

**Banka Slovenije**  
in cooperation with  
**the Research Centre of the School of Economics and Business**  
invites you to a seminar

***Capturing Regional Business Cycles with Matrix Variate Models and High-Frequency Indicators***

Author and speaker:  
**Dan Zhu**  
**Professor at Monash Business School**

The seminar will be held in the  
**Great Hall of Banka Slovenije**  
**on Wednesday, 11 June 2025 at 11:00**

**Abstract:**

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The limited availability of historical state-level GDP data poses significant challenges for macroeconomic analysis and forecasting. Traditional approaches often rely on alternative economic indicators, which may not fully capture economic activity. In this paper, we introduce a matrix variate framework to address missing data and mixed-frequency observations in state-level GDP modelling. Our framework leverages a set of sampling techniques to efficiently construct a Bayesian Markov Chain Monte Carlo (MCMC) algorithm for estimation and forecasting. We apply this method to two empirical applications: first, we generate historical quarterly state-level GDP estimates from 1988Q2 to 2004Q4 using seven state-level indicators available prior to 2005; second, we extend our framework to a mixed-frequency setting, incorporating monthly state-level indicators to produce high-frequency monthly GDP estimates. These applications highlight the advantages of our approach in capturing regional business cycles and improving forecasting accuracy. Our findings demonstrate that the matrix variate structure, combined with Bayesian inference, provides a robust solution for handling missing macroeconomic data while preserving key interdependencies in the data.

**About the author:**

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Dan Zhu is a Professor at Monash University, specializing in econometrics and macroeconomic modelling. Her research focuses on developing statistical methods for high-dimensional economic data, with particular expertise in Bayesian inference, forecasting, and state-level economic analysis. At Monash University Australia, she is actively involved in both teaching and collaborative research with academic and industry partners. Professor Zhu's work contributes to evidence-based policy and regional economic planning through advanced quantitative methods.

**How to sign up:**

To sign up for the seminar, please send an email to [seminar@bsi.si](mailto:seminar@bsi.si). You can sign up by Monday, 9 June 2025. The seminar will be held in English.