Zhiruo (Rachel) Zhang

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Office Contact Information

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Graduate Studies

The University of Adelaide   *2022-present*
Ph.D. Candidate in Economics and Econometrics
Expected Completion Date: June 2026

REFERENCES

Prof. Firmin Doko Tchatoka
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The University of Adelaide
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Dr. Qazi Haque
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A/Prof. Virginie Masson
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The University of Adelaide

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Prior Education

Monash University, Australia   *July 2016 – July. 2021*

- ***Master of Applied Econometrics***
  Dissertation: Empirical Analysis of a Time-varying Vector Autoregression Model
  Supervisor: Prof. Jiti Gao

- ***Bachelor of Business***
  Major: *Finance*; Minor: *Business Statistics*

Fields

Primary: Macroeconometrics, Bayesian Time Series and Panel Data Econometrics
Secondary: Machine Learning, Nonlinear Time Series Models

Job Market Paper

"Adaptive Bayesian Shrinkage of High-Dimensional Panel VARs." 2025.
With Firmin Doko Tchatoka and Qazi Haque

This paper develops a Bayesian framework for estimating high-dimensional panel vector autoregressions (PVARs). We propose a novel approach that combines Bayesian shrinkage with adaptive variable selection to effectively tackle over-parameterization and sparsity common in high-dimensional panels. By employing Laplace-based spike-and-slab priors on model coefficients, the framework flexibly captures both cross-sectional inter-dependencies and unit-specific heterogeneity, offering a powerful and robust tool for structured inference. Monte Carlo simulations demonstrate that our method outperforms existing regularization techniques in terms of estimation accuracy and forecasting performance. Empirically, the framework uncovers asymmetric financial contagion within euro area sovereign bond markets and produces stable, reliable forecasts across a multi-country macroeconomic panel. These findings highlight the effectiveness of adaptive shrinkage in modeling heterogeneous and evolving linkages within complex panel data systems.

Working Papers

"Bayesian Network Estimation for High-Dimensional Panel VARs." 2025.
With Firmin Doko Tchatoka and Qazi Haque.

This paper develops a Bayesian Graphical Network Lasso to estimate sparse precision matrices in high-dimensional panel VAR models with exogenous variables (PVARX). By directly targeting the inverse error covariance matrix, the method identifies contemporaneous conditional dependencies across macroeconomic units in a structure-aware and order-invariant way. We incorporate both adaptive and non-adaptive shrinkage priors, offering flexibility in modeling heterogeneous sparsity patterns. Monte Carlo simulations show strong performance in recovering the underlying graphical structure. In an empirical application, we analyze the global transmission of natural disaster shocks across high-income economies, uncovering a sparse but economically meaningful network of international macroeconomic spillovers.

Selected Work in Progress

"Beyond Group Shrinkage Toward Hierarchical Selection in Panel VAR." With Firmin Doko Tchatoka and Qazi Haque.

Teaching Experience

Tutor, The University of Adelaide

- *ECON3530 Applied Econometrics III* (Semester 1, 2024; Semester 1, 2025)

- *ECON3510 International Finance III* (Semester 2, 2024; Semester 2, 2025)

- *ECON2508 Financial Economics II* (Semester 1, 2024)

- *ECON2513 Global Economic History II* (Semester 2, 2025)

- *ECON2514 Managerial Economics II* (Semester 2, 2024)

- *ECON2515 Intermediate Applied Econometrics II* (Semester 2, 2023)

- *ECON1005 Introduction to Mathematical Economics I* (Semester 1, 2024; Semester 1, 2025)

Other Teaching Assistant Roles

- Converted econometrics teaching materials from `Stata` to `R`

- Developed code examples and solution templates.

Professional Activities

Presentations *(including scheduled)*

2025	-	World Congress of the Econometric Society 2025
	-	39th Annual Australian PhD Conference in Economics and Business
	-	10th Workshop of the Australasian Macroeconomics Society (WAMS + LAEF 2025)
2024	-	Australasian Meeting of the Econometric Society
	-	Continuing Education in Macroeconometrics
	-	Australian Conference of Economists
	-	Africa Meeting of the Econometric Society
	-	The 32nd Australia New Zealand Econometric Study Group Meeting
2023		The 31st Australia New Zealand Econometric Study Group Meeting (Poster)

Seminar

2024	The University of Adelaide SEPP HDR Internal Seminar
2023	The School of Economics and Public Policy Brown Bag Workshop

Scholarships and Grants

Adelaide International Graduate Research Scholarship, The University of Adelaide 2022–2026

Travel Grants, School of Economics and Public Policy, The University of Adelaide   2024–2025

Technical Skills

Programming Languages: MATLAB, R, Stata, Julia

Scripting & Workflow Tools: Git, Bash, Slurm (HPC)

Document Preparation: LaTeX, Markdown, HTML

Languages

Mandarin (native), English (fluent), Russian (intermediate)