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0521770416 - Nonlinear Time Series Models in Empirical Finance

Philip Hans Franses and Dick Van Dijk

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Nonlinear Time Series Models in Empirical Finance

Although many of the models commonly used in empirical finance are linear, the nature of financial data suggests that nonlinear models are more appropriate for forecasting and accurately describing returns and volatility. The enormous number of nonlinear time series models appropriate for modelling and forecasting economic time series models makes choosing the best model for a particular application daunting. This classroom-tested advanced undergraduate and graduate textbook – the most up-to-date and accessible guide available – provides a rigorous treatment of recently developed nonlinear models, including regime-switching models and artificial neural networks. The focus is on the potential applicability for describing and forecasting financial asset returns and their associated volatility. The models are analysed in detail and are not treated as ‘black boxes’ and are illustrated using a wide range of financial data, drawn from sources including the financial markets of Tokyo, London and Frankfurt.

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To our parents

Bas and Jessie

and

Gerrit and Justa

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Preface

A casual glance at the relevant literature suggests that the amount of nonlinear time series models that can be potentially useful for modelling and forecasting economic time series is enormous. Practitioners facing this plethora of models may have difficulty choosing the model that is most appropriate for their particular application, as very few systematic accounts of the pros and cons of the different models are available. In this book we provide an in-depth treatment of several recently developed models, such as regime-switching models and artificial neural networks. We narrow our focus to examining their potential applicability for describing and forecasting financial asset returns and their associated volatilities. The models are presented in substantial detail and are not treated as ‘black boxes’. All models are illustrated on data concerning stock markets and exchange rates.

Our book can be used as a textbook for (advanced) undergraduate and graduate students. In fact, this book emerges from our own lecture notes prepared for courses given at the Econometric Institute, Rotterdam and the Tinbergen Institute graduate school. It must be stressed, though, that students must have had a solid training in mathematics and econometrics and should be familiar with at least the basics of time series analysis. We do review some major concepts in time series analysis in the relevant chapters, but this can hardly be viewed as a complete introduction to the field. We further believe that our book is most useful for academics and practitioners who are confronted with an overwhelmingly large literature and who want to have a first introduction to the area.

We thank the Econometric Institute at the Erasmus University Rotterdam and the Tinbergen Institute (Rotterdam branch) for providing a stimulating research and teaching environment. We strongly believe that ‘learning by doing’ (that is, learning how to write this book by teaching on the subject first) helped to shape the quality of this book. We thank all our co-authors on joint papers, elements of which are used in this book. We would specifically like to mention André Lucas, whose econometrics skills are very

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impressive. Also, we thank Ashwin Rattan at Cambridge University Press for his support.

Finally, we hope that the reader enjoys reading this book as much as we enjoyed writing it.

Rotterdam, August 1999