

Preface to the Second Edition

In preparing this second and enlarged edition, a third author has joined the team. Still, the scope of the book has not changed. We try to provide a rigorous understanding of the theory and methods of univariate and multivariate time series analysis. At the same time, the main objective is the development of empirical skills with a special emphasis on the link to economic applications. Therefore, we strengthened the specific feature of our book that now contains 63 examples, most of them using real data sets. The computations for the empirical examples were performed by means of EViews, Version 7.2. Note that previous versions partly result in (slightly) different numbers for parameters, standard errors and test statistics. The same is likely to hold true with other computer programmes or future versions of EViews. Since the empirical examples are central to the book, we now provide all data sets contained in EViews files on the homepage of UWE HASSLER.

For this second edition we have updated some of the time series analysed in the examples, while other data sets containing historical series taken from the literature remain unchanged. The major change of this enlarged edition, however, consists of additional material. First, the new *Chapter 7* covers nonstationary panel data analysis. This accommodates that during the last decade many of the time series techniques treated in our book have been carried to the panel situation where series from several, possibly correlated units are investigated. Second, the final chapter on conditional heteroscedasticity has been supplemented by a section on multivariate ARCH models accounting for time-varying conditional correlation. Third, some subsections have been added (see *Section 2.2.2* on temporal aggregation), while others have been enlarged (see *Section 5.5.1* on fractional integration). Finally, we removed typos from the first edition and improved the exposition where this seemed necessary.

We wish to thank all those who have helped us with this second edition. It is our pleasure to mention, in particular, FLORIAN HABERMACHER, TERESA KÖRNER, and GABRIELA SCHMID. They have made valuable contributions towards improving the presentation but, of course, are not re-

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sponsible for any remaining deficiencies. Moreover, we are indebted to Dr. MARTINA BIHN and RUTH MILEWSKI from Springer for their kind collaboration.

St Gallen/Berlin/Frankfurt, August 2012

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Econometrics has been developing rapidly over the past four decades. This is not only true for microeconometrics which more or less originated during this period, but also for time series econometrics where the cointegration revolution influenced applied work in a substantial manner. Economists have been using time series for a very long time. Since the 1930s when econometrics became an own subject, researchers have mainly worked with time series. However, economists as well as econometricians did not really care about the statistical properties of time series. This attitude started to change in 1970 with the publication of the textbook *Time Series Analysis, Forecasting and Control* by GEORGE E.P. BOX and GWILYM M. JENKINS. The main impact, however, stems from the work of CLIVE W.J. GRANGER starting in the 1960s. In 2003 together with ROBERT F. ENGLE, he received the Nobel Prize in Economics for his work.

This textbook provides an introduction to these recently developed methods in time series econometrics. Thus, it is assumed that the reader is familiar with a basic knowledge of calculus and matrix algebra as well as of econometrics and statistics at the level of introductory textbooks. The book aims at advanced Bachelor and especially Master students in economics and applied econometrics but also at the general audience of economists using empirical methods to analyse time series. For these readers, the book is intended to bridge the gap between methods and applications by also presenting a lot of empirical examples.

A book discussing an area in rapid development is inevitably incomplete and reflects the interests and experiences of the authors. We do not include, for example, the modelling of time-dependent parameters with the Kalman filter as well as Markov Switching Models, panel unit roots and panel cointegration. Moreover, frequency domain methods are not treated either.

Earlier versions of the different chapters were used in various lectures on time series analysis and econometrics at the Freie Universität Berlin, Germany, and the University of St. Gallen, Switzerland. Thus, the book has developed over a number of years. During this time span, we also learned a lot from our students and we do hope that this has improved the presentation in the book.

We would like to thank all those who have helped us in producing this book and who have critically read parts of it or even the whole manuscript. It is our pleasure to mention, in particular, MICHAEL-DOMINIK BAUER, ANNA CISLAK, LARS P. FELD, SONJA LANGE, THOMAS MAAG, ULRICH K. MÜLLER, GABRIELA SCHMID, THORSTEN UEHLEIN, MARCEL R. SAVIOZ, and ENZO WEBER. They have all made valuable contributions towards improving the presentation but, of course, are not responsible for any remaining deficiencies. Our special thanks go to MANUELA KLOSS-MÜLLER who edited the text in English. Moreover, we are indebted to Dr. WERNER A. MÜLLER and MANUELA EBERT from Springer for their kind collaboration.

St Gallen/Berlin, April 2007

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<http://www.springer.com/978-3-642-33435-1>

Introduction to Modern Time Series Analysis

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2013, XII, 320 p., Hardcover

ISBN: 978-3-642-33435-1