Real Estate Modelling and Forecasting

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Real Estate Modelling and Forecasting

As real estate forms a significant part of the asset portfolios of most investors and lenders, it is crucial that analysts and institutions employ sound techniques for modelling and forecasting the performance of real estate assets. Assuming no prior knowledge of econometrics, this book introduces and explains a broad range of quantitative techniques that are relevant for the analysis of real estate data. It includes numerous detailed examples, giving readers the confidence they need to estimate and interpret their own models. Throughout, the book emphasises how various statistical techniques may be used for forecasting and shows how forecasts can be evaluated. Written by a highly experienced teacher of econometrics and a senior real estate professional, both of whom are widely known for their research, *Real Estate Modelling and Forecasting* is the first book to provide a practical introduction to the econometric analysis of real estate for students and practitioners.

Chris Brooks is Professor of Finance and Director of Research at the ICMA Centre, University of Reading, United Kingdom, where he also obtained his PhD. He has published over sixty articles in leading academic and practitioner journals, including the *Journal of Business*, the *Journal of Banking and Finance*, the *Journal of Empirical Finance*, the *Review of Economics and Statistics* and the *Economic Journal*. He is associate editor of a number of journals, including the *International Journal of Forecasting*. He has also acted as consultant for various banks and professional bodies in the fields of finance, econometrics and real estate. He is the author of the best-selling textbook *Introductory Econometrics for Finance* (Cambridge University Press, 2009), now in its second edition.

Sotiris Tsolacos is Director of European Research at Property and Portfolio Research, a CoStar Group company. He has previously held positions with Jones Lang LaSalle Research and the University of Reading, where he also obtained his PhD. He has carried out extensive research work on modelling and forecasting real estate markets, with over forty papers published in major international real estate research and applied economics journals. He is also a regular commentator on topical themes in the real estate market, with numerous contributions to practitioner journals.

Preface

Motivations for the book

This book is designed to address the quantitative needs of students and practitioners of real estate analysis. Real estate is a truly multidisciplinary field. It combines specialities from urban economics, geography, land management, town planning, construction, valuations, surveying, finance, business economics and other areas in order to perform a range of tasks, including portfolio strategy, valuations, risk assessment and development feasibility. In performing these tasks, objective analysis, systematic relationships and greater sophistication are essential. The present book targets this fundamental need in the market.

The demand for modelling and forecasting work is expanding rapidly, with a direct requirement for insightful and well-informed processes to be in place. The growing number and larger size of forecasting teams within firms compared with just a few years ago, and the existence of forecasting-related research sponsored by industry organisations and of professional courses in this area, demonstrate the significance given by the industry to quantitative modelling and forecasting.

At the same time, undergraduate and postgraduate courses in real estate have increasingly introduced more quantitative analysis into their portfolios of modules. Such students rarely come from a statistics background, which is acknowledged in this book. With increasing demands from employers for their applicants to have received statistical training, academic institutions and other educational establishments need to introduce more formal quantitative analysis in their degrees. Given the greater availability of data, firms require that their intake will be able to analyse the data and to support valuations, fund management and other activities.

There is a dearth of textbooks specifically focused on the quantitative analysis of real estate markets, yet there has been an explosion of academic articles in the last ten years offering a variety of models, estimation

methodologies and findings. Nevertheless, authors often use different criteria to evaluate their models, if they use any at all, and authors avoid discussing the factors that could invalidate their findings from a modelling point of view. This could lead to considerable confusion for readers who are not already familiar with the material. More importantly, just a handful of studies in this large literature will proceed to assess the model's adequacy and to engage in comparative analysis. This book aims to equip the reader with the knowledge to understand and evaluate empirical work in real estate modelling and forecasting.

Who should read this book?

The book is intended as an easy-to-read guide to using quantitative methods for solving problems in real estate that will be accessible to advanced undergraduate and Masters students, as well as practitioners who require knowledge of the econometric techniques commonly used in the real estate field. Use of the book may also extend to doctoral programmes in which students do not have strong backgrounds in econometric techniques but wish to conduct robust empirical research in real estate. The book can also be used by academic researchers whose work requires the undertaking of statistical analysis.

This book is also very much aimed at real estate practitioners. Analysts in research, investment, consultancy and other areas who require an introduction to the statistical tools employed to model real estate relationships and perform forecasting in practice will find this book relevant to their work. The book should also be useful for the growing number of professional education programmes in real estate modelling.

There are, of course, large numbers of econometrics textbooks, but the majority of these go through the introductory material in excruciating detail rather than being targeted at what really matters in real estate. Additionally, and more importantly, in such books, all the examples employed to illustrate the techniques are drawn from pure economics rather than real estate. Students of real estate who are required to learn some technical skills rapidly grow tired of such texts, and practitioners cannot relate to the examples, making it more difficult for them to see how the ideas could be applied.

Unique features of the book

(1) The reader can confidently claim an understanding of the methodologies used in real estate modelling. Great emphasis is put on regression analysis as the backbone of quantitative real estate analysis.

(2) Extensive examples: the range of international illustrations shows the reader the kind of relationships investigated in real estate market analysis. The examples are supported by a review of selected studies from the literature.
(3) The work on modelling in the book is extended to forecasting. The tone in the book is that forecasting in real estate is not, and should never be seen as, a black box. The detailed examples given in each chapter enable the reader to perform forecasting using all the methodologies we present.
(4) In much of the existing literature in real estate modelling and forecasting, there is a noticeable gap, in that diagnostic checking and forecast evaluation are overlooked. We examine these issues comprehensively and we devote a chapter to each of them. Our aim is to educate the reader to assess alternative theoretical propositions and/or the same proposition in different contexts and with diverse data.
(5) Hall (1994) argues that, 'while the technical aspects of forecasting are developing rapidly, there is still a need for the expert forecaster who blends a complex combination of real world institutional knowledge with formal academic modelling techniques to produce a credible view of the future' (p. iv). We devote a chapter to how real estate forecasting is carried out in practice and we highlight a host of practical issues of which the quantitative analyst, the expert and the final user should be aware. This chapter includes propositions as to how these parties can work more closely, make the forecast process more transparent and evaluate it.
(6) This book also studies the potential benefits of more complicated techniques, such as vector autoregressions, simultaneous systems and cointegration. We attempt to demystify these techniques and make them as accessible as possible. They are explained exhaustively and, again, the coverage extends to forecasting.
(7) All the data used in the examples are available on the book's companion website, www.cambridge.org/9780521873390.

Prerequisites for a good understanding of this material

In order to make this book as accessible as possible, the only background recommended in terms of quantitative techniques is that readers have an introductory-level knowledge of calculus, algebra (including matrices) and basic statistics. Even these are not necessarily prerequisites, however, since they are covered in the opening chapters of the book. The emphasis throughout the book is on a valid application of the techniques to real data and problems in real estate.

In the real estate area, it is assumed that the reader has basic knowledge of real estate theory, although, again, this is not strictly necessary. The aim of the book is to enable the reader to investigate and assess alternative theories in practice and in different contexts.

Our ambition

This book will be successful only if the reader is able to confidently carry out his/her own quantitative analysis, interpret conventional statistics encountered in similar studies in the fields of economics and finance, and conduct forecasting. We hope that the book achieves this aspiration.

Chris Brooks and Sotiris Tsolacos, April 2009

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The publisher and authors have used their best endeavours to ensure that the URLs for external websites referred to in this book are correct and active at the time of going to press. The publisher and author have no responsibility for the websites, however, and can make no guarantee that a site will remain live or that the content is or will remain appropriate.

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