4.3/5 (average: 4.0/5)

Instructor: *Business Statistics*, ISOM 2500, Hong Kong University of Science and Technology, undergraduate course, instructor rating: 87.5/100 (average: 86.5/100), Summer 2019

Teaching Assistant: *Statistical Analysis of Financial Data in R*, ISOM 4530, Hong Kong University of Science and Technology, undergraduate course, Fall 2016, Fall 2017, Fall 2018, Fall 2019

Teaching Assistant: *Statistics for Financial Risk Management*, ISOM 4520, Hong Kong University of Science and Technology, undergraduate course, Spring 2016, Spring 2017

ACADEMIC SERVICE

Reviewer for Journal of Econometrics, Journal of Empirical Finance, Journal of Business & Economic Statistics, Journal of Financial Econometrics, Statistics and Its Interface