# Research Seminar "Quantitative Economics"

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Abstract

**Estimation of Continuous-time Linear DSGE Models from Discrete-time Measurements**
(Juan Carlos Parra-Alvarez)

Abstract
In this paper, we present a general state space framework for estimating the parameters of continuous-time linear DSGE models using discrete-time data. Our approach relies on the exact discrete-time representation of equilibrium dynamics, thus avoiding any discretization errors. By utilizing the Kalman filter, we construct the exact likelihood for data sampled as either stocks or flows. Additionally, we provide the necessary and sufficient conditions for the local identification of frequency-invariant structural parameters inherent in the continuous-time model.

We demonstrate how to recover unobserved structural shocks at measurement times from the reduced-form residuals within the state space representation, leveraging the causal links embedded in the economic model. To illustrate the approach, we employ a standard real business cycle model. Through Monte Carlo experiments, we show that the finite sample properties of our estimator outperform those of an estimator based on a naive Euler-Maruyama discretization.

Finally, we apply the model to postwar U.S. macroeconomic data, estimating it using a mix of series sampled at different frequencies and as both stocks and flows. The analysis includes a historical decomposition, breaking down the effects of structural supply and demand shocks on the observable variables.