# JUNSU PAN

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## EDUCATION

**Ph.D. Economics,** University of North Carolina at Chapel Hill *May 2024 (Expected)*
Research Fields: Econometric Theory, Financial Econometrics, Asset Pricing

**Master in Management,** ESCP Business School, Paris *2018*

**Master of Finance,** Tongji University, Shanghai *2018*

**B.S. Mathematics & B.A. Economics,** Southwestern University of Finance and Economics, Chengdu *2016*

## JOB MARKET PAPER

***"Tensor Principal Component Analysis"*** with Andrii Babii and Eric Ghysels, submitted at *Econometrica*

- *Abstract:* In this paper, we develop new methods for analyzing high-dimensional tensor datasets. A tensor factor model describes a high-dimensional dataset as a sum of a low-rank component and an idiosyncratic noise, generalizing traditional factor models for panel data. We propose an estimation algorithm, called tensor principal component analysis (TPCA), which generalizes the traditional PCA applicable to panel data. The algorithm involves unfolding the tensor into a sequence of matrices along different dimensions and applying PCA to the unfolded matrices. We provide theoretical results on the consistency and asymptotic distribution for the TPCA estimator of loadings and factors. We also introduce a novel test for the number of factors in a tensor factor model. The TPCA and the test feature good performance in Monte Carlo experiments and are applied to sorted portfolios.

## WORKING PAPERS & WORK IN PROGRESS

***"Dynamic Portfolio Selection with Machine Learning"***

- Extends the static Markowitz portfolio choice to a dynamic and conditional problem by modeling portfolio weights as a function of characteristics, and incorporates a LASSO-type penalty to select the high-dimensional function coefficients.
- Outperforms the dynamic portfolio choice problem without a LASSO penalty and the benchmark of static and equally weighted portfolios in terms of out-of-sample Sharpe ratios.

***"Tensor Factor Asset Pricing Models"*** with Andrii Babii and Eric Ghysels

- Provides two additional applications of tensor factor models estimated by TPCA: 1) international asset pricing that involves time, industry and country dimensions, and 2) conditional asset pricing of equities based on (a) the cross-section of individual firm returns, (b) the time series of monthly returns and (c) data encoding characteristics across firms and time.
- The international asset pricing application suggests that there is one world factor and one segmentation factor that together explain the international asset returns.
- The conditional asset pricing application aims to estimate time varying loadings based on the time series behavior of a firm's characteristics, relative to the entire universe of stocks.

## CONFERENCE PRESENTATIONS

NBER-NSF Time Series Conference* *September 2023*
Fifteenth Annual SoFiE Conference* *June 2023*
Triangle Econometrics Conference* *April 2023*
$87^{\text{th}}$ Annual Meeting of the Midwest Economics Association (MEA) *March 2023*
Neuro Tensors in Finance Mini-Conference at the University of Cambridge* *March 2023*
The Centre for Econometric Analysis at the Bayes Business School* *March 2023*
(* Presented by co-authors)

## TEACHING EXPERIENCE

**Instructor, Department of Economics, UNC Chapel Hill**

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| ECON 101: Introduction to Economics | *Summer 2020* |

**Teaching Assistant, Department of Economics, UNC Chapel Hill**

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| ECON 876: Introduction to Empirical Finance | *2 semesters* |
| ECON 771: Econometrics | *3 semesters* |
| ECON 400: Introduction to Data Science and Econometrics | *1 semester* |
| ECON 101: Introduction to Economics | *4 semesters* |

## AWARDS, HONORS & FELLOWSHIPS

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| Graduate Student Transportation Grant, University of North Carolina at Chapel Hill | *Spring 2023* |
| Lurcy Fellowship, University of North Carolina at Chapel Hill | *Spring 2022* |
| National Postgraduate Mathematical Contest in Modeling (China), Meritorious Winner | *Fall 2016* |
| Mathematical Contest in Modeling (US), Meritorious Winner | *Spring 2015* |
| BOC Scholarship, Bank of China | *Jun 2016* |
| Academic Scholarship, Southwestern University of Finance and Economics | *4 semesters* |

## PROFESSIONAL SERVICE

Referee for *Journal of Applied Econometrics*

## WORK EXPERIENCE

Ph.D. Intern, NERA Economic Consulting, Washington, D.C.

## SKILLS

**Programming:** Python (TensorPCA package), Matlab (TPCA replication package), R, Stata, SAS, LaTex
**Languages:** English(fluent), Chinese(native)

## REFERENCES


**Eric Ghysels** *(advisor)*
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