Bayesian Dynamic Modeling in Macro & Finance: A few useful R packages

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November 27, 2025

1. Bayesian regression

Package	Summary	Typical Applications
`brms`	High-level interface to Stan for flexible Bayesian regression and hierarchical models.	General regression, mixed-effects models, psychometrics, ecology, health sciences.
`rstanarm`	Simplified Stan interface for standard regression models using R formula syntax.	Applied regression modeling, logistic/probit regression, teaching Bayesian methods.
`bayesreg`	Bayesian linear/logistic regression with shrinkage priors (ridge, lasso, horseshoe).	High-dimensional regression, variable selection, predictive modeling.
`sparsevb`	Sparse regression via variational Bayes inference.	Fast approximate inference for large-scale, sparse linear models.

2. Time series & dynamic models

Package	Summary	Typical Applications
`bsts`	Bayesian structural time series with trend, seasonality, and spike-and-slab regression.	Forecasting, causal impact analysis, marketing analytics, anomaly detection.
`bayesSSM`	Particle MCMC inference for nonlinear/non-Gaussian state-space models.	Complex dynamic systems, ecological/epidemiological time series, signal processing.
`dlbayes`	Bayesian dynamic linear models for time-varying regression and forecasting.	Forecasting with state-space models, real-time updating, econometrics.
`kDGLM`	Dynamic generalized linear models with Kalman filter inference for non-Gaussian data.	Count/time series modeling (e.g., Poisson, binomial), control systems.
`BayesARIMAX`	Bayesian ARIMA/ARIMAX modeling for forecasting with exogenous regressors.	Economic and financial forecasting with explanatory variables.
`bayesforecast`	Stan-based Bayesian framework for ARIMA, VAR, and related time-series models.	General-purpose Bayesian forecasting, macroeconomic and financial time series.

3. Time-varying parameter, VAR & macroeconomic models

Package	Summary	Typical Applications
`shrinkTVP`	Bayesian regression with time-varying coefficients and hierarchical shrinkage.	Dynamic regressions, evolving relationships in economics and finance.
`shrinkTVPVAR`	Time-varying parameter VAR models with global-local shrinkage priors.	Macroeconomic forecasting, monetary policy analysis, structural VARs.
`bsvars`	Bayesian structural VAR estimation with flexible identification and priors.	Macroeconomic impulse response analysis, causal inference in time series.

4. Volatility & financial econometrics

Package	Summary	Typical Applications
stochvol	Univariate stochastic volatility modeling via efficient MCMC.	Asset return volatility, risk modeling, financial econometrics.
factorstochvol	Multivariate factor stochastic volatility model estimation.	Portfolio risk modeling, multivariate volatility estimation.
bsarsv	Stochastic autoregressive volatility modeling with Bayesian inference.	Financial time series with persistence in volatility dynamics.
bayesGARCH	Bayesian estimation for GARCH-type volatility models.	Stock and exchange rate volatility, risk forecasting.
bayesDccGarch	Bayesian dynamic conditional correlation (DCC-GARCH) for multivariate series.	Correlated financial markets, portfolio risk and contagion studies.
bmgarch	Stan-based Bayesian multivariate GARCH modeling with flexible priors.	Multivariate financial modeling, volatility spillovers.

5. Dynamic factor models & dimension reduction

Package	Summary	Typical Applications
bayesdfa	Bayesian dynamic factor analysis for multivariate time series using Stan.	Environmental or biological monitoring, latent trend detection, dimensionality reduction.