



# **State-Space Methods for Time Series Analysis: Theory, Applications and Software (Chapman & Hall/CRC Monographs on Statistics & Applied Probability)**

*Jose Casals, Alfredo Garcia-Hiernaux, Miguel Jerez, Sonia Sotoca, A. Alexandre Trindade*

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The state-space approach provides a formal framework where any result or procedure developed for a basic model can be seamlessly applied to a standard formulation written in state-space form. Moreover, it can accommodate with a reasonable effort nonstandard situations, such as observation errors, aggregation constraints, or missing in-sample values.

Exploring the advantages of this approach, **State-Space Methods for Time Series Analysis: Theory, Applications and Software** presents many computational procedures that can be applied to a previously specified linear model in state-space form.

After discussing the formulation of the state-space model, the book illustrates the flexibility of the state-space representation and covers the main state estimation algorithms: filtering and smoothing. It then shows how to compute the Gaussian likelihood for unknown coefficients in the state-space matrices of a given model before introducing subspace methods and their application. It also discusses signal extraction, describes two algorithms to obtain the VARMAX matrices corresponding to any linear state-space model, and addresses several issues relating to the aggregation and disaggregation of time series. The book concludes with a cross-sectional extension to the classical state-space formulation in order to accommodate longitudinal or panel data. Missing data is a common occurrence here, and the book explains imputation procedures necessary to treat missingness in both exogenous and endogenous variables.

## Web Resource

The authors' *E<sup>4</sup>* MATLAB® toolbox offers all the computational procedures, administrative and analytical functions, and related materials for time series analysis. This flexible, powerful, and free software tool enables readers to replicate the practical examples in the text and apply the procedures to their own work.

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