# DACHUAN CHEN

Curriculum Vitae

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## ACADEMIC APPOINTMENT

**Full-Time Employment:**

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| 2024.07-present | **Singapore Management University**<br>**School of Economics**<br>Assistant Professor of Economics and Statistics | Singapore |
| 2019.12-2023.12 | **Nankai University**<br>**School of Statistics and Data Science**<br>Assistant Professor | Tianjin<br>China |

**Visiting Positions:**

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| 2024.04-2024.06 | **The Hong Kong University of Science and Technology**<br>**Department of Information System, Business Statistics and Operations Management**<br>Research Associate | Hong Kong<br>China |
| 2024.01-2024.03 | **Singapore Management University**<br>**School of Economics**<br>Visiting Scholar | Singapore |
| 2023.09-2023.11 | **The Hong Kong University of Science and Technology**<br>**Department of Information System, Business Statistics and Operations Management**<br>Visiting Scholar | Hong Kong<br>China |

## EDUCATION

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|---|---|---|
| 2014-2019 | **University of Illinois at Chicago**<br>**Liautaud Graduate School of Business**<br>Ph.D. in Business Administration.<br>Dissertation advisors: Professor Lan Zhang and Professor Per Mykland. | Chicago<br>Illinois |
| 2015-2016 | **The University of Chicago**<br>**Department of Statistics**<br>Travel Scholar in Chicago Metropolitan Exchange Program.<br>Curriculum included Measure-theoretic Probability, Stochastic Calculus,<br>and Statistics in High Frequency Financial Data. | Chicago<br>Illinois |
| 2012-2014 | **University of Colorado Denver**<br>**Business School**<br>Ph.D. Student in Computer Science and Information System Program. | Denver<br>Colorado |

## RESEARCH INTERESTS

Financial Econometrics, High Frequency Econometrics and High Dimensional Statistics

## HONORS AND AWARDS

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| 2023 | Excellent Local Organizer in the Second National Competition of Big Data Analysis Technology Skills. |
| 2023 | The Sixth National Education and Teaching Achievement Award for the Master Degree of Applied Statistics, Excellent Case Award, Second Prize. |
| 2023 | Favorite Teacher for Undergraduate Graduates of Class 2023 at School of Statistics and Data Science, Nankai University. |
| 2022 | Excellent Instructor in the First National Competition of Big Data Analysis Technology Skills. |
| 2022 | Advisor of First Prize Team in Asia and Pacific Mathematical Contest in Modelling (APMCM). |
| 2018 | Stevanovich Student Fellowship from the Stevanovich Center for Financial Mathematics, The University of Chicago (UoC), as the first recipient from non-UoC universities. |
| 2018 | CBA Doctoral Student Travel Fund from University of Illinois at Chicago. |
| 2014 - 2018 | Doctoral Scholarship and CBA Fellowship from University of Illinois at Chicago. |
| 2013 | Dean's Scholarship from University of Colorado Denver. |

## GRANTS

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| 2024-2025 | DART Funds and Conference Funds of School of Economics, SMU. |
| 2022-2024 | National Natural Science Foundation of China, Young Scholar Project (Grant 12101335). |
| 2022-2023 | Natural Science Foundation of Tianjin Municipal, Young Scholar Project (Grant 21JCQNJC00020). |

## PUBLICATIONS

Chen, D., Feng, L., Mykland, P.A. and Zhang, L (2024). "*High Dimensional Regression Coefficient Test with High Frequency Data*". Forthcoming in Journal of Econometrics. DOI: https://doi.org/10.1016/j.jeconom.2024.105812

Chen, D. (2024). "*High Frequency Principal Component Analysis based on Correlation Matrix that is Robust to Jumps, Microstructure Noise and Asynchronous Observation Times*". Forthcoming in Journal of Econometrics.
DOI: https://doi.org/10.1016/j.jeconom.2024.105701

Chen, D., Li, C., Tang, C.Y. and Yan, J. (2023). "*The Leverage Effect Puzzle under Semi-nonparametric Stochastic Volatility Models*", Forthcoming in Journal of Business & Economic Statistics.
DOI: https://doi.org/10.1080/07350015.2023.2203756

Chen, D., Mykland, P.A., and Zhang, L. (2023). "*Realized Regression with Asynchronous and Noisy High Frequency and High Dimensional Data*", Forthcoming in Journal of Econometrics.
DOI: https://doi.org/10.1016/j.jeconom.2023.02.015

Chen, D., Mykland, P.A., and Zhang, L. (2020). "*The Five Trolls under the Bridge: Principal Component Analysis with Asynchronous and Noisy High Frequency Data*", Journal of the American Statistical Association, **115** (532), pp. 1960-1977.

Mykland, P.A., Zhang, L., and Chen, D. (2019). "*The Algebra of Two Scales Estimation, and the S-TSRV: High Frequency Estimation that is Robust to Sampling Times* ", Journal of Econometrics, **208** (1), pp. 101-119.

Li, C., and Chen, D. (2016). "*Estimating Jump-Diffusions Using Closed-form Likelihood Expansions*", Journal of Econometrics, **195** (1), pp. 51-70.

Li, C., An, Y., Chen, D., Lin, Q., and Si, N. (2016). "*Efficient Computation of Likelihood Expansions for Diffu-*

*sion Models*", IISE Transactions, **48** (12), pp. 1156-1171.
(This paper received the *best paper award* in the IISE Transactions on Operations Engineering and Analytics for 2018.)

Backues, S. K., Chen, D., Ruan, J., Xie, Z., and Klionsky, D. J. (2014). "*Estimating the Size and Number of Autophagic Bodies by Electron Microscopy*", Autophagy, **10**, pp. 155-164.

## WORKING PAPERS

Chen, D., Lu, W. and Xie, S. (2023). "*High Frequency Factor Analysis with Partially Observable Factors*". In revision.

This paper considers a novel factor structure – *Partially Observable Factor Model* – where both observable factors and latent factors exist in the model simultaneously. Such factor structure can make sure both interpretability and goodness-of-fit at the same time. Necessary estimation methodologies for this partially observable factor model are developed in this paper for the high frequency data. The proposed estimation methodology is robust to jumps, microstructure noise and asynchronous observation times simultaneously.

When the observable factors are exogenous, we provide the estimation theory for the integrated eigenvalues of the residual covariance matrix, which including the bias-corrected estimator, central limit theorem and asymptotic variance estimator. As a result, the asymptotic normality of the bias-corrected estimator can be applied to test the existence of the latent factors.

When the observable factors are endogenous, we propose a novel framework of high frequency unsupervised exogenous component learning (HF-UECL), which can help people quantify the contributions of the observable factors to the latent factors. This is the first work on high frequency instrumental variables, and it can be regarded as a necessary extension of the Projected-PCA (or Instrumented PCA) in the world of continuous-time models. Statistical inferences have been established for the loadings of the observable factors onto the latent factors.

Monte Carlo simulation demonstrates the validity of our estimation methodologies. Empirical study demonstrates that (i) in the exogenous setting, the latent factors significantly exist in the residual process of the high frequency regression; (ii) in the endogenous setting, the correlations between the observable factors and latent factors do exist significantly.

Chen, D., Hu, S., Li, Y. and Zheng, X. (2023). "*Efficient High-Dimensional Covariance Matrix Estimation Incorporating Trading Information*". Working Paper.

This paper proposes the first trading information incorporated estimation methodology for high-dimensional covariance matrix using high-frequency data. Our method extends the univariate trading information incorporated variance estimator of Li, et al. (2016) to the high-dimensional setting, allowing the cross-sectional dimension $d$ to grow exponentially in $n^{1-\varepsilon}$ for any $\varepsilon \in (0,1)$, where $n$ is the intraday observation frequency. Theoretically, under mild assumptions, we establish the tail property of the trading information incorporated covariance estimator. We then impose a factor structure on cross-sectional intraday returns and apply POET to estimate high-dimensional covariance and precision matrices. We demonstrate the effectiveness of the proposed estimators through simulations and an empirical study using second-by-second Trade and Quote data from S&P 500 index constituents, showing that the minimum variance portfolio constructed with our estimator achieves lower long-term risk than that relying on the pre-averaging-based estimator.

## PRESENTATIONS AND TALKS

Conference presentation at Chicago Area SIAM Student Conference 2018, Chicago. (April 2018)

Invited talk at Department of Business Statistics and Econometrics, Guanghua School of Management, Peking University, Beijing. (June 2018)

Invited talk at International Symposium on Financial Engineering and Risk Management, Fudan University, Shanghai. (June 2018)

Invited seminar talk at Stevanovich Center for Financial Mathematics, The University of Chicago. (November 2018)

Invited seminar talk at School of Economics and Management, University of Electronic Science and Technology of China, Online. (May 2019)

Conference presentation at SoFiE Annual Conference 2019, Shanghai. (June 2019)

Invited seminar talk at Center of Statistical Research, Southwestern University of Finance and Economics, Chengdu. (June 2019)

Conference presentation at China International Conference in Finance, Shanghai. (July 2021)

Conference presentation at Financial Econometrics and Risk Management Conference, Mianyang. (July 2021)

Paper accepted for the conference presentation at SoFiE Annual Conference 2022, University of Cambridge (UK). (June 2022, failed to attend due to COVID-19 pandemic)

Invited seminar talk at Guanghua School of Management and Center for Statistical Science, Peking University, Online. (September 2022) Topic: High Frequency Econometrics: Foundation and Recent Progress.

Invited seminar talk at School of Statistics and Academy of Statistics and Interdisciplinary Sciences, Faculty of Economics and Management, East China Normal University, Shanghai. (March 2023)

Conference presentation at 12th National Conference of Probability and Statistics, Qingdao. (April 2023)

Invited seminar talk at School of Statistics and Data Science, Nanjing Audit University, Online. (May 2023)

Conference presentation at the Workshop on Theory and Application of Time-Varying Econometrics Models, Changsha. (May 2023)

Invited seminar talk at School of Economics and Management, University of Electronic Science and Technology of China, Chengdu. (May 2023)

Invited seminar talk at School of Entrepreneurship and Management, ShanghaiTech University, Shanghai. (May 2023)

Invited seminar talk at Guanghua School of Management and Center for Statistical Science, Peking University, Beijing. (June 2023)

Conference presentation at SoFiE Annual Conference 2023, Sungkyunkwan University, Seoul (Korea). (June 2023)

Invited seminar talk at Center for Statistical Science, Tsinghua University, Beijing. (June 2023)

Invited seminar talk at Department of Information Systems, Business Statistics and Operations Management, The Hong Kong University of Science and Technology, Hong Kong S.A.R., China. (October 2023)

Invited conference presentation in the Econometric Workshop at School of Economics and Management, Beijing University of Aeronautics and Astronautics, Beijing. (December 2023)

Invited seminar talk at Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Beijing. (December 2023) Topic: High Frequency Econometrics: Foundation and Recent Progress.

Invited seminar talk at School of Economics, Singapore Management University, Singapore. (January 2024)

Invited seminar talk at School of Statistics and Management, Shanghai University of Finance and Economics, Shanghai. (May 2024)

Invited seminar talk at Department of Economics, Chinese University of Hong Kong, Hong Kong S.A.R., China. (June 2024)

Invited presentation at 2024 Asia Meeting of the Econometric Society – China, Hangzhou. (June 2024)

Invited presentation at 2024 IMS – China International Conference on Statistics and Probability, Yinchuan. (July 2024)

Invited presentation at MPSS (Monash-Princeton-SJTU-SMU) Conference in Econometrics, Shanghai. (October 2024)

Invited presentation at SMU-XMU Econometrics Conference, Singapore. (November 2024)

Invited presentation at 2024 First Macau Conference in Business Intelligence and Analytics, University of Macau, Macau S.A.R., China. (December 2024)

## ACADEMIC SERVICES

Referee for *Journal of the American Statistical Association*, *Journal of Econometrics*, *Journal of Business and Economic Statistics*, *Econometric Theory*, *Statistica Sinica*, *Economic Modelling*, *Journal of Computational and Graphical Statistics*, *Journal of Statistical Planning & Inference*, *Journal of Systems Science & Complexity*.

External Reviewer of Research Grants Council (RGC) of Hong Kong.

Invited Session Chair at 2024 Asian Meeting of the Econometric Society, Hangzhou, China.

Session Chair at 2024 HKUST IAS-SBM Joint Workshop – Financial Econometrics in the Big Data Era, Hong Kong S.A.R., China.

Session Chair at 2024 SMU-XMU Econometrics Conference, Singapore.

Committee Member of Undergraduate Program in Data Science & Analytics Major, School of Economics, Singapore Management University. 2024.

## TEACHING EXPERIENCE

2024-present Singapore Management University, School of Economics. Singapore
DSA307 Big Data Analytics with Spark (U), Fall 2024
DSA308 SQL and NoSQL Database (U), Autumn 2025
ECON6006 Financial Econometrics (G), Spring 2025
ECON746 High Frequency Econometrics (G), Spring 2025
ECON751 Topics in Financial Econometrics (G), Autumn 2025