Zhaocheng Zhang

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Education

University of Cambridge

PhD in Economics. Supervisor: Prof Oliver Linton   expected 2026
- Visiting PhD 2023/24, UC Berkeley. Host: Prof Martin Lettau
MPhil in Economic Research   2020

London School of Economics and Political Science

MSc in Economics   2019

Xi'an Jiaotong University

BSc in Management, Special Class for the Gifted Young   2016
- Exchange Student 2014/15, National University of Singapore

Research Interests

Primary fields: Applied Econometrics, Financial Econometrics
Secondary fields: Empirical Industrial Organization, Big Data Analytics in Finance

Publications

1. Impact of Primary Care Market Mergers on Quality: Evidence from the English NHS

with Yuan Lyu, 2025, **Journal of Health Economics***, Forthcoming*

This study provides the first empirical evidence on the quality effects of primary care mergers, using comprehensive English NHS data from 2014-2018. Employing a stacked Difference-in-Differences (DiD) approach with Propensity Score Matching (PSM), we find that while mergers may improve clinical management, they decrease patient satisfaction and fail to improve broader clinical quality.

2. Credit Rating Prediction Through Supply Chains: A Machine Learning Approach

with Jing Wu and Sean Zhou, 2022, **Production and Operations Management** *31(4): 1613-1629*

This paper studies the role of supply chain information in firm credit risk prediction. Using firm-level supplier-customer linkages and corporate credit rating data, we develop a machine learning framework of gradient boosted decision tree to examine whether and what supply chain features can significantly improve the prediction accuracy of credit ratings, and what types of supply chain links have higher information content that positively affects the predictability of the supply chain features.

Working Papers

1. Tensor Factor Analysis of Global Supply Chains (Job Market Paper)

This paper develops and estimates a semi-parametric tensor factor model for high-dimensional data where latent factor loadings are flexible, non-parametric functions of time-varying covariates. We introduce this framework to analyze a pressing economic problem: the identification of systematic risks in global supply chains. Applying the model to a five-dimensional country-industry level dataset (2000-2014), the empirical analysis reveals that a small number of latent factors—interpreted as major trade hubs like China and the U.S.—explain the vast majority of the network's variation. The results demonstrate that exposures to these systematic risk factors are strongly driven by observable economic characteristics such as economic size and productive capability. This research provides both a novel econometric tool for dynamic, multi-dimensional data and new insights into the evolving structure of the global economy.

2. **Tensor Factor Models, Missing Financial Data, and Stock Returns** (*with Martin Lettau*)

We propose a tensor factor model for high-dimensional panels of stock characteristics that accommodates arbitrary patterns of missing data and uncovers the low-rank structure inherent in multi-way financial data. The model employs a weighted version of the Tucker decomposition, estimated via higher-order orthogonal iteration adjusted for unbalanced observation patterns. We apply this framework to a monthly panel of 153 firm-level characteristics for over 5,000 U.S. stocks from 1983 to 2022. Despite over 50% of entries being missing, the estimated model achieves over 90% out-of-sample explanatory power and compresses the data by more than 97%. Sorting stocks by these latent factor scores yields long-short portfolios with strong performance in asset pricing tests. The resulting tensor-based pricing factors earn high Sharpe ratios and exhibit lower pricing errors than traditional anomaly, PCA, and Fama–French factors. Our results demonstrate that modeling the characteristic tensor directly can offer significant empirical advantages in explaining the cross-section of stock returns.

3. **Determining the Number of Factors with Missing Observations** (*with Weiguang Liu*)

This paper proposes eigenvalue ratio-based estimators for determining the number of factors in latent factor models with missing observations. Our framework accommodates general missing data patterns and does not require the Missing Completely at Random (MCAR) assumption. Our approach is based on the spectral behavior of adjusted second-moment matrices under flexible overlap conditions, requiring only that cross-sectional pairs share a positive fraction of observations. Simulation studies demonstrate the robustness of our estimators across a wide range of missing data patterns and idiosyncratic structures. We further illustrate the practical applicability of our method with an empirical application to monthly excess returns (1995-2024).

4. **Detection of Weak Granulars in Large Panels** (*with Yinfeng Zeng*)

We propose a new framework to detect weak granular units in large panels—cross-sectional units that affect only a fraction N^α (with $0 < \alpha \leq 1$) of the data. Extending existing granular and factor models, our method accommodates both weak common factors and weak granular shocks. We derive consistency and asymptotic properties under relaxed loading assumptions, and develop a sequential testing procedure based on thresholding idiosyncratic variances. Our results bridge granular theory and weak factor analysis, and empirical applications show that weak granular structures are common in economic and financial panels.

5. **Impact of Horizontal Mergers on the Value of Suppliers and Customers**

This paper examines the impact of horizontal mergers on the value of merging firms' suppliers and customers using newly constructed supply chain data. I analyze both general and horizontal mergers and test for cumulative abnormal returns to related firms. The findings show that horizontal mergers lead to significant negative announcement returns for both suppliers and customers of the merging firms. I show empirical evidence that this adverse effect is likely driven by increased industry concentration following the merger.

Selected Work in Progress

Non-negative Tensor Factor Models
Tensor Factor Analysis of U.S. County-County Commuting Flows (*with River Chen*)
Tensor Factor Analysis of Institutional Stock Holdings

Conference and Seminar Presentations

2025: EEA Congress 2025, Bordeaux, France; RES Annual Conference, Birmingham, UK; SETA 2025, Macau; IAAE 2025, Turin, Italy; Econometrics Workshop, Cambridge, UK

2024: INFORMS Annual Meeting, Seattle; PhD workshop, CUHK Business School, Hong Kong; Econometrics Workshop, Cambridge; Trade and Spatial Economics Workshop, Cambridge

2023: MSOM Annual Conference, Montreal; Neuro Tensors in Finance Conference, Cambridge; Econometrics Workshop, Cambridge

2022: POMS-HK International Conference, Hong Kong; PhD workshop, CUHK Business School, Hong Kong; Econometrics Workshop, Cambridge

2021: INFORMS Annual Meeting, Anaheim; Econometrics Workshop, Cambridge

Teaching Experience

Faculty of Economics, University of Cambridge

College Tutor, Graduate-Level Econometrics	2022 - 2023
Teaching Fellow, F400 Asset Pricing (PhD and Master's)	2021 - 2022
Teaching Fellow, R301a Advanced Econometrics: Time Series (PhD and Master's)	2021 - 2022
Teaching Fellow, E300 Econometric Methods (Master's)	2021 - 2022
Supervisor, Paper 9 Empirical Industrial Organization (Undergraduate)	2020 - 2021

Other Experience

Research Intern, CUHK Business School and Credit Suisse, Hong Kong	2019
Research Fellow, CityU College of Business, Hong Kong	2016 - 2017

Selected Scholarships and Awards

Faculty of Economics Trust Funds (Cambridge)

Cambridge International Scholarship (Cambridge), full funding for PhD

Temasek Foundation LEaRN Scholarship (NUS), full funding for exchange student

Outstanding Graduate Award (XJTU)

Skills & Others

Languages: Mandarin (native), English (fluent)

Coding: Proficient in Stata, Python, SQL, C, LaTeX; Working knowledge of Matlab, R, HPC, Slurm

References

Oliver Linton	**Julius Vainora**	**Martin Lettau**
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University of Cambridge	University of Cambridge	University of California, Berkeley
obl20@cam.ac.uk	jv429@cam.ac.uk	lettau@berkeley.edu