JOURNAL OF TIME SERIES ANALYSIS
J. Time Ser. Anal. **39**: 107 (2018)
Published online 17 November 2017 in Wiley Online Library
(wileyonlinelibrary.com) DOI: 10.1111/jtsa.12273

BOOK REVIEW

APPLIED TIME SERIES ANALYSIS WITH R, Second Edition by Wayne A. Woodward, Henry L. Gray, and Alan C. Elliott (eds). Published by CRC Press, 2017. Total number of pages: 618. ISBN: 9781498734226

The field of time series analysis has changed considerably over the last 30 years. This book covers a very wide range of topics from basic stationary time series exploratory analysis right through to state space models and nonstationary time series. The breadth of the book is certainly to be commended. As is natural when such a vast array of topics is covered, the depth in each one must be curtailed. The book is aimed at practitioners of time series, and thus important topics for application of the primary techniques in each area are covered sufficiently.

The first three chapters of the book are dedicated to traditional time series analysis: autocorrelation and spectral properties, linear filters, and ARMA models. Chapter 4 is dedicated to other stationary time series models such as stationary harmonic models and ARCH and GARCH models. Nonstationary time series models are introduced in Chapter 5, which covers ARIMA, ARUMA, random walk, and G-stationary models. An important application of time series modeling is in forecasting from models, which is covered in Chapter 6. Chapters 7 and 8 are dedicated to parameter estimation and model identification in the aforementioned models. Model building is covered in Chapter 9, which covers several aspects and questions that arise in debates with practitioners. Multivariate (vector-valued) time series are considered in Chapter 10, where VARMA and state space models are covered. Chapter 11 is dedicated to long-memory processes but concentrates on ARFIMA and GARMA processes. Wavelets are introduced in Chapter 12, but the chapter fails to cover their applications to time series analysis beyond spectral estimation. The book concludes with Chapter 13 on G-stationary processes. Given the wide range of topics discussed by the book, I was surprised to see that changepoint analysis – arguably the simplest break from the stationarity assumption – is not covered. Similarly, for practitioners, a significant topic is missing data and this is only covered briefly in the context of the Kalman filter in Chapter 10.

The preface to the book states that a suggestion from the first book was to base the computing on R. The second edition has an associated `R` package with dedicated appendices to each chapter describing the relevant functions in that chapter. There is also a dedicated website, although the preface refers to the first edition version and not the second. You will need prior knowledge of `R` in order to be able to use this text with `R`, as the book dives right in with using their package – I did not come across a `library()` command anywhere. However, this might be expected for someone purchasing a book entitled as this one is. My only disappointment with the `R` examples is that the authors did not take this further and provide the `R` code in more places. For instance, throughout the book the authors introduce `R` functions without providing examples of their use and could have used the `demo()` functionality to provide fully worked-through analysis of a select number of real data series.

Overall, the book is a good introductory or reference text for practitioners or those new to time series analysis. The chapters are easy to read, and the distinction between applied and theoretical examples throughout helps to cement knowledge for these two distinct groups. The support for `R` could be improved, especially with discussion of the `ts` class and similar functionality, but overall this book provides an introduction to a large array of topics within time series analysis today.

REBECCA KILLICK
Mathematics & Statistics Department, Lancaster University, Lancaster, UK