

## Enhancing Business and Financial Analysis through Reduced-Rank Envelope Vector Autoregressive Models



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Vector autoregressive (VAR) models have historically been favored for their adaptability and simplicity in modeling multivariate time series data. However, the VAR framework often encounters overparameterization issues, particularly in high-dimensional time series datasets, limiting the incorporation of variables and lags. Several statistical approaches have been proposed to address dimension reduction in VAR models, yet, they prove inefficient in extracting relevant information from complex datasets, as they fail to distinguish between information aligned with scientific objectives and are also inefficient in addressing rank deficiency problems. In this context, envelope methods offer a promising solution by leveraging reduced subspaces to identify and eliminate irrelevant information, thereby enhancing efficiency in parameter estimation. This presentation introduces an innovative VAR model integrating envelope concepts within the reduced-rank framework, facilitating substantial dimension reduction without compromising parameter estimation accuracy. Through comprehensive simulation studies and real-world economic data analysis, we demonstrate the superior performance of our model compared to existing methodologies in the literature, underscoring its efficacy in capturing essential dynamics while mitigating the limitations of traditional VAR frameworks.

### Biography:

S. Yaser Samadi is an Associate Professor in School of Mathematical and Statical Sciences and an affiliated faculty in School of Computing at Southern Illinois University Carbondale, IL, USA. He obtained his PhD in Statistics from the University of Georgia in 2014. He was a Research Fellow at SAMSI & Duke University in 2020-2021.