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Modelling our Changing World

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Preface

This short introduction to *Modelling our Changing World* focuses on the concepts, tools and techniques needed to successfully model time series data. The basic framework draws on Hendry and Nielsen (2007), summarized in Hendry and Nielsen (2010) and Hendry and Mizon (2016). It emphasizes the need for general models to account for the complexities of the modern world and the magnitudes of the many changes that have occurred historically. The combination of evolutionary and abrupt changes poses a major challenge for empirical modelling and hence for developing appropriate methods for selecting models. Fortunately, many of the key concepts can be explained using simple examples. Moreover, computer software for automatic model selection can be used to undertake the more complicated empirical modelling studies.

Modelling our Changing World is aimed at general academic readers interested in a wide range of disciplines. The book is applicable to many areas within the sciences and social sciences, and the examples discussed cover our recent work on climate, volcanoes and economics. All disciplines using time series data should find the book of value. The level minimizes technicalities in favour of visual and textual descriptions, and provides a set of primers to introduce core concepts in an intuitive way. Any more

technical discussion with mathematics occurs in boxed material and can be skipped without missing the key ideas and intuition. Undergraduates on environmental and economics courses including some statistics and econometrics should find it a useful complement to standard textbooks.

The book commences with some 'Primers' to elucidate the key concepts, then considers evolutionary and abrupt changes, represented by trends and shifts in a number of time series. Sometimes, we can use trends and breaks to our advantage, but first we must be able to find them in the data being modelled to avoid an incorrect representation. Once a good empirical model of changing series has been built combining our best theoretical understanding and most powerful selection methods, there remains the hazardous task of trying to see what the future might hold. Our approach uses *OxMetrics* (see Doornik 2018b) and *PcGive* (Doornik and Hendry 2018) as that is the only software that implements all the tools and techniques needed in the book. The software is available for download from www.timberlake.co.uk/software/oxmetrics.html. Most recently, XLModeler is an Excel add-in that provides much of the functionality of *PcGive*: see Doornik et al. 2019. More advanced Monte Carlo simulations also require *Ox* (see Doornik 2018a). The accompanying online appendix includes all files required to enable a full replication of the empirical example in Chapter 6, including data, algebra, and batch files using *OxMetrics*.

The references provide plenty of further reading for interested readers. For readers looking to follow up with a more technical treatment we recommend Hendry and Doornik (2014) for model selection, Clements and Hendry (1998, 1999) for forecasting, and Hendry (1995) for a comprehensive treatment of econometric modelling with time series data.

Oxford, UK

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The book was prepared in *OxEdit* and initially typeset in LATEX using *MikTex*. Graphical illustrations, numerical computations and Monte Carlo experiments were done using *Ox*, *OxMetrics* and *PcGive*. The present release is *OxMetrics* 8.01 (November 2018).

Oxford
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