About the Time Series Library

During the past few years time series analysis has become one of the most important branches of Statistics with a wide variety of applications in areas such as sales forecasting, corporate planning, macroeconomic forecasting as well as more general use in the analysis of the dynamic behaviour of systems.

This series of books is directed at those who are responsible for analysing time series data of any type. The books will provide a sound statistical base for the analytical techniques and methods put forward and will describe their application to real life situations. Separately published case studies covering selected major application areas will make an important contribution to the series.

About the Book

This book is based on lectures given by the author during the Institute of Statisticians Conference on Forecasting at Kings College Cambridge in July, 1976. The book first builds on earlier publications covering the Box - Jenkins approach to time series analysis by presenting practical examples of the building of univariate and single output-multiple input transfer function models. It then goes on to describe recent developments and applications of the methodology to multivariate stochastic models, multiple output-multiple input transfer function models and intervention models for representing anomalous events such as strikes or holidays. Emphasis is placed on giving non-technical accounts of the models and forecasts developed in the examples, thus enabling a rapid appreciation of the role the methodology has to play in management decision-taking and policy-formulation processes.

About the Author

Gwilym Jenkins graduated in mathematics in 1953 and has a Ph.D. in Statistics from the University of London. After a period of research at the Royal Aircraft Establishment, he was a Lecturer and subsequently a Reader in Statistics at Imperial College London. He then became Professor and Head of the Department of Systems Engineering at the University of Lancaster. Professor Jenkins has consulted for several hundreds of organisations world wide and is the author of many papers and books, including the classic book on time series analysis which he co-authored with Professor George Box. He is currently a Visiting Professor at the London Business School and since 1974 Managing Director of Gwilym Jenkins & Partners Ltd, the organisation responsible for the consultancy assignments and the computer software developments described in this book.

Practical Experiences With Modelling and Forecasting Time Series

Gwilym.M.Jenkins

ractical Experiences with Modelling and Forecasting Time Series Gwilym.M.Jenkins

Practical Experiences with Modelling and Forecasting Time Series

Gwilym.M.Jenkins

lime Series Library

© Gwilym Jenkins & Partners (Overseas) Ltd, 1979.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the copyright owner.

First published 1979 ISBN 0 9506 423 0 4.

Gwilym Jenkins & Partners (Overseas) Ltd. 39/41 Broad Street St. Helier Jersey, Channel Islands.

Printed and bound in the U.K. by Titus Wilson Ltd. Kendal.

Contents

Foreword to the Series

Preface

Introduction			1
Part 1	Forecasting and Management		3
1.1 1.2 1.3	Forecas	nple of the consequences of poor forecasting. ting as part of the overall management activity. uidelines for tackling a forecasting problem.	3 5 7
Part 2	Five classes of time series models		13
2.1 2.2 2.3 2.4 2.5	Univariate stochastic (single output) models. Transfer function (single output - multiple input) models. Intervention models. Multivariate stochastic (multiple output) models. Multivariate transfer function (multiple output - multiple input) models. Building time series models.		14 16 18 21 23
Part 3	Applications		30
3.1 3.2	An application of univariate models to operational planning. Three applications of transfer function models.		33
	3.2.1 3.2.2 3.2.3	Relationship between market share, price and advertising. Relationship between electricity consumption and temperature. Relationships between manufacturing employment, G.D.P. and manufacturing output.	38 44 59