

Workshop ”Macro Policy Analysis with Julia”

European Central Bank, 6-11 November 2025

Program

- **Part 1:** Programming with Julia

- (1) Basics & Scalars
- (2) Functions
- (3) Vectors
- (4) Matrices & Arrays ^f
- (5) Conditionals & Loops
- (6) Object Scopes ^s
- (7) Further Object Types ^f
- (8) Path-, Folder & Workspace-Management
- (9) Storing & Loading Data ^s
- (10) Random Variables ^f
- (11) Parallelization
- (12) Plotting ^s
- (13) Further (error handling, timing, optimization, systems of non-linear equations, differentiation, integration, interpolation, polynomials, symbolic calculus, Julia-Markdown)

- **Part 2:** Macro-Econometrics with Julia: Models & Estimation Techniques¹

- (1) (Reduced-Form-) Vector-Autoregressions
Analytical Derivations of Maximum Likelihood Estimator and Posterior Distribution
- (2) Structural Vector-Autoregressions (Identified with Point- and Sign-Restrictions)
Analytical Derivations + Algorithm of Arias, Rubio-Ramirez & Waggoner (2018)
- (3) Hierarchical Bayes Modeling (ex: Prior Elicitation for VAR)
Gibbs-Sampling / RWMH- & SMC-Sampling
- (4) Linear State Space Models (ex: Dynamic Factor Model)
Carter-Kohn Gibbs-Sampling
- (5) Nonlinear State Space Models (ex: VAR with Stochastic Volatility)
SMC-Sampling with Likelihood Evaluation via Particle Filtering
- (6) DSGE Models (ex: Small NK Economy)
Solution: Package `SolveDSGE`
Estimation: SMC-Sampling with Likelihood Evaluation via Kalman/Particle Filtering

^s: Self-study (materials provided). ^f: Fast treatment.

¹Bayesian estimation is discussed and implemented in all sections. Maximum Likelihood estimation is outlined in all but Section 5, and it is implemented (point-estimation) in Sections 1, 2 (analytical) and 4 (EM-algorithm).

References

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