Zhiruo (Rachel) Zhang

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Office Contact Information

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School of Economics, College of Business and Law
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Graduate Studies

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

REFERENCES

Prof. Firmin Doko Tchatoka
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Adelaide University
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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." 2026.
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." 2026.
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.

"Disentangling Spillover Networks and Transmission Channels in Panel VARs." 2026.
With Firmin Doko Tchatoka and Qazi Haque.

International spillovers operate through specific bilateral relationships and different macroeconomic channels. Standard panel VAR regularization approaches, however, usually only work at one level of aggregation. Country-level shrinkage is too broad to uncover transmission channels, while elementwise selection fragments bilateral spillovers and hides their economic interpretation. This paper proposes a bi-level spike-and-slab framework for high-dimensional panel VARs that jointly selects spillovers at the country-pair level and variables within active spillover blocks. The approach delivers an interpretable bilateral spillover network together with a decomposition of transmission channels. An EM-based algorithm enables efficient estimation even with the nonconvex prior structure. Monte Carlo experiments demonstrate improved spillover detection relative to existing methods. An application to OECD macroeconomic data reveals a sparse but structured global network dominated by a small set of hub countries and real-side transmission channels.

Selected Work in Progress

[1] Structural Transformation, Green Technology, and Labor Reallocation (with Xiyu Ni)

Teaching Experience

Tutor, Adelaide University

- *ECON 1012 Data Analytics* (Semester 1, 2026)

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 Experience

Administration Assistant, Adelaide University 2026

- Provided administrative support for academic and professional activities within the School of Economics.
- Assisted with event coordination, communications, scheduling, and logistics for seminars, workshops, and conferences.

Lab Assistant, Adelaide Laboratory for Experimental Economics, Adelaide University
2025

- Supported the administration and implementation of behavioural and experimental economics research activities.
- Assisted with participant coordination, laboratory preparation, and data collection for experimental economics studies.

Professional Activities

Presentations

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 and New Zealand Econometric Study Group Meeting

2023 The 31st Australia and New Zealand Econometric Study Group Meeting (Poster)

Seminar

2024 Adelaide University SEPP HDR Internal Seminar

2023 The School of Economics and Public Policy Brown Bag Workshop

Conference & Event Service

Conference

- Australasian Meeting of the Econometric Society, 2026 — *Local Organizing Committee Secretary*
- Australian Conference of Economists, 2024 — *Volunteer*
- Continuing Education in Macroeconometrics, 2024 — *Volunteer*

School Event

- Budget 2026 — *School Organizer*
- Fisher Public Lecture, 2026 — *School Organizer*

Scholarships and Grants

Adelaide International Graduate Research Scholarship, Adelaide University 2022–2026

Travel Grants, School of Economics, Adelaide University 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)

Last updated: June 20, 2026