

Table of Contents

Welcome Message	ii
Acknowledgments	iii
General Information	V
Social Programme	vi
Exhibitors at ISF 2002	vii
Committee Meetings	ix
Hotels in the Locality	Х
Map of Trinity	xi
Programme Overview	xii
Scientific Programme	1
Keynote Addresses	4
Tutorials and Panel Discussions	7
Details of Sessions	11
Index of Contributors	138
IIF Information	141



ISF 2002 – the 22nd International Symposium on Forecasting, June 2002

Hosted at Trinity College Dublin, on behalf of the International Institute of Forecasters

Message from the ISF2002 Chair

On behalf of ISF2002 and IIF, I welcome you to the 22nd International Symposium on Forecasting. And on behalf of Trinity College Dublin, I welcome you to Dublin and to Ireland, the land of Saints and Scholars.

The International Institute of Forecasters is a relatively young learned society, although forecasting is surely one of the oldest of scientific endeavours. Trinity College describes itself as "A 16th Century University with 21st Century knowledge".

Here in Trinity you will find a beautiful old campus side by side with modern, state-of-the-art laboratory and library facilities. I hope you will have a sense of the great minds that have passed through over the ages - among them Berkeley, Swift, and Beckett in the Humanities; Hamilton, Fitzgerald, and Walton in the Sciences. Visit the Long Room in the Old Library when you go to see the Book of Kells; you'll see what I mean.

Ireland has given many scholars to lay the foundations of our subjects; one thinks of Edgeworth, Boole and Hamilton, and of course of Gosset. You will be pleased to know that Guinness is among our sponsors. I'd like to think that he would be pleased as well.

As always, the ISF produces a wonderful mix, of nationalities and of disciplines. Within our broad field, ISF2002 is focusing on issues in Finance and in Tourism, and special thanks go to those who worked hard in these areas. Practitioners and their role at ISF2002 have been the subject of a special effort by our President and others, and are particularly welcomed.

Work hard with your fellow delegates, and take intellectual stimulation from interaction. But enjoy your time here. Enjoy Dublin and Trinity. And take something of Ireland home as well.

John Haslett, Chair ISF2002



ISF2002 Acknowledgements

The International Symposium on Forecasting 2002 would like to thank the Institutions, Corporations and Individuals below for their generous support and sponsorship of the 22nd International Conference.

The following have contributed to the general costs of ISF2002:

- The National Lottery;
- Guinness;
- The Electricity Supply Board, Dublin;
- The Central Statistics Office, Dublin;
- Aer Lingus;
- Bank of Ireland Asset Management;
- Insight Statistical Consulting;
- Irish Statistical Association;
- Bord Failte;
- · Department of Statistics, Trinity College Dublin;

In addition, the following have contributed to the Finance day:

- Mercer Investment Consulting;
- Watson Wyatt Partners;
- Hibernian Investment Managers;
- B&W Deloitte;

and to the Tourism day:

- The Tourism Research Centre at Dublin Institute of Technology;
- Convention Bureau Ireland;
- Horwath Bastow Charleton;

The scientific programme has been assisted by the active involvement of various professional and learned societies:

- Irish Statistical Association;
- Management Science Society of Ireland;
- Society of Actuaries in Ireland;
- Irish Economics Association;

and of course by the Scientific Committee of ISF2002.

It is also important to acknowledge the presence of a number of Exhibitors, whose presence adds scientific value to meetings such as this, as well as to the finances. Please visit their exhibition stands.



Organising Committees at ISF2002

ISF2002 Local Committee

John Haslett, Trinity College, Dublin Moira Hughes, Napier University, Edinburgh Frank Bannister, Trinity College, Dublin

Geoff Allen, University of Massachusetts Amherst Robert Fildes, Lancaster University Chair Programme Coordinator Treasurer

Secretary/Treasurer, IIF President, IIF

Philip Boland, University College Dublin Dominic Dillane, Dublin Institute of Technology John Fitzgerald, Economic and Social Research Institute, Dublin John Frain, Central Bank of Ireland Mike Harrison, Trinity College, Dublin Moira Hughes, Napier University, Edinburgh Dave Jennings, Central Statistics Office, Dublin Noel O'Connor, Dublin Institute of Technology Shane Whelan, University College, Dublin

ISF2002 International Programme Committee

Jonathan Aylen, UMIST, Manchester, UK John Boylan, Buckinghamshire Chilterns University College, UK Chris Chatfield, University of Bath, UK Robert Fildes, Lancaster University, UK Michael Lawrence, Sydney, University of New South Wales, Australia Lars-Erik Oller, Statistics Sweden, Stockholm Keith Ord, Georgetown University, Washington Daniel Pena, Universidad Carlos III de Madrid, Spain

Particular thanks are due also to Lesley McLean in Napier, who did much of the work on the production of the ISF2002 programme, and to Darina Egan, Sinead Marrinan and to Nicola McGrane of Conference Partners.

Finally, can we acknowledge the enormous assistance provided to us by so many around the world, whether by publicising ISF2002, organising sessions, or by simply turning up and being here.



General Information

Dublin

Dublin, the capital of the Republic of Ireland, is increasingly the venue for a variety of international conferences. Today, it is a city of fine Georgian Buildings, excellent stores and shops, pubs and restaurants, museum and antique shops, all combining to make it one of the most enjoyable cities in Europe.

Conference Venue

The conference is being held in the Conference Centre of Trinity College Dublin. Founded in 1592, Trinity College is one of the oldest universities in Europe, and the 35 acre campus is located right in the heart of Dublin city. This 16th century campus, surrounded by attractive gardens, is an ideal location for conferences with well equipped lecture theatres, accommodation, banking, travel agency, shopping, and tourist attractions. The main conference building is the Arts Building. All the conference hotels are within walking distance of Trinity Conference Centre.

Social and Excursion Desk

Enquiries for the following should be made at the registration desk:

- General Information regarding the conference
- Social events
- Daily Excursions

Services in the Arts Building

The following services are available in the Arts Building:

- Photocopying
- Internet Facilities (coin operated)
- Computer Facilities (please ask for details at registration desk)
- Public Telephone (telephone cards are sold in machine beside telephone)
- Coffee Shop

Bank

There is a bank outside the University for foreign exchange on Monday to Friday only. There are automatic teller machines on site which can be accessed 24 hours a day.

Shopping

Dublin has a busy city centre shopping area around Grafton Street and across the river. There is a huge range of products to bring home – from traditional Irish handmade crafts to international designer labels. Things to buy: woollen knits, tweeds, crystal, Claddagh rings, pottery, silver and music. Shopping hours are from 9.00 am to .5.30 pm Monday to Saturday, with shops open until 8.00pm on Thursdays, and most shops open from 12 noon - 6pm on Sundays.

Smoking Policy

Smoking is only permitted in the designated smoking areas.

Messages

Urgent messages may be left on the message board at the registration desk

Lost and Found

Articles found should be taken to the Information Desk in the Arts Building. Lost property can be claimed.

List of Delegates

A list of registrants and information on their place of residence (if available) during the conference will be posted on panels at the registration desk.

Tipping

At your discretion. In most hotels and restaurants a service charge of 10-15% is added to your bill. A small tip is appreciated for good service. Tipping is not usual in pubs and bars. Tip cabs 10% and porters 65c. per bag.

Insurance

The Conference Organising Committee or its agents, will not be responsible for any medical expenses, loss or accidents incurred during the congress. Delegates are strongly advised to arrange their own personal insurance to cover medical and other expenses including accident or loss. Where a delegate has to cancel for medical reasons, the normal cancellation policy will apply. It is recommended that citizens from EU countries bring with them a current E1.11 form.

Preview Room

For those wishing to use Powerpoint Presentations the Preview Room is room 3025. Your presentation must be handed in 4 hours in advance.

Badges

Full delegates	—	White badge
Finance day delegates	_	Peach badge
Tourism day delegates	_	Blue badge
Exhibitors	_	Yellow badge
Accompanying persons	_	Pink badge



Social Programme

Welcome Reception

Date:Sunday 23th June 2002Venue:Dining Hall, Trinity College DublinTime:19:00 Hours

A welcome reception will take place in the Dining Hall of Trinity College Dublin to greet guests and provide an opportunity for delegates to meet each other. Delegates must make their own way there (within walking distance).

State Reception

Date: Monday 24th June 2002 Venue: Dublin Castle, Dames Street Time: 18:30 - 19:30 Hours

The Minister of State will host a reception in the historic State Apartments of Dublin Castle. Situated on an ancient Celtic Site, Dublin Castle was used by the British from the time of Elizabeth I until Irish independence.

Delegates must make their own way there (within walking distance, please refer to map on page x).

A Traditional Irish Pub Evening (optional)

Date: Monday, 24th June 2002 Venue: Johnnie Fox's Pub and Restaurant Coach: 19:30 Hours

Departure Point: Outside Dublin Castle

Johnnie Fox's, established in 1798, and one of the oldest and undoubtedly, the highest, licensed premises in Ireland is located in the small rural hamlet of Glencullen. Dinner will be served followed by an entertainment pogramme featuring dances from Lord of the Dance and River Dance

Gala Dinner

Date: Tuesday, 25th June 2002

Venue: The Dining Hall, Trinity College

Coach: 19:30 Hours

Delegates must make their own way there (within walking distance).

Situated in Trinity College, the Dining Hall is one of the most prestigious venues in Dublin. Drinks before dinner will be served in the Atrium situated just to the left of the hall.

Theatre Night (optional)

We would be delighted to make recommendations and bookings for the Theatre. Please contact the registration desk.

Golf

Conference Partners will be happy to book tee times at near by golf courses as required.

Post Conference Tours

If delegates require assistance in arranging post conference tours or accommodation please contact Conference Partners who will be happy to advise you and make necessary reservations.



Exhibitors List - ISF June 2002

Mexico ISF 2003

Contact: Dr. Victor M. Guerrero Departamento de Estadistica, Instituto Tecnologico Autonomo de Mexico (ITAM), Mexico 01000, D. F. MEXICO Tel. (+52)55 5628 4084 Fax (+52)55 5628 4086 E-mail: guerrero@itam.mx

Elsevier Science

Contact: Anita Olfers PO. Box 211, Amsterdam 1000 AE, The Netherlands Tel: 31-20 485 3911 Fax: 31-20 485 3809 E-mail: a.olfers@elsevier.nl

Elsevier Science is the leading publisher of academic research publishing under the imprints of Pergamon, Academic Press, JAI Press and North-Holland.

The International Journal of Forecasting, published by Elsevier Science, is the official Journal of the International Institute of Forecasters (IIF) organizers of the 22nd International Symposium on Forecasting. The International Journal of Forecasting is made available to members of the IIF as part of their membership. Other established Elsevier journals include Technological Forecasting and Social Change, Journal of Econometrics, Mathematical Social Sciences and Futures.

Book titles published by Elsevier include Advances in Business and Management Forecasting, Handbooks in Econometrics and Handbooks in Economics.

Business Forecast Systems, Inc.

Contact: Eric Stellwagen 68 Leonard Street, Belmont, MA 02478 USA Tel: 617 484 5050 x54 Fax: 617 484 9219 E-mail: estellwagen@forecastpro.com



Business Forecast Systems, Inc. (BFS) specializes in developing easy to use forecasting software for business. BFS will be demonstrating the award winning Forecast Pro product line at the symposium. Forecast Pro is a complete forecasting solution for professionals in marketing, sales, finance and manufacturing-it is also a terrific teaching and research tool. Interested attendees can receive a free demonstration package by stopping by the booth. In addition to forecasting software, BFS offers seminars and consulting in the area of statistical forecasting.

Timberlake Consultants

Contact: Ana Timberlake Unit B3, Broomsleigh Business Park, Worsley Bridge Road, London SE26 5BN, U.K. Tel: +44 (0)20 86973377 Fax: +44 (0)20 86973388 E-mail: ana@timberlake.co.uk



Timberlake Consultants Limited, with origins streching back to 1982, aims to provide a total solution to clients working in the statistics, econometrics, operational research and mathematical fields. Our areas of expertise fall into three main categories:

- Consulting projects
- Training courses and seminars
- Distribution and technical support of third-party quality software

Timberlake Consultants Ltd has a growing number of offices and agents worldwide, including Brazil, Italy, Portugal, Spain and U.S.A.

During the IFS 2002, we will be demonstrating some of the software in our portfolio (e.g. Stata, OxMetrics, EViews, ForecastPro, SmartForecasts, Autobox, Unistat, Statgraphics, and more) and discussing our training programme with interested parties.





Kluwer



Lynda Newman - Exhibits Assistant Kluwer Academic Publishers, P.O. Box 989, 3300 AZ Dordrecht, The Netherlands Tel: +31 (0)78 657 61 22 Fax: +31 (0)78 657 63 23 E-mail:Lynda.Newman@wkap.nl

Specialized Publications: KAP is active in many academic and professional fields, producing high-quality Englishlanguage books, journals, loose-leaf publications, and electronic publications. For each field we have a special division staffed with experts in publishing, editing, and the production process. These experts ensure that KAP's publications are authoritative and high-quality by using the latest techniques (for example, SGML) and first-class design capabilities. In addition, the lifetime of all paper-based products is enhanced by using acid-free paper. Highly Valued: Scientists and professionals from all over the world hold KAP's publications in high esteem. This is achieved by a combination of editorial quality, peer-reviewed information, and publications tailored to the customer's needs.

Global Coverage: Wherever you are located, KAP can provide up-to-date scientific and professional information: a valuable asset for a publishing house geared towards meeting the challenges arising from the information age.

John Wiley & Sons

Contact: Abby Williams - Exhibitions Coordinator John Wiley & Sons Ltd, Baffins Lane, Chichester, Sussex, PO19 1UD, ENGLAND Tel: +44 1243 770581 Fax: +44 1243 770154 Email: acollins@wiley.co.uk



John Wiley & Sons, established in 1807, is an independent global publishing company. Our business and finance publishing division started in 1992 and now incorporates Wiley, Capstone, Jossey-Bass and Pfeiffer imprints and now includes the Dummies brand.

Wiley has always been dedicated to providing groundbreaking research, uncommon insights, and the kind of independent, innovative thinking that goes unsurpassed. Similarly all our imprints are independent thinkers, and we operate together without losing our individual style and flair.

Our objective is to adapt to the changing needs of the business marketplace, providing accessible 'need to have' information that offers insights and perspectives as well as facts, in whatever format is most suitable, whether it be in book, journal, CD or Web-delivered.

Come and visit our stand to browse and buy our books at the special 15% discount to all attendees of the 22nd Int. Symposium on Forecasting.

Here at Wiley, indpendent thinking lives on...

Automatic Forecasting Systems

Contact: Dave Reilly Autobox, PO Box 563, Hatboro, PA 19040, USA Tel: 00 -1 -215-675-0652 Email: dreilly11@comcast.net http://www.autobox.com



Automatic Forecasting Systems (AFS) was founded in 1975 and is the oldest existing software company specializing in forecasting and time series analysis. AFS's leading edge product (AUTOBOX) was recently selected as the best "Dedicated business-forecasting program" in Armstrong's book "Principles of Forecasting". It's new product FREEFORE is a standout and is available without charge. http://www.autobox.com/freef.exe

SAS Institute Inc.

Contact: Brenda Wolfe SAS, Campus Drive, Cary, NC 27513, USA Tel: 00 -1 -919-677-8000 Fax: 00 -1 -919-677-8123 Email: brenda.wolfe@sas.com http://www.sas.com



Committee Meetings

Directors Meeting

Saturday June 22nd 2002. 2.00pm - 6.00 pm Room 3025 Arts Block Trinity College

Directors Meeting

Sunday June 23rd 2002. 12.00 - 3.00 pm Room 3025 Arts Block Trinity College

Associates Editors Meeting

Sunday June 23rd 2002. 3.00pm - 5.00pm Room 3126 Arts Block Trinity College

IIF Members Meeting

Tuesday June 25th 2002. 6.00 pm - 6.30 pm Venue to be confirmed Arts Block Trinity College

Future Organisers Meeting

Tuesday June 25th 2002. 6.30pm - 7.00pm Venue to be confirmed Arts Block Trinity College



Hotels in the Locality



1.	The Conrad Hotel	Five Star****
2.	Buswells Hotel	Four Star***
3.	Clarion IFSC	Four Star****
4.	Jurys IFSC	Three Star***
5.	The Academy Hotel	Three Star***
6.	The Paramount Hotel	Three Star***



Map of Trinity College



≚.

Monday 24 June 2002

	0910 - 1010	1010 - 1120	Break	1150 - 1300	Lunch	1400 -1450	1500 - 1610	Break	1640 - 1750
Burke Theatre	Кеумоте Wilkie					Кеумоте Terasvirta			
Α		FINANCE		FINANCE			FINANCE		FINANCE
В		Telecommunications Hamoudia		Supply Chain		Tutorial	Regional Forecasting Kurre		Neural Nets
С		Neural Nets Hall		Neural Nets			Judgemental Forecasting Lawrence		Judgemental Forecasting Lawrence
D		Judgemental Forecasting		Judgemental Forecasting			Financial Forecasting		Financial Forecasting
E		Forecasting Econ. & FTS Using Non-linear methods I Clements		Forecasting Econ. & FTS Using Non-linear methods II Franses			Time Series Analysis		Time Series Analysis
F		Financial Forecasting		Financial Forecasting			Electricity Forecasting Souza		Electricity Forecasting Souza
G		Crime Forecasting Gorr		Commodity Markets			Technology Forecasting Porter		
Н		Forecasting Methods		Tutorial Moon			Forecasting Practice		Tutorial Kumar
I		Technology Forecasting		Technology Forecasting			Forecasting Methods		Forecasting Methods



≚:

Tuesday 25 June 2002

	0910 - 1010	1010 - 1120	Break	1150 - 1300	Lunch	1400 -1450	1500 - 1610	Break	1640 - 1750
Burke Theatre	Кеумоте Swan					Кеумоте Madigan			
A		Tourisim		Tourisim		Tourisim	Tourisim/ Transporation Young		Tourisim
В		Forecasting Practice in Organisations Hughes		Tutorial Stellwagen			Times Series		Forecasting Methods
С		Technology Forecasting		Supply Chain Forecasting Levenbach			Technology Forecasting		Panel Discussion Fildes
D		Leading Indicators Oller		New Forecasting Methodologies Heilemann			Times Series		Times Series
E		New Forecasting Methodologies Steckler		Non-Parametric Forecasting Hyndman			Developing Corporate Forecasting Expertise Levenbach		Business Cycles
F		Financial Forecasting		Financial Forecasting			Financial Forecasting		Transportation Young
G		Forecasting Methods		Forecasting Methods			Long Memory & Forecasting Chatfield		Long Memory & Forecasting Chatfield
Н		Econometric & Economic Forecasting		Econometric & Economic Forecasting			Forecasting Inflation Rates		Econometric & Economic Forecasting
1		Sales & Marketing		Times Series			Time Series		Time Series

IIF Members Meeting 1800 -1830 Venue to be announced Future Organisers Meeting1830 - 1900Venue to be announcedConference Banquet1930 for 2000Dining Hall TCD (ticket needed)



Programme Overview



Wednesday 26 June 2002

	0910 - 1010	1010 - 1120	Break	1150 - 1300
Burke Theatre	Keynote – Hendry			
A		Innovation in Forecasting Practice Balkin		Panel Discussion Tashman
В		Seasonality Williams		Seasonality Williams
С		State & Local Government Pearson		State & Local Government Pearson
D		Macroeconomic Forecasting		Macroeconomic Forecasting
E		Econometrics & Economic Forecasting		Econometrics & Economic Forecasting
F		Financial Forecasting		Financial Forecasting
G		Tutorial Boylan		Financial Forecasting
н		Supply Chain		Econometrics & Economic Forecasting
1				

Please note that rooms will be clearly signposted on the day.

Xiv



Scientific Programme

CONTENTS		ROOM	PAGE	
Keynote papers		Edmund Burke	4	
Tutorials and Pa	Tutorials and Panel Discussions			
MONDAY	Title			
0910 - 1000	KEYNOTE ADDRESS Professor David Wilkie – Comparing Stochastic Asse	Burke Theatre et Models	4	
1010 - 1120	Forecasting in Finance Telecommunication Forecasting Neural Networks Judgemental Forecasting Forecasting Econ. & FTS Using Non-linear methods I Financial Forecasting Crime Forecasting Forecasting Methods Technology Forecasting	A B C D E F G H I	11 16 24 31 36 43 50 56 59	
1150 - 1300	FORECASTING IN FINANCE Supply Chain Forecasting Neural Networks Judgemental Forecasting Forecasting Econ. & FTS Using Non-linear methods II Financial Forecasting Commodity Markets Tutorial – Establishing Best Practice Technology Forecasting	A B C D E F G H I	12 18 26 32 38 45 52 7 61	
1400 - 1450	KEYNOTE ADDRESS Professor Timo Terasvirta – Statistical properties of volatility models and stylized facts of financial time Tutorial – Identification and forecasting of dynamical systems by neural networks	Burke Theatre series B	4 7	
1500 - 1610	Forecasting in Finance Regional Forecasting Judgemental Forecasting Financial Forecasting Time Series Analysis Electricity Forecasting Technology Forecasting Forecasting Practice Forecasting Methods	A B C D E F G H I	14 20 28 34 40 46 54 57 63	
1640 - 1750	Forecasting in Finance Neural Networks Judgemental Forecasting Financial Forecasting Times Series Analysis Electricity Forecasting Tutorial – New Product Forecasting Forecasting Methods	A B C D E F H I	15 22 30 35 41 48 7 64	

•

See also list of speakers page 138. For your convenience, the ISF2002 'post-its' may be used as bookmarks. •



TUESDAY	TITLE	ROOM	PAGE NO.
0910 - 1000	KEYNOTE ADDRESS Dr William Swan – Three mistakes we made in fore	Burke Theatre ecasting	5
1010 - 1120	Forecasting in Tourism	А	65
	Forecasting Practice in Organisations	В	71
	Technology Forecasting	С	79
	Leading Indicators	D	85
	New Forecasting Methodologies	Е	91
	Financial Forecasting	F	97
	Forecasting Methods	G	103
	Econometric & Economic Forecasting	Н	109
	Sales & Marketing	I	113
1150 - 1300	Forecasting in Tourism	А	66
	Tutorial – Incorporating Marketing effects into	В	8
	Hierarchial Forecasting		
	Supply Chain Forecasting	С	81
	New Forecasting Methodologies	D	86
	Non-Parametric Forecasting	E	92
	Financial Forecasting	F	98
	Forecasting Methods	G	105
	Econometric & Economic Forecasting	Н	110
	Times Series Analysis	I	114
1400 -1450	KEYNOTE ADDRESS	Burke Theatre	5
	Professor David Madigan – Bayesian Methods		
	for Hidden Markov Models		
	TOURISM FORECASTING	Α	73
1500 - 1610	Forecasting in Tourism/Transporation	А	68
	Times Series Analysis	В	75
	Technology Forecasting	С	81
	Times Series Analysis	D	87
	Developing Corporate Forecasting Expertise	E	94
	Financial Forecasting	F	100
	Long Memory & Forecasting	G	107
	Forecasting Inflation Rates	Н	111
	Time Series Analysis	I	116
1640 - 1750	Forecasting in Tourism	А	69
	Forecasting Methods	В	77
	Panel Discussion – Forecasting Knowledge – What do we do with it?	С	8
	Times Series Analysis	D	89
	Business Cycles	Е	95
	Transportation Forecasting	F	102
	Long Memory & Forecasting	G	108
	Econometrics & Economic Forecasting	Н	112
	Time Series Analysis	l I	117



WEDNESDAY	TITLE	ROOM	PAGE NO
0910 - 1000	KEYNOTE ADDRESS Professor David Hendry – New Developments in Automatic General-to-specific modelling	Burke Theatre	6
1010 - 1120	Innovation in Forecasting Practice Seasonality	A B	119 121
	State & Local Government	С	123
	Macroeconomic Forecasting	D	126
	Econometrics & Economic Forecasting	E	128
	Financial Forecasting	F	131
	Tutorial – The forecasting and inventory control for slow moving parts	G	9
	Supply Chain	Н	136
1150 - 1300	Panel Discussion – How to improve the practice of business forecasting	А	10
	Seasonality	В	122
	State & Local Government Forecasting	С	125
	Macroeconomic Forecasting	D	127
	Econometrics & Economic Forecasting	E	129
	Financial Forecasting	F	133
	Financial Forecasting	G	134
	Econometrics & Economic Forecasting	Н	137

Please note that rooms will be clearly indicated by signage on the day.



Keynote Addresses

Monday 24th June 2002 0910 - 1000

Keynote Address

Burke Theatre

Chair: Professor Phil Boland

Comparing Stochastic Asset Models

Professor David Wilkie

InQA Limited and Heriot Watt University, Edinburgh, UK

Actuaries and others advising insurance companies, pension funds and other long-term financial institutions need to consider the risks involved in the investment policies of those institutions. They therefore find it useful to have models for carrying out Monte Carlo simulations of the future, particularly of future investment returns, on the basis of which estimates of the distributions of possible future outcomes can be obtained.

Several such stochastic investment models have been constructed over recent years. The features of those models whose details have been published can be compared. They vary in the frequency of their model, and in the variable modelled. Some model a wider range of variables than others. Others offer a more elaborate, perhaps more realistic, model than the simpler ones first developed. These differences affect the simulated distributions of future returns in interesting ways.

There are several ways in which some of these models could be elaborated to make them more useful and more realistic. These include allowing for the starting conditions in various ways, allowing for exogenous short-term effects, using distributions for the innovations that are fatter-tailed than the normal, allowing for uncertainty in the parameter estimates, and several others.

Monday 24th June 2002		Burke Theatre
1400 - 1450	Keynote Address	

Chair: Professor Lars-Erik Oller

Statistical properties of volatility models and stylized facts of financial time series

Professor Timo Terasvirta

Stockholm School of Economics, Stockholm, Sweden

Three well-known and frequently applied models for modelling and forecasting volatility in financial series such as stock and exchange rate returns are considered. These are the standard Generalized Autoregressive Heteroskedasticity (GARCH), the Exponential GARCH and the Stochastic Volatility model. In this presentation the interest lies in observing how well these models are able to reproduce characteristic features typical of such series, here called stylized facts. These include high kurtosis and a rather low-starting and slowly decaying autocorrelation function of the squared or absolute-valued observations. First, the models and a number of results for moments of their models are given as well as the autocorrelation function of squared observations or, when available, the autocorrelation function of the absolute-valued observations raised to a positive power. These results make it possible to consider kurtosis-autocorrelation combinations that can be reproduced with these models and compare those with what has been estimated from financial time series. Furthermore, the stylized fact that the autocorrelations of powers of absolute-valued observations are maximized when the power equals one, that is, when the autocorrelation function is that of the absolute values of the series, is discussed. That includes defining the corresponding theoretical property and investigating its validity in the three models considered here. Slow decay of the autocorrelations is discussed, and attention is drawn to a simple way of generating series with this feature. A conclusion that emerges from these considerations is that none of the three models dominates the others when it comes to reproducing the stylized facts in typical financial time series.



Tuesday 25th June 2002 0910 - 1000

Keynote Address

Burke Theatre

Chair: Dominic Dillane

Three Mistakes We Made In Forecasting

Dr William Swan

Boeing Commercial Airplanes, USA

For over 40 years Boeing has published an annual forecast for the growth of air travel world wide. Current Market Outlook has become a standard reference for planners in government and industry. Major methodological changes in the forecast occurred in mid-1990's. These were a result of rethinking the data, methods, and models. It turns out standard approaches over-emphasized the effect of GDP. On the other hand, statistics found a convincing and cogent link between trade and travel, even though the data appeared entirely random. Finally, a startlingly simple approach established the hitherto elusive link between travel and service quality. This talk is a light-hearted review of the things we did wrong and fixed, and the things we are still worried about. It provides a bittersweet contrast between the ways of industry and academia. As a bonus we introduce "Occam's Toothbrush"-an entirely new, hopelessly backwards, and entirely unpublishable way industry does hypothesis testing, but doesn't realize it.

Tuesday 25th June 2002		Burke Theatre
1400 - 1450	Keynote Address	

Chair: Professor John Haslett

Bayesian Methods for Hidden Markov Models

Professor David Madigan Rutgers University, Dept of Statistics, NJ, USA

Hidden Markov models (HMMs) facilitate the statistical modeling of stochastic dynamic phenomena by decomposing the modeling task into two components. One component captures the dynamic aspects and comprises a discrete-time, discrete-space system governed by a Markov chain. The other component models the observable outputs as a function of the dynamic state and does not involve time per se. This decomposition is the linchpin for myriad successful HMM applications in areas such as ecomometrics, finance, biology, genetics, neurophsyiology, and speech processing.

Classical maximum likelihood analysis and the EM algorithm have dominated the HMM literature over the years. Recently however the Bayesian approach to HMM analysis has emerged as a viable alternative and offers several advantages. In particular, the Bayesian approach facilitates inference about the number of hidden states, can incoporate prior information when it is available, and, for forecasting purposes, can fully account for the various sources of uncertainty.

This talk will introduce HMMs and briefly describe the classical algorithms. The talk will then survey recent progress on the application of Markov Chain Monte Carlo methods to the Bayesian analysis of Hidden Markov Models (HMMs). The talk will also discuss HMM applications where the observations are unequally spaced in time. This issue arises in financial and biological applications.



Wednesday 26th June 2002 0910 - 1000

Burke Theatre Keynote Address

Chair: Dr John Frain

New Developments in Automatic General-to-specific Modelling

Professor David Hendry

Oxford University, Oxford, UK

Scientific disciplines advance by an intricate interplay of theory and evidence, although precisely how these should be linked remains controversial. The counterpart in `observational' (as against experimental) subjects concerns empirical modelling, which raises the important methodological issue of how to select models from data evidence: by prior specification alone, by data evidence alone, or by some mixture of these, where the weights' attached to the former could vary from unity to zero. Neither extreme seems tenable: economies are too complicated for pure theory; and variables too numerous for pure data basing. Since the correct specification of any economic relationship is always unknown, data evidence remains essential to separate the relevant from the irrelevant variables. We show that simplification from a congruent general unrestricted model (GUM) — known as general-to-specific (Gets) modelling — provides a powerful approach to doing so. The theory of reduction provides the basis for simplification, commencing from a general congruent specification, seeking an undominated (encompassing) simplification. We consider the analytic basis for PcGets, which implements automatic general-to-specific modelling for linear, dynamic, regression models. The initial general model is first tested for congruence, then simplified to a minimal representation consistent with the desired selection criteria and the data evidence. Almost all feasible reduction paths are explored, and any resulting models selected between using encompassing. Pre-search steps accelerate the path search; and post-search evaluation helps eliminate spurious significance.

We discuss the theory behind Gets, why it might work when other model selection approaches have failed, use Monte Carlo to show the excellent properties of PcGets, and contrast Gets with possible alternatives. Our results to date reveal that model selection can be relatively non-distortionary, since PcGets achieves the pre-set size with power close to the upper bound of not needing to search. Yet the study of automatic selection procedures has barely begun - early chess-playing programs were easily defeated by amateurs, but later ones could systematically beat Grandmasters. We anticipate computer-automated model selection software developing well beyond the capabilities of the most expert modellers: `Deep Blue' may be just round the corner.



Tutorials and Panel Discussions

Monday 24th June 2002 1150 - 1300

Tutorial

Room H

Room H

Establishing Best Practice – the Role of the Sales Forecasting Audit

Mark Moon

Continuous improvement in sales forecasting is an important goal for any organization. This presentation describes a methodology developed by the Sales Forecasting Management Research Center at the University of Tennessee for conducting a sales forecasting audit, the goal of which is to help a company understand the status of its sales forecasting processes and identify ways to improve those processes. The methodology described here has been developed over a six-year period, involving multiple auditors, and has been implemented at 21 organizations, across a variety of industries and a range of company sizes. The presentation will summarize both the audit methodology as well as generalized learnings about effective forecasting management that have come from the audit research to date.

Monday 24th June 2002		Room B
1400 - 1450	Tutorial	

Identification and forecasting of dynamical systems by neural networks

Hans Georg Zimmermann

Siemens AG, CT IC 4, Otto Hahn Ring 6, Munich, Germany

Neural Networks are well known as data mining tools. In many economic applications, this is a misleading point of view: We do not have enough data, the data is noisy or there are unknown external influences. Hence, the modelling of complex economical dynamical systems is a difficult task. As a solution, we propose to enrich the modelling by the integration of prior knowledge in form of first principles. We will show that prior knowledge can be integrated into the network by architectural extensions. By this, we improve the economic model building and forecasting.

First, we will discuss unfolding in time as a technique to model the time structure of dynamical systems. Second, we will focus on partially autonomous/external driven dynamical systems. Third, we discuss the topic of missing external influences of our dynamical system. Here, the last model error is an indicator of the models misspecification. Since we use the model error as a measure of unexpected shocks, the learning of false causalities is lowered and models generalization ability will improve. Separating time invariant form variant structures, we improve our ability to model high dimensional dynamical systems. Further on, we focus on the reconstruction of the underlying dynamics from observations. The aim is to specify a transformation such that the related forecast problem becomes easier, because the transformed system evolves more smoothly over time. We achieve this by integrating state space reconstruction and forecasting in a neural network. Typically, the model time grid is assumed to be equal or coarser than the data time grid. We will discuss how a refinement of the model time grid can be interpreted as an assumption of a stronger causality of the underlying dynamics. This additional structure can be used to improve forecasting.

Monday 24th June 2002 1640 - 1750

Tutorial

New Product Forecasting

V Kumar

ING Aetna Centre for Financial Services, School of Business

New product forecasting has gained increased attention among businesses due to the growth in the number of new products introduced worldwide. This tutorial will walk the audience through the evolution of the basic diffusion model, which has been applied in various contexts of new product forecasting. Further, various estimation methods that are available for model estimation will be presented. The relative advantages and disadvantages of each of those methods will shed light in to the most appropriate estimation method. Next, improvements (in the form of marketing mix elements) to the basic model specification will be discussed. Later, the use of the diffusion model for forecasting in multiple markets/countries which involves the modification of the basic model will be presented. Finally, the possibility of using the basic diffusion model (typically used for the product category) for brand level forecasting will be discussed. The concept of purchase intention measures will be introduced and various ways of generating forecasts from these measures will be discussed. Examples from real world applications will be one of the highlights of the session.



Tuesday 25th June 2002		Room B
1150 - 1300	Tutorial	

Incorporating Marketing Effects into Hierarchical Forecasting

Eric Stellwagen

Corporations typically deal with multiple levels of aggregation and require consistent forecasts at all levels. Forecasting product or geographical hierarchies becomes more challenging when the effects of promotional campaigns-conducted at various levels-needs to be incorporated. This tutorial will begin with a quick overview of basic hierarchical forecasting approaches and then explore strategies for incorporating promotional information. Issues discussed will include construction of the hierarchy to best model the promotions, how to reconcile between levels of the hierarchy and how to accommodate product cannibalization. Several examples using actual corporate data will be presented to illustrate the methodology.

Tuesday 25th June 2002 1640 - 1750

Panel Discussion

Room C

Moderator: Monica Adya

Forecasting Knowledge: What do we do with it?

Table: Robert Fildes, Kesten Green, Mark Moon

What method should we use? How should data be adjusted? What is going to be the impact of new concepts such as causal forces or neural nets on organizational and individual knowledge? What are our best practices in forecasting? These are just some aspects of forecasting knowledge that reside in our community of academicians and practitioners. While academic journals and now forecasting websites have provided a valuable repository for many decades of empirical findings, forecasters possess many years of experience and experience that remains tacit and implicit and yet have a significant impact on the accuracy of forecasts. Even though such knowledge may coded in "best practices" manuals, it most often fails to impact the forecasting practices.

This panel will examine the issues and opportunities related to leveraging forecasting knowledge. Some themes that will be examined are: how can such knowledge be captured and reused, can and should such knowledge be managed, what sort of cultural change is required for successful knowledge management, what is the role of technology in this task.



Wednesday 26th June 2002Room G1010 - 1120Tutorial

The forecasting and inventory control for slow moving parts - how to give service at a price you can afford

Dr John Boylan, Roy Johnston, Estelle Shale

Buckinghamshire Business School, Chalfont Campus, Buckinghamshire Chilterns University College,UK

Drawing on their experience of designing, installing and running inventory management systems, the presenters will discuss recent research findings and show how they can be applied in practice. Slow moving items are sometimes perceived as unimportant, but such a perception could hardly be more mistaken. Errors in forecasting slow moving items attract severe penalty costs. Consistent upward bias in forecasting slow movers will inflate stock-holdings unnecessarily and lead to obsolescence problems.

In the first section of this tutorial workshop, the presenters will discuss the inventory management context. The decision to stock an item and the categorisation of stocked items as 'slow' are crucial issues. These questions will be addressed using a classification framework, extended recently, and compared with the standard Pareto approach. Research on statistical distributions of 'intermittent' and 'lumpy' items and the requirements placed on demand forecasting methods will be summarised.

In the second section, the focus will move to alternative approaches to the estimation of the mean and variance of slow moving items. Single Exponential Smoothing is known to introduce a 'decision point' bias. Croston's method eliminates this source of bias but has been shown recently to introduce another upward bias, namely the 'inversion' bias. Methods to overcome these biases have been found but are not yet widely known. These methods will be discussed and some practical findings summarised, showing that savings in stocks may be achieved whilst still attaining service targets.

In the third section of this session, returning to the inventory management context, the presenters will discuss when it is worthwhile to forecast slow movers differently. Practical guidance will be given on how an organisation can evaluate the costs and benefits of the approaches proposed in the session. Finally, some interesting future developments will be discussed.

The workshop assumes no prior knowledge of this subject.



Wednesday 26th June 2002Burke Theatre1150 - 1300Panel Discussion

Moderator: Len Tashman

How to improve the practice of business forecasting

Table: Scott Armstrong, Holton Wilson, Keith Ord

What can practitioners do to improve forecasting practices in their organisations?

In the past 20 years, there has been enormous progress in the development and dissemination of forecasting know-how, through the initiation of forecasting institutes, forecasting journals, forecasting conferences, forecasting software, and forecasting websites. It is not evident, however, how business forecasters should proceed to reap the benefits of these advances. In many organisations the forecasting function remains "at ground zero" as practitioners still rely on primitive tools, seemingly unaware of the more productive alternatives that are available.

This panel will address aspects of what can be done to facilitate practitioner awareness and adoption of better forecasting practices:

The effective use of websites will be discussed by Scott Armstrong, developer of the ForecastingPrinciples.com website.

Textbook author Holton Wilson will discuss how to best develop and use forecasting textbooks.

How the institutes (IIF) and journals can better serve practitioners will be discussed by IJF Editor Keith Ord.

Len Tashman, developer of a website for forecasting software reviews, will discuss the capabilities and uses of forecasting software.



Monday 24th June 2002

Details of Sessions Monday 24th June 2002

Monday 24th June 2002 1010 - 1120

Forecasting in Finance

Room A

Chair: Phil Boland

1. Stochastic modelling for assurance companies - lessons from the last decade

Andrew Smith

Bacon & Woodow - Deloitte, UK

Many life assurance companies have now constructed Monte Carlo simulation models of their businesses. However, during the late 1990's, many interest rates and yields moved below their historic trading ranges, generating outcomes well beyond the worst anticipated by the then popular stochastic models. Back-testing has revealed that a different class of models, used to price financial instruments, were much more credible in their prognosis of possible market moves. This talk will explore the biases inherent in the actuarial calibration approaches. Practical steps to market calibration are described as a way to resolve these biases. Finally, a number of new tests will be unveiled so that users can establish the extent to which their favourite projection model is ignoring messages in market prices.

2. Inflation forecasting for actuarial applications: a new inflation model for actuarial use

Jon Exley

WM Mercer, London, UK

The actuarial profession has in recent years shown increasing interest in the valuation of options linked to the rate of retail price inflation associated with corporate pension plans offering indexed pension increases subject to "caps" (typically maximum increases of 5% pa) and "floors" (typically non-decreasing pensions). Since the UK has a well-developed market in inflation linked bonds, the modern finance approach to this valuation problem has effectively viewed it as an exercise in bond derivative (or "contingent claims") pricing and the required methodology has been set out in some detail writing the actuarial literature. Parallel with this development, several authors have recently applied the mathematics of term structures to develop theoretically intensive models covering a range of global assets. However, given the wide range of assets covered in typical asset and liability projects, few if any of these modern models have attempted to capture the full richness of individual interest rate term structures at a level of detail needed for accurate valuation and matching of inflation contingent liabilities. On the other side of the divide, actuaries have for a number of years produced detailed and empirically intensive models describing both inflation and interest rates without seeking analytic tractability of the final model in modern contingent claims valuation applications. In this paper we attempt to build a bridge between the theoretically intensive, comprehensive, global asset models an the empirically intensive, descriptive models of UK inflation and interest rates. In doing so we illustrate a simple technique to extend the Hull and White (1990) model to a multifactor description of term structures and show how it can be calibrated accurately to reproduce the empirical correlations between changes along real and nominal term structures and between structures. The model has a number of apparent flaws in a purely descriptive framework, such as admitting negative interest rates, but its ultimate validity is tested in terms of the success of its use in the valuation and matching of inflation linked derivative liabilities. Accordingly the model is shown to have applications whenever stochastic inflation forecasting is used as a means to assess economic cost and value.



Monday 24th June 2002		Room A
1150 - 1300	Forecasting in Finance	

Chair: Shane Whelan

1. Investment risk of an insurance company: Long-term stochastic simulations and scenarios

Lasse Koskinen, Kasimir Kaliva

Insurance Supervisory Authority, Helsinki, Helsinki, Finland

Insurance companies and other institutional investors invest increasingly abroad. Hence, international aspects of risk in investment performance are essential. In this paper we model the rate of return of internationally diversified equity portfolios.

The risk of equity investment can be divided into short-term volatility and long-term under-performance. Despite the exchange rate risk international investment should reduce both these risks by diversifying the portfolio effectively. This has been explained by low enough correlation between returns across countries and a possibility to offset the currency risk by hedging. However, for the purposes of an insurance company, the correlations and variances of past returns do not describe the investment risk sufficiently. Here stochastic simulations and scenarios are made for a more extensive risk analysis.

Our aim is to study the effects of estimation period, country selection and exchange rate on the rate of return. First, we investigate several equity indices and exchange rate series by GARCH modelling. Then we study the effects of the three factors on portfolio performance using the estimated GARCH model to generate simulations and scenarios. Special attention is paid to particularly low profit scenarios and their probabilities.

2. The evaluation of technical forecasts: synthetic versus actual trading rules

Roy Batchelor, Steven Kwan

City University Business School, Frobisher Crescent, Barbican, London, UK

The profits from trading on forecasts of currency or interest rate movements are known to bear only a weak relationship to the accurancy of the forecasts themselves. Several studies have therefore attempted to evaluate technical forecasts by measuring the profits from synthetic trading rules based on published targets and support and resistance levels. The difficulty with this is that the trading rules chosen may be unrealistic - either excessively simple, or excessively mechanical.

In this paper we use an unique data base which contains daily technical forecasts for four major currencies over the past four years, and - crucially - the actual intra-day trading positions taken by the analysts in response to these forecasts. Our findings are:

- The directional accuracy and mean square error of central forecasts is no better than random.
- Profitability varies across a number of popular synthetic trading rules, but none produces consistent profits.
- The profitability of the actual trading positions is uniformly higher than for all mechanical rules, and statistically significant when compared with a bootstrap distribution for potential profits.
- The value of technical forecasts therefore appears to be understated by conventional profits-based measures.

In the concluding section of the paper we discuss the possibility of modeling trader behaviour in a more realistic way.



Monday 24th June 2002 1150 - 1300

Forecasting in Finance

3. Forecasting Financial time series using models of nonstationarity

Sebastien Van Bellegem, Rainer von Sachs, Piotr Fryzlewicz

Universite catholique de Louvain, Institute of Statistics, Voie du Roman Pays, 20, Louvain-la-Neuve, Belgium

The classical forecasting theory of stationary time series exploits the second-order structure (variance, autocovariance and spectral density) of an observed process in order to construct some prediction intervals. However, many time series in the applied sciences show a time-varying second-order structure. During the talk, this nonstationarity will be illustrated on some financial examples. In particular, we will show that simple examples, such as the Dow Jones index, can be reasonably modelled by a stationary process modulated by a time-varying variance.

We will address the problem how to forecast such processes with evolutionary variance. To this end, we will present a nonparametric estimator of the (unconditional) time-varying variance of the process. This estimator is called multiscale because it is based on nondecimated wavelets. The practical computation of the predictor will be illustrated on different financial indices. A comparison with classical conditional heteroscedastic models (such as GARCH models) will be done and will show in which case our forecasting methodology is preferable.

Finally we will mention the possible extension of the method to the general situation of time-varying covariance process. For this problem, we will refer to our recent Discussion Paper.

Room A



Monday 24th June 2002 1500 - 1610

Forecasting in Finance

Room A

Chair: Phil Boland

1. Forecasting returns and volatilities in GARCH processes using the bootstrap

Esther Ruiz, Lorenzo Pascual, Juan Romo

Universidad Carlos III de Madrid, Departamento de Estadistica y Econometra, Madrid, Getafe, Spain

We propose a new bootstrap resampling scheme to obtain prediction densities and volatilities of time series generated by GARCH processes. The main advantage over other bootstrap methods previously proposed for GARCH processes is that the procedure incorporates the variability due to parameter estimations and, consequently, it is possible to obtain bootstrap prediction densities for the volatility process. The asymptotic properties of the procedure are derived and the finite sample properties are analyzed by means of Monte carlo experiments, showing its good behaviour versus alternative procedures. Finally, the procedure is applied to estimate prediction densities of the Madrid Stock Market index, IBEX35.

2. Modelling and Trading the EUR/USD: Do neural networks perform better?

Christian Dunis, Mark Williams

Liverpool Business School, Liverpool, UK

This research examines and analyses the use of Neural Network Regression (NNR) models in foreign exchange (FX) forecasting and trading models. The NNR models are benchmarked against traditional forecasting techniques to ascertain their potential added value as a forecasting and quantitative trading tool. In addition to evaluating the various models using traditional forecasting accuracy measures, such as root mean squared errors, they are also assessed using financial criteria, such as risk-adjusted measures of return. Having constructed a synthetic EUR/USD series for the period up to 4 January 1999, the models were developed using the same in-sample data, leaving the remainder for out-of-sample forecasting, October 1994 to May 2000, and May 2000 to July 2001, respectively. The out-of-sample period results were tested in terms of forecasting accuracy, and in terms of trading performance via a simulated trading strategy. Transaction costs are also taken into account. It is concluded that NNR models do have the ability to forecast EUR/USD returns for the period investigated, and add value as a forecasting and quantitative trading tool.

3. Conditional Value at risk using macroecnomic information

Debashis Guha

Alphanomics LLC, 110 East 59th Street, 18th Floor, New York, USA

Value at risk, the standard measure of the market risk of a portfolio, is commonly estimated from the tails of the unconditional distribution of returns. The present study provides evidence that estimates of monthly VaR of stock returns (S&P 500 Index) change significantly if conditioning information is taken into account. The conditioning variable we use is an index that combines the term yield spread, and a measure of the real output gap. These two indicators are selected because of their widely studied properties as leading indicators of economic activity, and inflation, respectively.

Our results show that when the leading index is sloping downward, the Conditional VaR of stock returns rises exceeds the unconditional VaR by almost 20%, and the difference is highly statistically significant. Conversely, when the leading index is sloping upward, the Conditional VaR is more than 30% below the unconditional VaR, and the difference is highly statistically significant. The results depend critically on the lag of the index, however, with the effect being most pronounced at a lag of nine months, and decaying to near zero levels at a three or twelve month lag.



Monday 24th June 2002 1640 - 1750

Forecasting in Finance

Chair: Shane Whelan

1. How to profitably exploit seasonalities in equity markets

Shane Whelan, Brian Lucey University College Dublin, Ireland

Financial data have been analysed now for upwards of a century with a sizeable industry in most developed countries devoted to forecasting price movements. Most data exploration is motivated by feeble (if any) theoretical justification as there is a general failure of financial theory to adequately account for observed absolute or relative price movements. Accordingly, extant financial data have been data-mined perhaps to the exhaustion of its inferential capability. In this environment a new and independent financial data set is perhaps more valuable than another clever hypothesis. We present the unusual development of the Irish economy and, with it, the Irish equity market over much of the twentieth century as largely novel, independent of other markets, and a data set only lightly studied. The Irish market is used illustrate some of the key attributes of market returns that make modelling and forecasting especially difficult (eg non-stationarity, thick tails). We test out-of-sample some promising trading strategies based on seasonalities observed in other equity markets, and recommend one that looks especially economically and statistically significant.

2. Practical Risk Management

Ronan O'Connor

UCD & NTMA, Dublin, Ireland

Academic literature provides a large toolkit for the risk manager. Markowitz' seminal work on portfolio optimisation in mean/variance space is still regarded as a basic building block. The Capital Asset Pricing Model (CAPM) and its successor the Arbitrage Pricing Model (APT) were significant developments in simplifying the risk problem in an equilibrium framework. Fama's Efficient Markets Hypothesis (EMH) had the effect of spawning benchmarks and gave rise to the new industry of low cost index funds. Black/Scholes and Merton cleverly developed option pricing models in risk neutral space and these models were rapidly developed by Rubenstein et al to equip managers with a full armoury of risk management instruments. Insurance mathematics was found to be largely applicable to financial risk and the distinction between insurance and other financial intermediaries quickly blurred.

Practical risk managers beware! Risk remains a complex business and elegant mathematical models in two or three dimensions may be seductive, but are unlikely to be complete. The adoption of modern financial theory without the ability to question may have unintended side effects. The following presentation outlines where academic thought has brought us and where practical considerations must enter the risk management process.

3. Uncovering long memory in volatility processes

Dr John Cotter

University College Dublin, Dept of Banking and Finance, Blackrock, Co. Dublin, Ireland

Volatility modelling engulfs the finance literature, as precision of risk management estimates is fundamentally dependent on accurate measures. This paper examines the time series properties of alternative risk measures, observed absolute and squared returns for high frequency futures data. Specifically, intraday volatility series' for three different asset types, using stock index, and the less risky, interest rate and bond futures are analysed. Long memory is strongest for the bond contract, followed by the stock index contract. Long memory is strongest for the absolute returns series' for all contracts and at a power transformation of d < 1. The long memory findings generally incorporate intraday periodicity. Seven related GARCH processes through an APARCH specification, are fitted to the data to determine whether they adequately describe the long memory features inherent in the futures contracts. The APARCH process is unable to adequately describe the long memory features through filtering the original futures series'.

Room A



Monday 24th June 2002 1010 - 1120

Telecommunication Forecasting

Room B

Chair: Mohsen Hamoudia

1. Telecommunications demands': a review of forecasting issues

Robert Fildes

Lancaster University, Dept of Management Science, Lancaster, UK

The last decade has seen rapid advances in telecommunications technology. Companies operating in these markets have relied on demand forecasts to justify the considerable investment needed to ensure capacity availability at the right time. These new markets typically consist of new entrants taking up the generic service for the first time, established users changing their usage patterns, users of competing services shifting to the new service and those exiting from this segment of the market altogether. This paper examines a number of telecommunications services and describes various models that have been used to understand the markets' dynamics. Markets discussed include both established and new: mobile, the internet, and PSTN (Public switched telephony network). Models typically include price (and perceived price) differentials, aspects of service quality and the attributes of the products themselves. Because of the complexity of these drivers' the successful modelling of these markets has been limited by data problems. Even where the appropriate data are available, the limited data history is insufficient to permit the statistical identification of the models' structure. For longer term forecasting the data base often neglects patterns of changing uses. These changes pose major problems to the practising forecaster how should a forecaster approach problems where rapid change and instability are the norm?

2. Forecasting the growth of internet services demand and the network capacity requirements

Mohsen Hamoudia

France Telecom, 30 Terrasse Bellini, 92800 Puteaux - Paris, France

The forecasting of the Growth of Internet Services Demand and the correspondant Capacity requirements through traditional techniques, such as econometric modeling (different kind of Regression Models and Simultaneous Equation Models) or Time Series (Box & Jenkins, Exponential Smoothing), fail to accurately predict the future of this market. In fact, the past history of this market may not holds true for future state and performance since it fails to capture some new key drivers and changing factors.

The alternative forecasting approach should take into account the impact of the rapidly changing within economic and social factors, new usages and proliferation of new technologies (MPLS, DWDM, ADSL, RSVP, 3G protocols) and applications (streaming video & radio, VoIP, Downloading MP3, Software).

In this paper, we present a forecasting method based on the S-Curve Analysis and New Product Penetration. Many qualitative factors/drivers for the Internet Service Demand Forecasting (technology, new usages, QoS) for each segment of customers are also integrated in the models.

In the last part of this paper, we will measure the forecast accuracy and ensure that the models are sufficiently flexible.

Room B



Monday 24th June 2002

Monday 24th June 2002 1010 - 1120

Telecommunication Forecasting

3. Understanding the factors that drive residential internet/www usage: a modified theoretical approach to forecasting information technology acceptance.

Alastair Robertson

Lancaster University, Dept of Management Science, The Management School, Lancaster, UK

The internet/www will have an impact on residential communication patterns. As suppliers of information (eg banks and TV media organisations) rapidly move toward the internet/www platform to facilitate remote access for their customers, it is important to understand the adoption process and usage parameters of the internet/www so that suppliers of information may meet the demands of consumers successfully. There has been very little direct residential internet/www usage research conducted thus far, and forecasting approaches designed for this market are rare. This research bridges this gap by looking at theoretical models from socialpsychology that assess why some IT technologies (both hardware and software) fail to be adopted when others succeed. In general, these models discuss the need to facilitate the conditions of use and to measure how "useful" individuals find a particular IT technology. They also discuss the social factors that are involved that can be used in statistical modelling procedures. However, social-psychological models lack some of the properties that are known to be important in the analysis of markets. The non-social psychological literature highlights the importanct of other factors that affect the growth of internet/www technologies, such as cost of access, demographics, market competition and product complementarity. This paper proposes a modified theoretical apprach to IT choice and usage that marries the concepts outlined by social-psychology ot that of the remainer of the literature. This unified framework will be of assistance to researchers wishing to understand the factors that drive the adoption process in many IT technology area and will be useful in guiding econometric modelling strategies that would be used to forecast technology adoption rates.



Monday 24th June 2002 1150 - 1300

Supply Chain Forecasting

Room B

Chair: John Boylan

1. Data-Driven Supplier Performance Monitoring

Theos Evgeniou, Constantinos Boussios, Giorgos Zacharia

INSEAD, Technology Management, Bd de Contance, Fontainebleau, France

We study how past supplier performance as well as transactional and financial data about companies can be used to derive a number of findings and predictions useful for supplier selection, monitoring the supply chain performance, and improving inefficiencies. We discuss findings from analysing supplier performance data for a small sub-set of a database with information on about 15 million companies. The results suggest that the combination of the increased ability to capture transactional data across companies - as opposed to data about only a given company - globally, and the use of data mining tools can have an important impact on supply chain management.

2. Enhancement of Forecasting Software at Syncron UK Ltd

G C Karakostas, J E Boylan

Buckinghamshire Business School, Chalfont Campus, Buckinghamshire Chilterns University College, UK

Syncron UK Ltd is a provider of specialist forecasting and inventory management software, concentrating on the European market. The work described in this paper is part of a two year research programme at Syncron UK Ltd to review the forecasting and inventory management methods used in the company's software. Syncron had earlier identified potential gains in accuracy for slow moving and lumpy demand items by using different approaches to demand forecasting and categorisation. Current work is addressing similar issues in trend forecasting. These new approaches are evaluated by examining a number of combinations of demand type categorisation methods, forecasting methods and forecasting parameter values on a variety of data sets obtained from clients of Syncron UK Ltd. The sequence of combinations of the parameter values, the available data sets and their characteristics, and the performance measures are discussed in detail. The data sets are large, comprising many thousands of SKUs, thereby allowing significant empirical conclusions to be drawn. To take the research one step further, the paper discusses further work on the interactions of the forecasting methods with established inventory management methods.



Monday 24th June 2002

Room B

Monday 24th June 2002 1150 - 1300

Supply Chain Forecasting

3. Shrinkage techniques for forecasting intermittent demand

Don Miller, Ibrahim Kurtulus

Virginia Commonwealth University, School of Business, Box 844000, Richmond, USA

Successful inventory control policy depends upon the accuracy of demand forecasting. Forecasting demand can be especially daunting when demands are intermittent. A scarcity of data usually exacerbates the problem. The method most recommended by textbooks is Crostin's procedure. Willemain, et. al., showed that Crostin's method is superior to exponential smoothing in forecasting intermittent demand.

In most such applications, forecasts are required simultaneously for a large number of items. This suggests the possibility that forecasting accuracy can be improved by employing shrinkage methods, where the forecast for an individual item is based on data for all items. Indeed, intermittent demand can be expected to exhibit the characteristics most favorable to shrinkage methods: scarcity of data for a given series, great random variation, and a large number of similar series. In this study, we perform a simulation to compare the forecasting accuracy of Crostin's method to that of forecasts developed by applying shrinkage to Crostin forecasts.

In the simulation, we generate 500 demands and demand intervals for a group of items under several of the conditions investigated by Willemain, et. al., as well as conditions that mirror the characteristics of real intermittent demands for a group of 78 similar items manufactured by a large company. First, following Crostin's method, demand magnitudes and demand intervals are forecast independently for period t = 2 to 500 using simple exponential smoothing. Next, corresponding shrinkage forecasts are developed, where the shrinkage forecast for any item is a weighted average of the usual forecast for that item and the mean of the forecasts for all items. We consider both the James-Stein and Lemon-Krutchkoff shrinkage methods. We will report the relative forecasting performances of the Crostin method and the shrinkage methods and indicate the types of conditions that are most advantageous to each method.



Regional Forecasting

Room B

Chair: Professor James Kurre

1. Identifying useful monetary and financial variables for regional forecasting

Don Schunk,

The University of South Carolina, Moore School of Business, Columbia, USA

The purpose of this paper is to consider the usefulness of various monetary and financial indicators for regional economic forecasting. Empirical research over the last decade has resulted in two themes that serve as background to this project. First, monetary and financial indicators can be efficient predictors of national economies. For example, the yield spread has been shown to be a good predictor of U.S. recessions. Second, changes in monetary variables, typically taken to indicate changes in national monetary policy, can have differential impacts across regional economies. Following from these two strands of research, this paper provides evidence on several fronts. First, for which regions can forecasts be improved by using monetary and financial indicators? Second, are there differences between these regions in terms of which monetary indicators provide useful information? Finally, can this forecasting evidence be explained in terms of regional economic structure? The empirical approach is to first specify appropriate VAR models that include some measure of regional economic activity (personal income, real income, employment) along with some set of monetary or financial variables (including interest rates, rate spreads, monetary aggregates, stock prices). The chosen VAR models will generate regional economic forecasts that can be compared with univariate regional models to determine the extent to which forecasts can be improved by including the chosen monetary variables.

2. An evaluation of alternative strategies for incorporating inter-industry relationships into a regional employment forecasting model

Dan S Rickman, Steven R Miller

Oklahoma State University, 338 College of Business, Stillwater, USA

Alternative strategies for incorporating inter-industry relationships into industry employment forecasting equations are evaluated. The strategies differ along several dimensions. First, strategies that are based upon using input-output information to select which industry employment variables to include as independent variables in each employment forecast equation are compared to those based upon using input-output linkages to create aggregate demand variables for inclusion. Second, strategies differ according to the degree of endogeneity in the regional economy that they reflect. Third, the strategies also differ according to whether model selection procedures are used to potentially reduce the set of independent variables in each equation. Finally, the strategies differ according to whether restrictions are placed upon the coefficients during estimation. Relative forecast performance of the alternative models serve as one criterion in the evaluation of the models. Employment multipliers of the more successful forecasting strategies also are examined to assess the usefulness of the different strategies in impact analysis.



Monday 24th June 2002 1500 - 1610

Regional Forecasting

3. Performance forecasting for metropolitan area economies: Washington DC area leading and coincident indices

Stephen S Fuller

George Mason University, School of Public Policy, Fairfax, USA

The Washington Economic Index has been published monthly for eleven years. It was developed in response to the 1990-1991 recession when business leaders in Washington became concerned that there was no regularly available reliable information upon which to make business decisions as the economy slipped in to recession or to determine the turning points and emergence from the recovery. The Leading and Coincident Indices developed in 1990 for the Washington metropolitan area have been used subsequently to track the recovery in 1992, document the expansion and predict and describe changes in performance over the nineties, and to identify the turning points leading into the current downturn.

The Leading Index was designed to forecast the performance of the Coincident Index by nine to twelve months. It peaked in January 2000 and the Coincident Index peaked in November 2001. The subsequent deceleration of the area economy was deepened by the economic impact of the September 11th terrorist attack. Even though the Coincident Index remains depressed by the aftermath of September 11th, the Leading Index turned positive during the last quarter of 2001 and is again out-performing its twelve-month moving average and appears to have established a new turning point as of December 2001.

The provision of timely performance measures for metropolitan area economies upon which government and private sector decisions can be made over the course of the business cycle is essential for effective management. The short-term forecasting power of the Leading Index can provide this information on a monthly basis looking forward three quarters from the current period thus providing a reference base for informed decisionmaking.

4. No room at the Inn? Forecasting Hotel-Motel occupancy for a local area

Professor James A Kurre, Barry R Weller

Penn State Erie, School of Business, 5091 Station Road, Erie, USA

This paper documents the creation of a model to forecast hotel-motel occupancy for a small metro area (Erie Pennsylvania) in the northeastern United States. It starts with a review of the literature, and techniques used in some American cities. It discusses data availability, focusing on the strengths and weaknesses of one widely-available data source. The paper then examines several forecasting models to identify the most appropriate technique. Since many areas impose a hotel-motel tax, this project clearly has implications for local governments as well as for local accommodation industries.

Room B



Chair: Timo Terasvirta

1. Building neural network models for time series

Professor Timo Terasvirta, Marcelo C Mederios, Gianluigi Rech Stockholm School of Economics, Box 6501, Stockholm, Sweden

Neural Network (NN) time series models are often specified and estimated by applying computational algorithms with the purpose of reducing the size of the originally postulated model. Recently some authors have suggested a statistical approach to specifying NN models. In this presentation we consider such an approach for specifying single hidden-layer feedforward NN models. There exist two specification problems in building such models. Firstly, one has to select the variables to be included in the model from a set of candidate variables. Second, one has to determine the number of hidden units appearing in the model. The first problem is solved by applying standard model selection criteria to a "lineraized" NN model. The number of hidden units is determined sequentially by starting with a linear model, testing the null hypothesis of no additional hidden units and continuing until the first acceptance of the hypothesis. The estimated model is evaluated using appropriate misspecification tests. The performance of the whole technique is illustrated by simulation, and the proposed technique is also applied to the NN modelling of real time series.

2. Dynamic approach for identifying time series financial data using BP neural networks: International Evidence

Dayong Gao, K. Kinouchi, K. Ito

2-1 Minamijyosanjima, Tokushima, Japan

Existing studies largely focus on estimating the level of return on stock markets, but sparsely address identifying dynamic properties for time series financial data. A prediction with little error in a specific period does not necessarily characterize the nature of financial markets. In this paper, underlying dynamic properties of time series financial data are identified using an MA model composed of BP neural networks. Based on dynamic approach to TOPIX, HSI, STI and S&P500 from four countries (areas), namely Japan, Hong Kong, Singapore and the USA, BP neural networks capture the homeostatic dynamics of the system under the influence of exogenous forces from the environment. Data in the previous 3-4 days as system inputs appear to be particularly useful in prediction of financial markets. The results show that financial time series data include both predictable deterministic and unpredictable random components. Neural networks can acquire the deterministic component. Adaptive change of homeostatic dynamics is evaluated by the change of weight vectors in neural networks. Dynamic approach provides evidence that stock markets have memory and models the relation between endogenous and exogenous variables in the input-output system of financial markets. The results suggest that some exogenous regularities occur when adaptive properties of the networks change. The methodology in this paper may be useful for economic analysis and financial prediction.


Monday 24th June 2002

Monday 24th June 2002Room B1640 - 1750Neural Networks

3. Transfer of advanced manufacturing technology (AMT) related knowledge: an assessment of contribution by foreign based companies to local companies

KD Gunawardana, Dr Chamnong Jungthirapanich

Assumption University of Thailand, Huamark, Bangkok, Thailand

This study empirically evaluates the contribution of technical knowledge transfer from foreign-based companies to local companies in the Sri Lankan's manufacturing sector. It is analyzed in terms of contributions to the Advanced Manufacturing Technology Transfer (AMTT) from foreign-based companies to local companies and to further know the variations in technical knowledge transfer by origin of foreign companies. It is also analyzed from the viewpoint of their mode of entry, type of industry, employees, usage of AMT, and location. The statistical analysis has shown that usage of AMT, country of origin and mode of entry variables are more significant than other variables. The amount of contribution to each local firm is measured by summing up the scores of the expatriate managers working in a local offices, number of local training programs conducted by trainers of foreign-based companies and number of training programs in the headquarters of foreign based companies for local managers, manuals, course materials, books and papers relevant to transfer of technical knowledge. The contribution of the AMTT was calculated by summing up the weighted scores of the above three criteria.

This paper is mainly limited to the Knowledge flow from foreign-based companies to local companies. A foreignbased company means those companies, which have originated in developed nation or developing nation but functioning business in local situation or host country situation. Multinational companies, trans-national companies, international joint ventures are included in this sample. Knowledge can either from foreign-based companies to local companies or local companies to foreign-based companies. This paper is based on the knowledge inflows from foreign-based companies to local companies only. There are several knowledge flows from foreign-based companies; AMT is one of them. In this paper AMTs refer to a family of technologies that include computer-aided design (CAD), engineering systems, materials resource planning systems, automated materials handling systems, robotics, computer controlled machines, flexible manufacturing systems, electronic data interchange and computer-integrated manufacturing systems. This study has focused on the transfers of largely procedural AMTs related technical knowledge.

The present research has used multiple regression model and artificial neural network model for determining the contribution of knowledge transfer related to the AMT by foreign-based companies to companies in developing countries. Information was collected from foreign-based companies operating business in Sri Lanka - a developing country. The proposed model of AMTT has shown the structure of Artificial Neural Network (ANN) and regression model.

The researchers have analyzed information collected from 1026 foreign-based companies operating business in Sri Lanka and developed two models-Regression based model and Artificial Neural Network based model. It was found that the ANN Model and regression model guide same prediction of AMT use by foreign-based companies contributing to developing countries.



Neural Networks

Room C

Chair: Owen Hall

1. Improving Forecast Accuracy Using Neural Nets

Owen Hall

The George L Graziadio School of Business and Management, Pepperdine University, Culver City, USA

One of the growing problems facing business and industry today is to improve forecast accuracy. Forecasts are the primary driver of most business operations. Surprisingly, many organizations do not use a structured forecasting process. Instead they relay on an informal approach often driven by target forecasting. This approach often results in higher inventories, longer customer lead times, reduced levels of service and bottlenecks throughout the supply chain. One of the primary reasons for the lack of a systematic approach is that most managers are uncomfortable using technical based forecasting systems. This uneasiness can be attributed to a lack of understanding of standard forecasting principles and the complexities associated with some classical forecasting systems. Recent developments in artificial intelligence (AI) techniques suggest that there is an opportunity to improve the forecasting process in a non-threatening environment. Artificial neural nets (ANNs) is one branch of AI that is particularly well suited to support the forecasting process. ANNs are beginning to find widespread acceptance throughout business and government. Among other things, ANNs have the advantage of not requiring aprior assumptions about possible relations as is the case with more classical analysis methods. The primary purposes of this paper are threefold: 1) to introduce the use of neural nets as an effective forecasting system, 2) to compare the use of neural net based forecasting with other classical forecasting systems and 3) to develop a neural net model for estimating product sales in the printers and imaging industry. The analysis shows that a neural network can accurately predict sales over a wide range of sales volumes and product lines. The reported R-squares exceed 90%. These results suggest that the new generation in AI technologies holds considerable promise for helping to develop more accurate forecasts over a wide range of organizational applications.

2. Stability and predictive performance of subsample bootstrapping for classification or regression

Theos Evgeniou, Andre Elisseeff, Massimiliano Pontil

INSEAD, Technology Management, Bd de Contance, Fontainebleau, France

Bootstrapping has been often empirically shown in the past to lead to very good predictive performance. In this paper we present a new theoretical analysis, with experiments validating the theory, of the characteristics of linear combinations of models, where each of the models is developed using a small random sub-sample of the original data - a small-subsamples version of bootstrapping. We study the cases of classification and regression, with an emphasis on the first. We present a theoretical analysis based on the theory of algorithmic stability of models - namely, how much a model changes when the data used to develop it are perturbed - to understand why and when this type of bootstrapping works. We present new theoretical results about how, and when, small subsample bootstrapping increases, or decreases, the stability of the underline model. We also show new bounds on the distance between the empirical and expected error for this type of bootstrapping, based on the stability of the underline model. These bounds also imply that for bootstrapping using small sub-samples the empirical error can be a good indicator of the actual predictive performance. We report experiments on a number of datasets using support vector machines, decision trees, and neural networks. The results validate the theory.



Monday 24th June 2002

Monday 24th June 2002 1010 - 1120

Neural Networks

3. Quantitative measurement of advance manufacturing technology transfer from foreign based companies to local companies

K D Gunawardana,

Assumption University of Thailand, Huamark, Bangkok, Thailand

The literature on foreign direct investment (FDI) has recently analysed the nature of the firm's entry mode choice in a foreign market, particularly the choice between a joint venture and a wholly owned subsidiary. Foreign-based companies are defined as having one or more overseas manufacturing subsidiaries or joint venture relationship. Foreign-based companies can be divided into following three groups in descending order: multinational, transnational and ventures. Most of these companies are using Advanced Manufacturing Technologies (AMT) in manufacturing operations conducted in host country. Therefore type of industry, mode of entry, country of origin, and location of the host country and number of employees are variables of AMT for conducting this research. This paper aims at providing further empirical evidences on the influences of some key variables in explaining issues related to transfer of AMT.

Advanced Manufacturing Technologies are integral part of the production process. It is important to understand the factors that are associated with differences in technology use at the plant level. This paper examines the relationship between the use of AMT at the plant level and the characteristics of these plants. Information on technology use is derived from a literature that investigates the use of 22 Advanced Maufacturing Technologies. These 22 technologies can be divided in to following 5 functional groups: design and engineering; fabrication and assembly; automated material handling; communications and inspection, manufacturing information systems; and integration and control of manufacturing system of the organisation.

The researchers hold that there is a significant link between the use of AMT and subsequent success of usercompanies. This makes it important to highlight differences between companies using or not using AMT from the viewpoint of their success. This research will further attempt to investigate the number of AMTs (out of 22) used by various companies included in the sample.

The present research has used multiple regressions model and artificial neural network model for determining the incidence of using AMT by foreign-based companies in manufacturing processes in developing countries. Information has been collected from companies operating businesses in Sri-Lanka - a developing country. The proposed model of AMT use shows the structure of Artifical Neural Network (ANN) instead of regression model.

The researchers have analyzed information collected from 1026 foreign-based companies operating business in Sri-Lanka and developed two models - Regression-based model and Artifical Neural Network based model. It was found that the ANN model guides prediction of AMT use by foreign-based companies more effectively when compared with regression model.



Monday 24th June 2002Room C1150 - 1300Neural Networks

Chair: Owen Hall

1. A neural forecasting model for the air transport passenger demand

Luiz P Caloba, Kriseida P G Alekseev, Jose M Seixas COPPE, Progr. Eng. Electrica, CP 68504, Rio de Janeiro, Brazil

The air transport industry relies heavily on forecasting methods for supporting management decisions on a bunch of application areas: operation of new routes, acquisition of aircrafts, staff training programmes, the opportunity of building new terminals, etc. However, optimistic forecasting has resulted in serious problems to the Brazilian industry in last years, which has been paving the way for the search of new techniques that may improve both forecasting performance and reliability. Typically, econometric techniques, logit models and "gravity" modelling have extensively been used in this field. In this paper, the use of models based on artificial neural networks is discussed for the important problem of forecasting the air transport passenger demand. Considering actual data from nationwide operation in Brazil, it is found that neural processing can outperform the econometric approach. When neural modelling is applied to relevant preprocessed data, it can accurately generalize the learnt time series behaviour for the air transportation of passengers, even in practical conditions, where a small number of data points is available. Relative errors between the neural model and actual sample points that were not seen during both training and validation phases of the network design were found to be below 1%.

2. Neural Networks: contributions and weaknesses

Bruce Curry

Cardiff Business School, Colum Drive, Cardiff, UK

This paper reviews the value of NNs in a forecasting context, in the light of research on various technical issues. NNs are viewed not as a technique rooted in Computer Science but as a method of implementing non-linear regression. Their particular advantage is that there is no need to specify the functional form a priori. This same property of 'universal approximation' also underpins the use of NNs as a specification test.

Although the capacity of NNs to 'mimic' functional forms is well-founded, there are numerous problems. There is firstly a need for caution concerning the choice of search algorithm. The 'orthodox' Backpropagation method is based on gradient descent and has certain weaknesses in this context. Also, because of the inherent complexity of the NN model, which in fact provides the capacity to approximate, there is a great need for caution in implementation. The end result can be very sensitive to various choices. Unfortunately there is as yet no generally agreed strategy for model selection.

NNs are in principle subject to standard statistical significance tests. This is not often stressed by those who use them. On the other hand, experience suggests that standard statistical testing does not lead to clear choices in matters such as the number of nodes in hidden layers.

A further interesting problem concerns replication of parameters/weights. Experience suggests that while one can replicate the level of fit, randomly restarting the fitting procedure will not lead to identical values of the weights. Some theoretical examination of this phenomenon is provided in the paper. Weight indeterminacy means that calculating degrees of freedom is dangerous: the number of 'effective' parameters is less than the number of network weights. Hence one must be wary of forecasting based on criteria such as AIC and BIC.

Room C



Monday 24th June 20021150 - 1300Neural Networks

3. On estimating confidence intervals for polynomial neural network models

Lilian M de Menezes, Nikolay Nikolaev

City University Business School, Faculty of Management, Walsmley Building, Northampton Square, London, UK

Recent literature shows encouraging results from using genetically programmed polynomial neural networks for forecasting. The resulting models appear to capture the non-linearity, which is quite common in financial data. Nevertheless, an outstanding research issue is that of evaluating the uncertainty in the forecasts. In this paper, we develop confidence intervals for polynomial neural network models using two approaches: the delta method, which is implemented using neural network techniques, and the bootstrap. Second, we present preliminary results on empirical data. These initial results suggest the delta method may lead to more unstable and thus favour the bootstrap for practical applications.



Chair: Michael Lawrence

1. Framing effects in judgemental forecasting

Nigel Harvey, Clare Harries

University College London, Dept of Psychology, Gower Street, London, UK

The same formal judgment task can be framed within different scenarios. Framing effects refer to influences that variation in the scenario has on judgment performance. We describe some experiments designed to examine such effects. In all experiments, a number of pieces of information (cues) had to be combined to make forecasts. The statistical relation between cues and the outcome was constant across conditions within each experiment.

We studied two types of framing: task-framing and source-framing. In task-framing, people in different conditions are told that the cues refer to different types of information. In source-framing, they are all given the same type of information but told that it comes from different sources.

In the task-framing experiment, half the participants forecast sales for various products from information about cost of the products, number of outlets selling them, etc. The other half made their judgments by combining forecasts that they had received from advisors. Although the statistical structure of the task was the same in both conditions, forecasting performance was much better in the second one. We argue that assumptions that people brought to the task were more useful in this case.

In the source-framing experiments, people combined forecasts that varied in quality. There was no effect of telling people that the forecasts were made by men, by women, or by a mixed-sex group. However, people told that the better of two forecasts was made by a person using judgment and the worse one was made by a computer-based statistical procedure performed better than those told that the better forecast was computer-generated and the worse one was produced by judgment. Assumptions that people brought to the task about the credibility of the two sources of information appear to have been more appropriate in the former case.

2. Dealing with bias: how well do forecasters handle an asymmetric loss function.

Michael Lawrence, Marcus O'Connor

University of New South Wales, School of Information Systems, Sydney, Australia

Many practising forecasters operate in an environment where there are either implicit or explicit biases favouring under or over forecasting. For example some marketing executives may be rewarded for exceeding the forecast which operates, in effect, as a sales target. In other organisations the forecast may be set high to encourage greater effort. Studies show that most practical forecasts are indeed significantly biased, with some organisations biased one way and some the other. A study was conducted to determine if people are able to respond appropriately to an asymmetric loss function. The subjects were given a cover story that they were the production manager in an organisation with an asymmetric loss function. This was diagrammatically displayed, and operationalised in the experiment by paying money bonuses to the subjects. Two shapes of loss function were used differing in their kindness, and two directions of bias, one favouring over and one under forecasting. The results show that the research subjects, business majors at a leading Australian University, did respond appropriately to the differing directions of the asymmetry and to the differing kindness shapes of the loss functions. These results support the field research showing that most forecast biases are the result of deliberate decision making behaviour on the part of the forecasters.



Monday 24th June 2002 1500 - 1610

Judgemental Forecasting

3. The influence of positive affect and DSS explanations in judgement forecasting

Marcus O'Connor, Louise Davies, Michael Lawrence

University of New South Wales, School of Information Systems, Sydney, Australia

People are reluctant to use computer-generated advice. Research has shown that unless users are satisfied or confident with system advice, they are unlikely to accept it. This paper investigates the influence of Decision Support Systems (DSS) explanations and positive affect on user satisfaction and forecasting performance. Three hundred and ninety subjects used a DSS to assist them in a forecasting task. Subjects were randomly allocated to one of four treatment groups (no explanations, management explanations, technical explanations or both explanations) and one of two condition categories (a control and an affect-induced group). They were required to forecast the following month's sales for twenty products and could choose to either accept system forecasts or make adjustments to them. Results indicated that subjects induced with positive affect were more satisfied and accurate in their forecasting compared to subjects in the control group. They were less inclined to alter system recommendations, resulting in more accurate forecasting. Subjects provided with DSS explanations were more satisfied and indicated greater confidence in their forecasts compared to subjects without explanations. These findings are compatible with previous research suggesting improved problem solving and decision-making among people induced by positive affect, and with prior work suggesting that positive affect promotes task satisfaction. They are also consistent with existing literature showing greater acceptance of system advice for users receiving explanations.

Room C



Judgemental Forecasting

Room C

Chair: Michael Lawrence

1. Heath administrator's provider-user criteria for forecasts

Dilek Onkay-Atay, Fergus Bolger

Bilkent University, Faculty of Business Administration, Ankara, Turkey

This paper reports the initial results of a forecasting study conducted with health administrators. First, health professionals identified different sets of criteria which they considered significant in (1) selecting a forecasting technique to construct their forecasts, and in (2) using forecasts presented to them. Health administrators were then requested to express their perceived levels of importance for the various criteria when assuming their forecast provider versus forecast user roles. Evaluations of different forecasting formats in provider and user roles were also elicited. The practical significance of the findings are discussed and directions for future research are proposed.

2. The Performance Analysis of Judgmental Directional Exchange Rate Predictions

Andrew Pollock, Alex Macaulay, Mary E Thomson, Dilek Onkal-Atay

Glasgow Caledonian University, Dept of Mathematics, Cowcaddens Road, Glasgow, UK

A general framework is described for examining different aspects of performance or judgemental directional probability predictions of exchange rate movements. The framework extends existing accuracy measures that compare probability forecasts with ex-post estimated probabilities derived from movements of the series. A range of predictive performance measures is identified to highlight specific expressions of strengths and weaknesses in judgemental directional forecasts. The framework provides a flexible approach that is straightforward for practitioners to implement and can be used in situations where the time intervals between the predictions have variable lengths. The framework is applied to a set of directional probability currency forecasts for the US Dollar/Swiss Franc from 23-7-96 to 7-12-99 and the findings are discussed.

3. Validating the components of a scenario planning process: issues and analysis

George Wright, Ron Bradfield, George Burt, George Cairns, Kees van der Heijden University of Strathclyde, Graduate School of Business, 199 Cathedral Street, Glasgow, UK

This paper decomposes the scenario process into a number of separable parts. These components are then described in detail. Next, other process intervention methodologies are analysed and, where validation of the process interventions have been conducted, implications for the scenario process, itself, are drawn. For example, role-playing interventions have been shown to provide improved forecasts compared to expert judgment. Role-playing has close similarity to the stakeholder analysis component of scenario planning and thus this component of scenario planning is supported. Similarly, attenuation of probabilistic judgmental prediction - a key component of scenario planning - is supported by empirical evidence on managers' poor ability to make valid probability judgments. In short, this paper strives to provide an empirically-related underpinning for the scenario process. In practice, scenario thinking is well-received by senior managers but, given the long-term focus of most scenario projects, no validation studies have been conducted. Indeed, scenario thinking may be best thought of as a tool to enhance organisational learning than as a forecasting tool. This and other issues will be addressed in the paper.



Monday 24th June 2002 1010 - 1120

Judgemental Forecasting

Chair: William Remus

1. To identify time-series features: a comparison of expert, novice, and automated codings

Monica Adya, J Scott Armstrong

DePaul University, Chicago, IL, USA

Research in the past decade has been successful in matching the extrapolations method to the features of the time series (e.g., is there a strong trend? Is variability high?). Some of these features depend on the judgments of forecasters. Rule-based forecasting attempts to summarize on the cumulative knowledge about how to match the methods to the features. In Adya, et al. (2001), available in full text at forecastingprinciples.com on the "Papers/journals" page, we automated the identification of these features in order to improve reliability and consistency of feature codings for subsequent research studies. To further improve the coding process, we presented subsets of 122 annual series from M-Competition to undergraduate management majors. They coded seven features of time series. Forecasts from student codings will be compared to the expert codings used originally in RBF (Collopy and Armstrong, 1992) and with automated codings as described in Adya, et al.(2001).

2. The role of judgmental techniques in model-based employment forecasting

Charles Bowman

Massachusetts Ave. NE, Washington DC, USA

This paper describes the use of judgmental techniques in an employment forecasting system developed by the U.S. Bureau of Labour Statistics (BLS). The system is designed to produce highly disaggregate 10-year industrial and occupational employment forecasts for use in career guidance, educational planning and policy analysis. The BLS approach decomposes the forecasting problem into a number of distinct but interrelated components each of which addresses a major influence on the labour market. These vary from the growth of consumer spending to changes in the occupational structure of industries. The forecasting techniques used vary widely across these components but all involve judgmental techniques to some degree.

The first section describes the components of the system, identifies those areas where judgmental techniques are used and presents some of the reasons for their adoption. In particular, the choice of technique is related to the peculiarities of the historical data, the level and type of uncertainty, availability of staff expertise and similar factors. Next, empirical evidence from a recent forecast is used to analyze and quantify the impact of judgmental methods on the final outcome. The paper concludes with some thoughts on the strengths and weaknesses of the BLS approach and some possible ways in which it might be improved.

3. Forecasting decisions in conflicts: analogies, game theory, role-playing, and expert judgement compared

Kesten C Green

Lambton Quay, Wellington, New Zealand

Can the formal use of analogies lead to useful forecasts of decisions by parties in conflict? The approach has been recommended for such problems, but there has been no research to determine whether this is good advice. Research first presented by this author at ISF 2001 led to the surprising finding that, for conflicts involving interaction between parties, forecasts by game-theory experts were no more accurate than unaided-judgement forecasts by students. Moreover, forecasts from role-plays, which also used students, were considerably more accurate. Can non-game theory expertise help with such forecasting problems? And what about collaboration? I will present preliminary findings on the effects of: (a) the formal use of analogies, (b) expertise, and (c) collaboration on the accuracy of forecasts of decisions in conflicts. I will compare the new findings with previous ones on game theory, role-play, and unaided judgement by novices.

Room D



Chair: William Remus

1. Application of structural qualitative method of forecasting to Indian seed industry

Gopal Naik

Indian Institute of Management Ahmedabad, Vastrapur, Ahmedabad, India

Structural Qualitative Method (SQM) has been suggested as an effective alternative method of forecasting in the business organizations (Naik, ISF2001). Problems such as inadequate time series data constrain organizations to use time series or causal models. In developing countries there are added problems of computational facilities and expertise to use these models. Even in the developed countries the use of judgmental methods have been significant due to reasons such as its ability to incorporate most recent qualitative information. SQM provides a structure to such qualitative methods used for forecasting. For business organization, SQM suggests two step process for sales forecasting: industry level and company level forecasts. In both these steps factors influencing demand are identified and weights are attached subjectively. Assessment of changes in the conditions of factors enables to assess through a proper formula the expected change in the next year. The method uses both qualitative and quantitative information. The method can be used for generating any type of forecasts and therefore useful in many decision making situations.

SQM has been applied in an agricultural seed firm in India. Seed demand is highly variable and is dependent on agro-climatic, market and technology conditions. The method is found to be highly suitable as the decision on production and marketing of seeds requires a number of types of forecasts to be generated. The method enables individuals to understand inter-relationships of variables and fine tune their assessment through systematic feedback. It also helps to assess the training needs of staff members. Continuous use of this method and fine-tuning of individual's assessment will enable development of an effective model of forecasting.

2. The influence of task randomness and information disclosure on the utility of confidence information in decision making

Michael Nelson, Michael Lawrence, Marcus O'Connor

University of New South Wales, Sydney, Australia

Understanding the level of uncertainty in a decision making task is crucial for effective decision making. It has been recommended that the provision of confidence information (CI) should improve decision making performance by providing the decision maker with an indication of task uncertainty. Empirical evidence confirming this hypothesis has not materialised. Decision makers may have ignored CI in favour of other information cues, such as historical information. Additionally, in previous studies the level of task uncertainty may have been expected and therefore the CI added little value. This study, using a paper based experiment, investigates the influence of task uncertainty and information disclosure on the effectiveness of CI in a capital investment decision making task. Results show that CI improved decision performance when task uncertainty was high. CI was found to be more effective when accompanied by forecast information. A contingency model for understanding how CI can be effectively used in decision making is discussed.



Room D

Monday 24th June 2002 1150 - 1300

Judgemental Forecasting

3. A Theory based examination of forecasting in organisations

William Remus, Maureen Macleod

University of Hawaii, College of Business, 2404 Maile Way, Honolulu, USA

This paper examines the role of forecasts in organizations from the perspective of theories on organizations and Actor Network Theory in particular. A major focus of this review is to explain why judgmental forecasts are often preferred in organizations even though often less accurate. The starting point for the investigation is Actor Network Theory as viewed through the perspective of the cognitive three process (C3P) model. Evidence for the predictions from this perspective are then examined. Later more general predictions are examined from the more general perspective of Actor Network Theory. Applying this theory to the literature on managerial judgmental forecasts has implications for both research and practitioner communities.



Monday 24th June 2002 1500 - 1610

Financial Forecasting

Room D

Chair: Iris Stuart

1. The eToys story: why did they fail when analysts' forecasts and pro forma earnings reports indicated huge gains in sales?

Iris Stuart, Vijay Karan

California State University Fullerton, Fullerton, USA

There has been considerable interest in the financial press regarding the reporting practices of High Tech Firms, especially the use of pro forma earnings in quarterly press reports and the use of pro forma earnings to respond to analysts' forecasts. The popularity of using pro forma earnings has increased the gap between earnings released by companies and used by Wall Street analysts, and the numbers reported to the Securities and Exchange Commission (SEC). The SEC has issued warnings to public companies regarding disclosure related to pro forma earnings releases, and has issued an alert to investors regarding the potential dangers of relying upon such releases in determining a companies' financial health. This paper looks at one new economy firm, eToys, Inc. who went public in 1999 and filed for bankruptcy protection in 2001. In this paper, several forecasting errors are considered, including the failure of the audit firm to correctly forecast the financial position of the firm and the company's attempts to meet financial analysts' forecasts by the use of pro forma earnings in its quarterly press releases.

2. Using DEA to forecast bankruptcy

Armando Zeferino Milioni, Henry Rossi de Almeida

Sao Jose dos Campos, San Jose, Brazil

In this work we present a new method for evaluating the solvency level of enterprises, within the context of supporting credit decisions that are made under uncertainty. In order to do so, we make use of an Operations Reseach technique called Data Envelopment Analysis (DEA). In the development of our study we use financial indexes as enterprises solvency indicators (variables). We present the problem in its general form, with any number of input and output variables. Making use of DEA, we define two envelopes aiming to group those enterprises, separating those that are known to be financially healthy, and those that are unhealthy, respectively. In order to calibrate the model, we select data from companies that are known to belong to each group. Next, we present and evaluate a procedure that estimates a score designed to classify each company as financially+U113 healthy or unhealthy, within the goal of evaluating the risk of giving credit for a new company that is not part of the companies used in the calibration. Finally, we propose a dynamic improvement procedure, which, under certain assumptions, enhances the model's performance as new companies are evaluated.

3. Predicting Bank soundness in the Eastern Caribbean currency union

Tracy Polius, Leah Sahely

c/o ECCB, Box 89, Birdrock, Basseterre, St Kitts

The paper makes an intuitive assessment of the performance of the banking system by evaluating indicators of bank soundness. The paper uses a selection of macroeconomic factors and bank specific such as liquidity, earnings, capital, non-performing loans in a logit/probit framework to predict bank soundness. The model seeks to identify banks that are likely to experience liquidity or solvency problems, given the macroeconomic outlook and the performance and management of individual banks.



Monday 24th June 2002

Monday 24th June 2002 1640 - 1750

Financial Forecasting

Chair: Iris Stuart

1. Revenue modelling and prediction

Jerry Shan, Hsui-Khuern Tang

Hewlett-Packard Company, 3809 Ross Road, Palo Alto, USA

HP executives need a reliable and accurate system that predicts the company's total monthly revenue at any point during the accounting month. Without such a system in place, HP was facing enormous pressures in the last few quarters prior to FY01Q3, due to complicating factors such as the Agilent spin-off, and the slide-down of both the tech industry and the overall economy. In response to this urgent need, the R-MAP (revenue modelling and prediction) team was created in HP Labs in December 2000. The objective was to develop statistical forecasting methods that can enable the establishment of such a predictive financial reporting system, so that top executives can discern as early as possibly where the company is heading financially.

This is completely a real world problem, which differs significantly from many of the traditional academic settings. In this talk, we'll be reviewing the details of the problem statement, technical challenges, methodology and algorithm development, and technology transfer process as well. In addition, we'll be sharing some of the successful milestones that we have achieved so far.

2. Enron: Why were bankers, financial analysts, auditors, company executives and employees blind to the forecasting errors?

Iris Stuart

California State University Fullerton, Fullerton, USA

The Enron bankruptcy filing on December 2, 2001 took both company outsiders (bankers, financial analysts, auditors) and employees and executives by surprise. Why were these individuals who were familiar with the company, surprised by the largest bankruptcy filing in history? Surely a company of this size, that is closely followed by financial analysts and bankers, whose financial statements were audited by one of the premier accounting firms in the world, would exhibit signs of doom before the stock price dropped to less than a dollar a share. How did the experts watching this company miss the signs of decay? This paper looks at disclosure practices in the United States and considers the problems that led to the Enron collapse and some possible solutions to these problems. Some of the issues examined include: the role of bonus incentive schemes and stock options in earnings manipulations, related party transactions, revenue recognition issues, off-balance sheet financial analysts who work for brokerage firms, employee pension funds invested in company stock, the issue of auditor independence with substantial fees from consulting and internal audit activities, and the standard of due care and materiality as it relates to evaluating audit evidence.

Room D



Monday 24th June 2002 Room E 1010 - 1120 Forecasting Economic & Financial Time Series Using nonlinear methods I

Chair: Michael Clements

1. Evaluating non-linear models on point and interval forecasts: an application with exchange rate returns

Emanuela Marrocu, Gianna Boero

Universita di Cagliari, Dipartimento di Ricerche Economiche e Sociali, Cagliari, Italy

The aim of this paper is to compare the forecasting performance of alternative time series models for the returns of the Japanese yen/US dollar exchange rate. SETAR and GARCH-M models are compared and contrasted with the AR alternative. First, the forecasting exercise was conducted by evaluating point forecasts over different subsamples; on the basis of the MSFEs the analysis revealed potential gains from the SETAR models, especially in periods characterised by stronger nonlinearities. In a previous study, Boero-Marrocu (2001) found that the nonlinear models did not yield significant forecasting gains relative to the linear counterpart, when the models' performance was evaluated over the whole forecast period. The results of this study, based on a more articulate analysis of the forecast period, provide important evidence questioning the oft-claimed forecasting superiority of the linear models. In a second exercise, we evaluated the models on their ability to produce interval forecasts by applying the LR tests proposed by Christoffersen (1998) for independence, unconditional and conditional coverage. The evaluation of interval forecasts showed that the static interval forecasts from the AR model are clearly not good conditional interval forecasts, while those obtained from nonlinear models, in particular from the GARCH one, are clearly superior for wider intervals (95-75%). This result, not apparent on MSFE measures, implies that nonlinear models are more adequate to forecast the extreme movements of the series, relative to the linear model. On the other hand, the tests showed that all models failed to produce forecasts with correct coverage for narrow intervals (around 50%). This suggests that there are some aspects of the data generating process that have not been captured adequately by the models. However, the forecast performance in the middle range of the distribution is of minor interest in applications with financial variables, where attention is typically confined to the extreme values of the variable.

2. A comparison of tests of non-linear cointegration with an application to the predictability of US interest rates using the term structure

Michael P Clements, Ana Galvao

University of Warwick, Dept of Economics, Coventry, UK

We evaluate the forecasting performance of a number of systems models of US short- and long-term interest rates. Non-linearities, including asymmetries in the adjustment to equilibrium, are shown to result in more accurate short horizon forecasts. We find that both long and short rates respond to disequilibria in the spread in certain circumstances, which would not be evident from linear representations or from single-equation analyses of the short-term interest rate.

International Institute of Forecaste

Monday 24th June 2002 1010 - 1120 Forecasting Economic & Financial Time Series Using nonlinear methods I

Room E

3. Forecasting EMU macroeconomic variables

Massimiliano Marcellino

IGIER- Bocconi University, Via Salasco 3/5, Milan, Italy

After the creation of the European Monetary Union (EMU), both the European Commission (EC) and the European Central Bank (ECB) are focusing more and more on the evolution of the EMU as a whole, rather than on single member countries. A particular relevant issue from a policy point of view is the availability of a reliable forecasts for the key macroeconomic variables. Hence, both the fiscal and the monetary authorities have developed aggregate forecasting models, along the lines previously adopted for the analysis of single countries. A similar approach will be likely followed in empirical analysis on eg. the existence of an aggregate Taylor rule or the evaulation of the aggregate impact of monetary policy shocks, where linear specifications are usually adopted. Yet, it is uncertain whether standard linear models provide the proper statistical framework to address these issues. The process of aggregate across countries can produce smoother series, better suited for the analysis with linear models, by averaging out country specific shocks. But the method of construction of the aggregate series, which often involves time-varying weights, and the presence of common shocks across the countries, such as the deflation in the early '80s and the convergence process in the early '90s, can introduce substantial non-linearity into the generating process of the aggregate series. To evaluate whether this is the case, we fit a variety of non-linear and time-varying models to aggregate EMU macroeconomic variables, and compare them with linear specifications. Since non-linear models often over-fit in sample, we assess their performance in a real time forecasting framework. It turns out that for several variables linear models are beaten by non-linear specifications, a result that questions the use of standard linear methods for forecasting and modelling EMU variables.

4. Domestic and International influences on business cycle regimes in Europe

Marianne Sensier, Michael Artis, Chris Birchenhall, Denise Osborn

University of Manchester, School of Economic Studies, Oxford Road, Manchester, UK

The study of the business cycle has gained renewed interest due to the onset of a recession in the US that has been dated by the National Bureau of Economic Research (NBER) to have begun in April 2001. The expansion prior to this recession lasted exactly ten years which has made it the longest in the NBER's chronology. Policy makers and private agents have a serious interest in the occurrence of these business cycle regimes and, in particular, in models that help in predicting the onset of recession or recovery.

This paper estimates logistic regression models that use leading indicator data to construct regime prediction probabilities of the business cycle for four European countries, namely Germany, France, Italy and the UK over the period 1970 to 2001. In view of the current interest in business cycle linkages and European integration, the scope of the leading indicator information used is deliberately widened to include "foreign" variables. The results help to confirm both the existence of linkages and the presence of a financial channel in the transmission mechanism within Europe.

A range of real and financial variables are used as leading indicators in domestic models, with these variables predicting regimes in Germany relatively well, followed (in order) by the UK, Italy and France. Consideration of foreign variables leads to important roles for the composite leading indicator for France, together with German and US interest rates. The relative importance of these variables differs over countries, but overall they confirm the importance of international influences in the business cycles of these European countries. Three-month ahead forecasts are given for each country, with those for Germany indicating that this country will follow the US into recession in 2001 or early 2002.



Monday 24th June 2002 Room E 1150 - 1300 Forecasting Economic & Financial Time Series Using nonlinear methods II

Chair: Phillip Hans Franses

1. Forecasting umemployment with time-varying paramenter autoregressions

Phillip Hans Franses, Richard Paap

Erasmus University Rotterdam, Econometric Institute, Rotterdam, The Netherlands

Monthly observed umemployment typically displays explosive behaviour in recessionary periods, while there seems to be stationary behaviour in expansions. Allowing parameters in an autoregression to vary across regimes can capture this feature. In this paper we put forward a new autoregressive time series model with time-varying parameters, where this variation depends on a leading indicator variable. When the value of this variable exceeds a stochastic threshold level, the parameters, change. We discuss representations, estimation and interpretation of the model. Also, we analyze its forecasting performance for unemployment series for several OECD countries.

2. Forecasting threshold cointegreated systems

Antoni Vidiella-i-Anguera, Jan de Gooijer

University of Barcelona, Dept of Economical, Financial and Actuarial Mathematics, Barcelona, Spain

The cointegration literature suggests that forecast errors may be reduced by incorporating the knowledge of cointegrating relationships into linear models to generate forecasts. We show that the long-term (one to sixty-step ahead) forecasting performance can further be enhanced by applying nonlinear error correction models. In particular, we focus on a bivariate threshold vector error correction model with the same unknown cointegrating parameter vector in both regimes (TVECM), and a bivariate regime-specific vector cointegration model (LTVECM). Based on simulation experiments as well as two real data sets, and using a variety of evaulation measures, we find that the forecasting performance of the LTVECM outperforms the TVECM and the usual linear specification of the error correcting mechanism. This result holds for forecasts generated by bootstrapping and Monte Carlo simulation. Moreover, depending on the variability in the series, significant improvements in forecast accuracy of the LTVECM over the TVECM can be obtained if the parameters of themodel are estimated by either maximum likelihood or by two-stage least squares.

Monday 24th June 2002

Room E

1150 - 1300 Forecasting Economic & Financial Time Series Using nonlinear methods II

3. Multiscale volatility estimation

Ramo Gencay, Faruk Selcuk, Brandon Whitcher

University of Windsor, Dept of Economics, Windsor, Ontario, Canada

Conventional time series analysis, focusing exclusively on a time series of a given scale, is far from being able to explain the nature of the data generating process. A process equation that successfully explains daily price changes, for example, is unable to characterize the nature of hourly price changes. On the other hand, statistical properties of monthly price changes are often not fully covered by a model based on daily price changes.

In financial markets the data generating process is a complex network of layers, where each layer corresponds to a particular frequency. A successful characterization of such data generating processes should be found using models whose parameters are functions of both intra- and inter- frequency dynamics. Our understanding of financial markets would improve with the incorporation of such paradigms into financial econometrics.

4. A non-linear dynamic model of stock returns

Dennis W Jansen, Michael D Bradley

Texas A & M University, Dept of Economics, College Station, USA

It is generally recognized that asset markets in general, and equities markets in particular, are characterized by low frequency, high amplitude shocks. The history of the New York Stock Exchange, for example, is populated with famous historical one day declines in value. These sharp declines are then associated with a sustained decline returns over the monthly, quarterly, or annual bases. Because of the existence of these shocks, a linear dynamic model of stock market returns may provide a misleading specification of market movements. If the dynamic propagation mechanism following high amplitude shocks is different than the mechanism following normally-sized shocks, then a model that relies upon a unique propagation mechanism will necessarily be incorrect.

In this paper, we investigate the possibility that stock returns are characterized by a non-linear, state-dependent model which has significantly different dynamics in periods following a large swings in stock returns. We pursue an empirical approach which lets us (1) test for the existence of nonlinearities in returns; (2) estimate the size of the shock that is required to generate the alternative dynamics; (3) identify the nature of those dynamics; and (4) examine the impact of accounting for those nonlinear dynamics on forecasting. We do this in the hope of contributing to the understanding of how the market responds to extreme fluctuations.

We also investigate the link if any between unusual stock market dynamics and changes in real-sector activity. We examine what information is contained in sharp changes in the level of real economic activity and how it might be used in explaining the dynamic process generating stock return movements and in forecasting stock market returns. We also examine whether unusual changes in stock returns hold information for the dynamics of real sector growth, and how that might help with forecasts of real economic activity.



Time Series Analysis

Room E

Chair: Nigel Meade

1. Testing the order of integration using non-nested procedures

Antonio Aznar, Maria-Isabel Ayuda

Dep. Analisis Economico, Fac. De CC.EEy EE.C, Gran Via 1-3 (50005), Zaragoza, Spain

This paper proposes a non-nested procedure for detecting the presence of a unit root in a time series; we define a type t-test procedure that is a slight modification of the J-test first proposed in Davidson and MacKinnon (1981). The analysis is extended to cases in which the model embodies a drift and a linear trend. We derive the asymptotic distribution of the statistics used in the proposed procedures and it is shown that, in all cases, they follow a standard-normal distribution. Then, using simulation studies we examine the performance of the procedures with finite sample sizes. The results reported in the paper indicate that the performance of the test are quite good in terms of both, the closeness of the empirical size to the nominal size and the high values taken by the power function.

2. Disaggregating time series: A simulation study of Chow and Lin's based models

Alejandro Rodriguez Caro, Santiago Rodriguez Feijoo, Delia Davila Quintana

Universidad de Las Palmas, Facultad de Empresariales, Campus de Tafira, Las Palmas de GC, Spain

Works from Palm and Nijman (1984), Nijman and Palm (1988), Weiss (1984) and others have shown that there is a gain in efficiency in the estimation of time disaggregated model's parameters than those estimates from aggregated models. Furthermore, Nijman and Palm (1985), Nijman and Palm (1990) and L₁tkepohl (1986) have shown that time disaggregated models have a much lower variance in their predictions.

Chan (1993) studied time disaggregation methods that only use the available information in the annual time series to disaggregate. However, the most commonly used methods are those which use additional information available in quarterly time series related with the annual one to be disaggregated. Into this group of methods, Chow and Lin (1971) developed the best linear unbiased estimator of the quarterly time series, but it has a problem when put into practice. Due to this problem, some authors have proposed different solutions, but, which one do we have to use?. This is the question we face in this paper giving some practical answer using a simulation study.

Results show not only that all these methods are more efficient than dividing the annual figure by four, but also, studied characteristics affect to the quality of the final disaggregated series.

Works from Palm and Nijman (1984).

3. Best subset selection of ARX-GARCH models

Cathy Chen, Mike So, Feng-Chi Liu

Feng-Chia University, Graduate Institute of Statistics and Actuarial Science, Taichung, Taiwan

We develop in this paper an efficient way to select the best subset autoregressive model with exogenous variables and GARCH errors. One main feature of our method is to select important autoregressive and exogenous variables, and at the same time estimate the unknown parameters. The proposed method uses the stochastic search idea. By adopting Markov chain Monte Carlo techniques, we can identify the best subset model from a large number of possible choices. Simulation experiment shows that the method is very effective. Misspecification in the mean equation can also be detected by our model selection method. In the application to the stock market data of seven countries, the lagged one US return is found to have strong impact on the other stock market returns.

Room E



Monday 24th June 2002 1640 - 1750

Time Series Analysis

Chair: Nigel Meade

1. Bootstrap techniques in semiparametric estimation methods for ARFIMA(p,d,q) models: a comparison study

Glaura C Franco, Valderio Anselmo Reisen

Dept of Statistics - UFMG, CxP 702, Belo Horizonte, Brazil

This work considers different bootstrap procedures for time series with long memory property, i.e., for ARFIMA models with d in (0.0,0.5). One approach proposed here consists of a local bootstrap method for time frequency. We also consider the bootstrapping in the residuals of the frequency-domain regression equation to estimate the fractional parameter d. Through Monte Carlo simulation, these alternative bootstrap methods are compared with the well known parametric and nonparametric bootstrap techniques for time series models. An application in the BOVESPA Index series is performed, and bootstrap confidence intervals for the forecasts are provided.

2. Segmentation of the Times Series for an Optimal Extrapolation

Ciresica Jalobeanu

Technical University of Cluj-Napoca, 15 C. Daicoviciu Str, Cluj-Napoca, Romania

Time series extrapolation is studied using a syntactic method. A segmented time series is codified with a finite alphabet. The resulting symbolic time series depends essentially by the initial segmentation. The aim of our research was a criterion to find all acceptable segmentation. We proposed an operator which select the local extremes depending on a suitable threshold. Hence a sequence of different segmentations, depending on the thresholds was evidenced. Corresponding to the sequence of segmentations, a sequence of symbolic time series is attached. The comparison of the symbolic time series using a measure of likelihood with the initial time series permit to find a best segmentation. Sufficient condition for extrapolation of a symbolic time series have been studied. The best segmentation offer a criterion for an optimal extrapolation of the initial time series.



3. An asymptotic MLE approach to Modelling Multiple Frequency GARMA models

Aaron Smallwood, Paul Beaumont

729 Elm Avenue, Hester Hall Room 313, Norman, USA

We investigate the properties of the multiple frequency GARMA model. The multiple frequency GARMA model generalizes other existing long memory time series models such as ARFIMA and GARMA models in at least two ways. First, it allows a process to have quite diverse autocovariance structures. In particular, and unlike existing models, the multiple frequency GARMA model allows a process to have autocorrelation functions that decay at a non-monotonic rate that can be asymmetric to zero. Secondly, the multiple frequency GARMA model allows for more than one source of long memory as evidenced by multiple singularities in the spectral density function of these processes. After discussing the time series characteristics of the model, we propose the constrained sum of squares (CSS) estimator, and calculate the asymptotic distribution of the parameters of this estimator. Several applications of the model are considered including Wolfer's sunspot data. We show through simulation exercises that the estimator is robust.

4. Forecasting sectoral employment: an error correction-Bayesian vector autoregression approach

Gerhard Streicher, Raimund Kurzmann

Joanneum Research GmbH, Wiedner Hauptstr. 76, Vienna, Austria

In forecasting sectoral employment, information from input output tables has been used to improve forecast performance by explicitly taking into account intersectoral linkages. Specifically, in a Bayesian Vector Autoregression framework, I-O information has been used for specifying prior variances and prior means, respectively.

This paper pursues a somewhat different approach by incorporating an error correction mechanism in a (Baysian) VAR. The error correction term is derived not from a Vector Error Correction model but from an I-O model which is specified in terms of employment. The I-O model itself is set up on the basis of the 1995 input output table of Austria along with sectorally disaggregated employment data provided by the Social Security agency. Results from this I-O model are incorporated as an error correction mechanism into otherwise standard VAR and BVAR models.

The first part of the paper presents the derivation of the I-O model. The second part presents estimation results for the EC-BVAR model and gives an assessment of its relative merits by means of a comparison with the performance of single-equation ARIMA and standard VAR and BVAR models.



Monday 24th June 2002 1010 - 1120

Financial Forecasting

Chair: Bernard Morzuch

1. Change-point detection based decision rules in finance - a comparison of different approaches

David Bock

Goteburg University, Dept of Statistics, Goteborg, Sweden

Active investors must instantly face the situation of making decisions of whether to make some type of financial transaction at current time or postpone it until later. By using a rule that timely decides whether to make a transaction, investors might increase returns and hedge risk. Decisions are based on informative indicators. By using a method that is prospectively monitoring the movements of an indicator, early signals about what decision to make can be obtained. Some decision rules are rather ad hoc and in other cases they are developed from certain optimality criteria. Some decision rules use change-point detection methods. Common to the decision rules is the prospective approach with sequential decisions. The purpose of this paper is to investigate the inferential differences and similarities between statistical surveillance (see e.g. FrisÈn and de MarÈ (1991)) and some of the proposed decision rules. Here represented by the filter rule (see e.g. Lam and Yam (1997)), optimal stopping rules (Shiryaev (1978)) and decision rules based on hidden Markov models (Marsh (2000)). Aspects that are included in the comparison are different optimality criteria and ways of evaluating decision rules.

2. Evaluation of Management Disclosures on Expected Cash Flows for Fifty NYSE and NASDAQ Companies

Jay Forsyth

Central Washington University, Ellensburg, Washington, USA

The U.S. Securities and Exchange Commission (SEC) requires management to review and analyse corporate liquidity for their entity in the "Management's Discussion and Analysis" (MD&A)section of the annual registration statement (10-K). Specifically, any known trends or events that are expected to adversely affect future cash flows are required to be disclosed. The key issue for the corporate outsider (regulator, creditor, or investor) is how to evaluate management's stated verbal or quantitative expectations on future cash resources. This research project focuses on current disclosure practices for fifty firms selected from both the New York and Nasdaq stock exchanges. Each firm is then evaluated on the information content of the MD&A disclosure and its usefulness in making an independent verification of management statements.



Monday 24th June 2002		Room F
1010 - 1120	Financial Forecasting	

3. Bayesian analysis of multivariate futures in commodity markets

Viridiana Lourdes, Mike West, James E Smith

Rio Hondo #1, Col. Tizapan Progreso, Mexico City, Mexico

The stochastic behaviour of commodity prices plays a central role in Modelling approaches to the evaluation of commodity-related securities.

We develop models for commodity prices by exploiting the common latent structure of multiple time series of prices of futures contracts, based on traditional economic theories about the short-term and long-term behaviour of spot prices and the relationship with futures contracts. We build on previous work of E. Schwartz and J. Smith (1998) in terms of basic model forms, and explore developments and analyses of oil future series. This work involves a new class of Bayesian dynamic multivariate time series models for analysing the latent structure of series of futures contract prices with different maturities. This class of models is based on two latent factor processes: a notional equilibrium price level, and a process representing short-term deviations from equilibrium levels. The idea is that movements in prices for long-maturity futures contracts provides information about the equilibrium price level and differences between the prices for the short and long term contracts provides information about short-term variations in prices.

The structure of the model includes novel ideas on singular observational variance matrices that allow for a general analysis regarding uncertainty about the rank of such matrices. A major component of this project involves the development of customized MCMC simulation algorithms for model fitting and forecasting. Extensions that involve stochastic volatility components for latent processes are mentioned, and we study the application of the models and approaches in analyses of weekly crude oil futures prices.



Monday 24th June 20021150 - 1300Financial Forecasting

Chair: Bernard Morzuch

1. The importance of within-sample misspecification tests when constructing prediction intervals

Bernard J Morzuch, P. Geoffery Allen

University of Massachusetts, Dept of Resoure Economics, Stockbridge Hall, Amherst, USA

The literature offers suggestions for ways to improve the calibration of post-sample prediction intervals. It is quite surprising that emphasis on within-sample misspecification tests as a first step toward fostering calibration improvement has received so little attention. Several years ago the present authors used the M-1 competition data to explore this issue. When using a given technique on within-sample data, we paid careful attention to testing the stationarity of each series prior to estimation. If a series failed one or more misspecification tests, we made the appropriate correction(s). Upon correcting, we proceeded with estimation and post-sample predictions. We analyzed the distribution of post-sample forecast errors over all series for which we developed forecasting models. We did this for one- through multiple-steps ahead. We showed remarkable calibration improvement for the simplest of models. We now expand the approach using the M-3 competition data. We provide several rules for guidance when constructing prediction intervals.

2. An approach to combine heterocedastic volatility forecasts about IBEX-35 options in the Spanish market of derivatives

Carlos Mate, Alejandro Oliva

Universidad Pontificia Comillas, c/ Alberto Aguilera 23, Madrid, Spain

Nowadays, one of the most relevant elements for making decisions in stock markets is the volatility of trading assets; hence handling accurate forecasts is very significant. This paper focuses on forecasting this critical variable in IBEX-35 options at the Spanish market of derivatives, covering a period from 1999. We will show as much information as possible from the temporal structure concerning the underlying index time series, using some heterocedastic forecasting models. Finally, a mechanism of combining will be considered and the improvement of error measures studied. As a result, with the knowledge of conditional volatility, we will arrange a method to analyse the expectations that investors have with regard to that 35 outstanding Spanish companies.

3. Switching Regime Models: applications to trading rules

Pedro Valls Pereira, Nuno Almeida

Ibmec Business School, Rua Maestro Cardim 1170, San Paulo, Brazil

The paper uses switching in mean and in variance models to analyze financial time series. These models are compared with a model without regime switch. Also trading rules based in the probablity of staying in low volatility regimes are implemented and the results shows that for the Bovespa and Nasdaq indexes the switching regime perform better than the buy and hold strategy. We used data after the Real Stabilization Plan, ie from July 1994 up to July 2000.

Room F



Monday 24th June 2002 1500 - 1610

Electricity Forecasting

Room F

Chair: Reinaldo Castro Souza

1. Comparision of several methods of long-term electricity consumption models

Noelle Ameijenda, Damien Fay

Eirgrid, Fitzwilliam Street, Dublin, Ireland

Predictions for the long-term demand in electricity consumption are extremely important for the electricity industry. These forecasts signal the need for investment in the building of new generation stations and the reinforcement and/or extension of the supporting transmission network. The forecasting of electricity demand in the Republic of Ireland over the next 15 years is investigated here.

This forecasting is made difficult by the shortage of contiguous and consistent data. Only 21 years of consistent data for Total Final Consumption of electricity (TFC) was available from the Electricity Supply Board of Ireland. Input selection was carried out on the following economic indicators:

- Gross Domestic Output (GDP),
- Personal consumption and
- Average unit price of electricity.
- A forecast for these parameters for 15 years into the future is available.

Even with a model that describes well the conditions during the test period, there is the possibility that conditions will change over the next 15 years that are not allowed for in the model of the last 21 years. For this reason a cautious approach is taken where different scenarios of high and low GDP growth are taken into account, and the electricity forecasts are presented as a band of possibilities.

In the effort to find a robust and accurate model, a number of linear and non-linear techniques are compared which forecast the TFC out to 2015. Specifically, the models examined are:

- · Regression using logarithmically transformed inputs,
- Multiple linear regression,
- Extended Kalman filter and
- Recursive Neural Network.

Each of these models is optimised, their performance is evaluated and results are presented.

Room F



Monday 24th June 2002

Monday 24th June 2002 1500 - 1610

Electricity Forecasting

2. Forecasting reactive power series in electrical systems

Eliane da Silva Christo, Elizabeth Cardoso Bezerra, Reinaldo Castro Souza, Antonio Luiz Bergamo do Bonfim

Catholic University of Rio de Janeiro (PUC-Rio), Rua Marques de Sao Vicente 225, Rio de Janeiro, Brazil

The need for good services offered to clients of electrical power systems are becoming important targets for those involved in the supply market. Interruptions on energy supply can bring a lot of social and economics consequences. In operational terms, safe is usually measured by the capacity of an electrical energy system to ensure non-interceptive energy supply. This condition is requested even in situations of unexpected events in the system, such as sudden disturbances in demand, transmission line and generation. Thus, forecasting load is an important tool to guarantee such conditions. Heavy load in transmission lines results in more reactive consumption. It increases the necessity of well-compensated system that provides a bigger margin of transmitted active power. However, until nowadays studies in this area were elaborated only for active load forecasting. The aim of this work is, therefore, to elaborate a tool to focus on forecasting reactive power. A new short-term forecasting model for hourly reactive loads is developed and compared to a backpropagation artificial neural network approach. The model is applied to real Brazilian data and the results are discussed.

3. Price modelling with the new electricity trading arrangements of England and Wales

Nektaria Karakatsani, Derek Bunn

London Business School, Dept of Decision Sciences, Regent's Park, London, UK

This paper proposes a structural econometric approach for modelling prices and volatility in wholesale electricity markets. Conventional models tend to ignore the physical attributes of the commodity and disregard significant factors influencing prices. A classification of these factors is introduced and non-strategic variables relevant for the UK market (NETA) are included in the analysis. After detaching prices from their structural component, emphasis is placed on volatility models. The analyses reveal that price and volatility dynamics can be severely obscured if the structural component of prices is ignored.



Chair: Reinalado Souza

1. Brazilian Electricity market and price forecasting

Lucio Medeiros, Derek Bunn, Reinaldo Castro Souza London Business School, Regent's Park, Sussex Place, London, UK

In some countries, prices in the electricity spot markets are determined in a highly administered manner, using specific algorithms, in order to preserve the benefits of centralist, economic power dispatch. This does not necessarily make price forecasting any easier. In Brazil, a well-defined computer program based on stochastic optimization determines the Short Run Marginal Cost (SRMC) and the Wholesale Energy Market price is fixed each month on this SRMC value. As the SRMC is only one of the outputs, and due to the huge number of the program inputs (e.g., supply, transmission constraints and demand of each Brazilian sub-market - North, Northeast, South, and Southeast), it is a time consuming program, making impracticable any kind of extensive price risk analysis, even if market participants have access to it. In this paper, we investigate neural networks and neuro-fuzzy models to forecast these SRMCs using several variables such as river inflows, storage capacity, demand and supply.

2. A short-term load forecasting model using neural network and fuzzy logic

Reinaldo Castro Souza, Flavia C Serrao, Evandro Luiz Mendes, Plutarcho M Lourenco DEE, PUC-RIO, Rua Marques Sao Vincente 225, Gavea, Rio de Janeiro, Brazil

In the past years, many load forecasting procedures have been put forward and nowadays many other are still being proposed, due to the economic and technical importance of the load. This paper presents a short-term load forecasting procedure mixing computational intelligent(I) techniques. It creates an automatic classification procedure to establish the various standard load profiles without the need of prior information on the various cyclical/seasonal components present in these sort of data and processes climatic variables in a linguistic way.

The final model incudes both, a classifier scheme and a predictive shceme. The classifier is implements via an artificial neural network using a non-supervised learning procedure know as 'Kohonen self-organizing features map' (SOM). Concerning the predictive scheme, a fuzzy logic procedure uses climatic variables and their predictor to choose the appropriate profiles created by SOM and then combines them to produce the desired forecast. It also provides an estimate of the confidence intervals for the forecastings based on the load values of the days belonging to the profiles selected. Recent data load are easily introduced in the classifier allowing adaptation of the profiles and therefore that the lst trend of the series be considered.

The model is applied to two utilities in Brazil (one in Central and another in Southeast region) using hourly observations collected during two calendar years and the results obtained, in terms of mean absolute percentage error (MAPE) through the period analyzed, are presented.

The model implementation is simple and matches two different utilities easily. A friendly man-machine interface is being implemented having visualization and editing functions, which will make possible its immediate application.



Monday 24th June 2002

Monday 24th June 2002 1640 - 1750

Electricity Forecasting

3. Using wavelet-based forecasts of spot electricity prices within a risk management context

Max Stevenson, Maurice Peat

University of Technology Sydney, School of Finance and Economics, Sydney, Australia

By applying wavelet analysis, we decompose both an electricity spot price and a demand for electricity series at different time locations and levels of resolution in order to differentiate between what is signal and noise. The filtered series, reconstructed from the more fundamental levels of frequency resolution as well as cleansed of leakage from high frequency mean reverting price spikes, are used to forecast the spot price. For this purpose, we use a model from the threshold autoregressive (TAR) class that appears to adequately capture the mean and variance components of the original data.

Using one-step-ahead forecasts of the spot price, we calculate the potential losses incurred by holding a portfolio of one unit (MWh) of electricity over a time horizon of half an hour. We first fit a theoretical probability distribution to a series of historical spot prices. The distribution of the potential losses in the next period is derived by subtracting the one-step-ahead forecast for that period from all values of a simulated distribution of the spot price. From this distribution, we estimate the maximum value of the loss that cannot be exceeded for more than a given fraction of all prices. This maximum value is a measure of downside risk of holding the portfolio for the next period, and also serves as the Value at Risk (VaR) for a given probability (Tolerance Level) of losses being greater than the VaR. We repeat this process for a forecast horizon of approximately one month.

4. Short -term electricity demand forecasting using double seasonal exponential smoothing

James W Taylor

University of Oxford, Siad Business School, Park End Street, Oxford, UK

This paper considers univariate online electricity demand forecasting for lead times from a half-hour-ahead to a day-ahead. A time series of demand recorded at half-hourly intervals contains more than one seasonal pattern. A within-day seasonal cycle is apparent from the similarity of the demand profile from one day to the next, and a within-week seasonal cycle is evident when one compares the demand on the corresponding day of adjacent weeks. There is strong appeal in using a forecasting method that is able to capture both seasonalities. The multiplicative seasonal ARIMA model has been adapted for this purpose. In this paper, we adapt the Holt-Winters exponential smoothing formulation so that it can accommodate two seasonalities. We correct for residual autocorrelation using a simple autoregressive model. The forecasts produced by the new double seasonal Holt-Winters method outperform those from traditional Holt-Winters and from a well-specified multiplicative double seasonal ARIMA model.

Room F



Monday 24th June 2002 1010 - 1120

Crime Forecasting

Room G

Chair: Wilpen Gorr

1. Crime Hot spot prediction using data clustering and rule abduction

Jonathan Corcoran, Ian Wilson, Andrew Ware

University of Glamorgan, School of Computing, Treforest, Pontypridd, UK

Crime rates differ between types of urban district, and these disparities are best explained by the variation in use of urban sites by differing populations. A database of violent incidents is rich in spatial information and studies have, to date, provided a statistical analysis of the variables within this data. However, a much richer survey can be undertaken by linking this database with other spatial databases, such as the Census of Population, weather and police databases. Coupling Geographical Information Systems (GIS) with Artificial Neural Networks (ANN) offers a means of uncovering hidden relationships and trends within these disparate databases. This paper documents the first stage in the development of such a system, designed to facilitate the prediction of crime hot spots. For this stage, a series of Kohonen Self-Organising Maps (KSOM) is used to cluster the data in a way that allows common features to be extracted.

2. A model for crime seasonality within cities using land use and demographic variables

Wilpen Gorr, Jacqueline Cohen, Christopher Durso

Carnegie Mellon University, Heinz School, 4800 Forbes Avenue, Pittsburgh, USA

Leading theories on crime suggest that crime seasonality should vary across different land uses (e.g., commercial versus residential) and populations (e.g., low versus high income). Past empirical work on crime seasonality, however, has been limited largely to studies at the city or even larger levels, and very little has been done at the sub-city level. Our research is based on monthly crime data at a fine-grained, sub-city level; namely, uniform grid cells 4,000 feet on a side. We collected land use and demographic variables and interacted them with seasonal indicator variables in regression models of violent and property crimes for two medium-sized cities. We find evidence of significant spatial variation in crime seasonality. Our model yields multiplicative seasonal estimates which can be used to deseasonalize crime time series data in localized crime forecasting models.



Room G

Monday 24th June 2002 1010 - 1120

Crime Forecasting

3. A new quantitative theory of offenders and their convictions: its application to forecasting the English and Welsh prison population

Peter Grove

Home Office, Reseach Development Statistics Directorate, London, UK

The talk will discuss a new quantitative theory of offenders and their convictions. The theory has been developed using the unique database of the English Offenders Index. The Offenders Index contains the criminal careers of all those convicted of serious offences, born after 1952. The new theory in a natural way both, accurately reproduces the behaviour seen in the Index which can be explained by existing criminological theory, and, more importantly, also that which cannot. The theory allows the number of active offenders in the community and the number of convictions per year to be calculated purely from demographic information. It is demonstrated that when convolved with sentencing practice the theory 'predicts' the actual English and Welsh prison population from 1970 onwards to within 2%. It now forms the basis of the Long Term (2 to 10 years ahead) Methodology used by the UK Home Office to forecast the prison population. The methodology is being extended to forecast probation service workloads.

The theory also allows the effects of various interventions to reduce crime to be calculated. It shows that one should put most emphasis on catching/convicting offenders and where possible behavioural programmes to reduce recidivism. Longer prison sentences have no greater specific deterrent effect and it is shown that there is no steady state incapacitation effect on crime, except for the longest prison sentences. The talk will emphasize that while forecasting crime is difficult (partly because it is difficult to measure) if one believes the theory, forecasting offenders is relatively straightforward. The problem of forecasting crime is thus reduced to forecasting the criminal behaviour of offenders.



Monday 24th June 2002 1150 - 1300

Commodity Markets

Room G

Chair: Ben Vogelvang

1. Exchange rates and natural rubber prices, the effect of the Asian crisis

Ben Vogelvang, Kees Burger, Hidde Smit

Vrije Universiteit, Dept of Econometrics, De Boelelaan 1105, Amsterdam, The Netherlands

The Asian crisis has provided strong evidence on how exchange rates affect international prices. The more recent depreciation of the Euro currencies has also had substantial effects on the US-dollar prices in the world market. In this paper we investigate these effects and focus on a commodity strongly represented in the Asian region: natural rubber (NR). At first a description of developments on the world rubber market has been given, which is followed by some simple theoretical considerations concerning the relationship of exchange rates and world market commodity prices. In the empirical analysis the long-run and the short-run influence on the price of NR are first analyzed along the classical Engle-Granger procedure and with the more efficient dynamic generalized least squares (DGLS) estimator introduced by Stock and Watson. Both the long run and the short run show influences of production of NR, consumption of rubber and prices of other commodities. However, better results in explaining and predicting the NR price, are obtained with VAR and VEC models for the entire sample and for sub samples. Confirmation is found for the theoretical model that predicts the effects of both a weighted real exchange rate of important importing countries with regard to the dollar, and a weighted real exchange rate of the NR producing countries. The analysis also shows that traders have changed their behaviour in connection with the Asian crisis, whereas lagged exchange rates were a sufficient source of information before the crisis, contemporaneous effects now dominate.

2. Modelling the influence of supply and demand fundamentals on international cocoa prices and its use in forecasting and policy analysis

Alan Brewer

ICCO, 22 Berners Street, London, UK

The International Cocoa Year runs from October through to the following September with the bulk of cocoa production in the majority of major cocoa-producing countries falling in the main crop period from October through to the following March. By using crop surveying techniques, commonly known as 'pod-counting', cocoa market analysts start forecasting the following season's production and the expected balance between world cocoa supply and demand during the summer preceding the start of the new season. By analysing the behaviour of monthly average cocoa prices, as measured by the International Cocoa Organization (ICCO) daily price which is an average of quoted prices on the London and New York futures markets, the temporal pattern of assimilation of the balance between world supply and demand into international cocoa prices can be observed. Accounting for this process of price formation from market fundamentals, one can also observe the nature of long-term trends in cocoa prices and monthly short-term auto-regressive structures. Briefly describing the means by which global cocoa production and consumption can be modelled and used for medium to long-term forecasting, the use of the price model as a component of an overall model of the world cocoa economy is described with illustrations of the results of such exercises. In addition, the use of the model for policy analysis, including the effects of supply-management (such as buffer stock operations), production-management policies, and the provision of derivative contracts to cocoa producers, will be discussed and described.



Monday 24th June 2002

Monday 24th June 2002 1150 - 1300

Commodity Markets

3. Pepper Cultivation in India: a crop forecasting model of pepper production

Wouter Zant, B Sree Kumar, P Jagadeesan, N E Cheriankunju

Vrije Universiteit, De Boelelaan 1105, Amsterdam, The Netherlands

The objective of this study is to construct a model that is capable of forecasting pepper harvest in the south of India at the end of October, around one month before the harvesting period starts. Pepper harvests are assumed to be determined by weather, material & labour inputs and (real) off-farm prices. An attempt is made to relate these factors to the size of pepper production.

The backbone of the data used to estimate the crop forecasting model are data obtained from a monthly survey among 250 pepper farmers which aims at establishing quantitative information on e.g. the application of material inputs in pepper cultivation (organic manure, chemical fertiliser, pesticides and fungicides, etc.) and undertaking different types of maintenance activities in the pepper garden (mulching, pruning, etc.), both before and after harvest. This monthly survey is supplemented with an annual survey among the same 250 farmers in which factors are recorded that may be expected to influence the cultivation of pepper, but which do not, or hardly, fluctuate within the season (e.g. soil quality, elevation, etc.). Both surveys cover two full seasons, namely 1998-99 and 1999-2000 and these two seasons are the basis for the empirical work. Finally, the data on pepper cultivation are completed with district-wise information on climatic factors, in particular data on monthly rainfall.

Important features of the crop-forecasting model are, in the first place, the emphasis on care in cultivation to explain eventual crop yield. In the second place the attention placed on (the timing of) the inputs in the crop year. And, in the third place, the use of the number of vines and yield per vine as a basis for the model, as opposed to area and yield per unit of area, which is common in crop forecasting models.



Technology Forecasting

Room G

Chair: Alan Porter

1. Technology Forecasting and Social Values: A value mapping approach

Barry Bozeman

School of Public Policy, D M Smith Building, Atlanta, Georgia, USA

Technology forecasting rarely has a normative aspect and, indeed, an explicit normative approach even seems inimical to technological forecasting, a possible threat to validity. Take issue with the fact/value dichotomy as it pertains to forecasting, this paper discusses some of the practical, methodological and epistemological problems of taking social values as a guide to an outcomes-oriented approach to technological forecasting. Possible approaches are identified and used in connection with a variety of technologically-intensive public policy domains, including an extended case from National Institute of Health long-range planning ("Healthy People 2010").

2. Strengthening both the European and the regional dimension of TA/TF - a promising pathway for competitiveness and quality of life in globalised, knowledge-based economies?

Guenter Clar

European Commission, SDME 11/35, Brussels, Belgium

Lisbon Strategy', New European Governance, Developing a European Research Area - these are general developments in Europe with relevance for understanding and shaping economic, political, technological, and social transformations associated with the emerging issue of knowledge-based, globally connected markets. Against this background, the presentation analyses activities initiated and supported by the Foresight unit of the European Commission's DG Research, that aim at strengthening both the European and the regional (subnational) dimension of TA/TF.

Based on the outcomes of two high level expert groups, which the author has set up (reports due in March and May 2002), two complementary thrusts will be detailed to move further ahead towards developing Foresight, and an enlarged and dynamic institutional landscape: to develop a coherent supportive framework at the European level to ensure systematic use and optimum benefit of Foresight, and to identify and mobilise all relevant actors, to promote EU wide networking and institutional development.

Finally, the TA/TF supporting activities of the EU via the next Research Framework Programme (FP6, 2002-2006) are outlined. To incentivate respective actions, DG Research has developed a systems approach to support TA/TF throughout the different parts of FP6:

- as integrated parts of all thematic priorities
- in "supporting policies and anticipating scientific and technological needs"
- in "Structuring the European Research Area", where science-society questions are addressed
- in "Strengthening the Foundations of ERA" focussing on co-ordination of research activities, and the coherent development of research and innovation policies

Thus, the presentation has been designed not only to promote the debate on cross-cutting issues, but also as an invitation to the participants of ISF 2002 to join and play an active part in these activities, as the EU's new Research Framework Programme will be open to non-EU-participants as none of its predecessors.



Monday 24th June 2002 1500 - 1610

Technology Forecasting

3. Recent developments in technological forecasting

Joseph P Martino

905 South Main Ave, Sidney, USA

During the past decade there have been some significant developments in technological forecasting methodology. This paper describes developments in Environmental Scanning, Models, Scenarios, Delphi, Probabilistic Forecasts, and Technology Measurement. Some of these developments are refinements of earlier methodology, such as using computerized data mining for Environmental Scanning, which extends the power of earlier methods. Other methodology developments, such as the use of Cellular Automata and Object-Oriented Simulation, represent new approaches to basic forecasting methods. Probabilistic Forecasts were developed only within the past decade, but now appear ready for practical use. Other developments include the wide use of some methods, such as the massive national Delphi studies carried out in Japan, Korea, Germany and India. Other new developments include empirical tests of various trend extrapolation methods, to assist the forecaster in selecting the appropriate trend model for a specific case. Each of these developments is discussed in detail.

Room G



Forecasting Methods

Room H

Chair: Michelle Hibon

1. Combination of forecasts of the M3 - competition: further results

Michelle Hibon

INSEAD, Boulevard de Constance, Fontainebleau, France

Aggregating information by combining forecasts from two or more forecasting methods is a successful alternative to using just a single methods. In the M3-competition, the method Comb S-H-D is a simple average of the forecasts of the methods Single, Holt and Dampen-Trend exponential smoothing. Such combination provided not only excellent results that were more accurate than each of the three individual methods themselves but also proved to be on the most accurate ways of forecasting. In a previous paper we explored various alternative ways of combining forecasts methods by varying the number of methods being combined consisting of simple averages of forecasts from 14 individual methods of the M3-competition. The results were being compared with those obtained from similar combining schemes utilized with the data of the M3-competition.

In this paper we are considering the combination of 5 forecasts from the 14 methods of the M3-competition. We are evaluating a practical method to select the best choice among different possible combinations. Furthermore, we are investigating if the different methods selected in the coombination are more or less frequently used than others. And we are comparing the results with the ones given by the combination of forecasts of methods randomly selected.

2. Invertibility conditions for exponential smoothing

Muhammad Akram, Rob J Hyndman

Monash University, Dept of Econometrics & Business Statistics, Clayton, Melbourne, Australia

In this article we discuss the invertibility conditions for some state space models, including the models that underly simple exponential smoothing, Holt's linear method, Holt-Winter's additive method and damped trend versions of Holt's and Holt-Winters' methods. The parameter space for which the model is invertible is compared to the usual parameter regions. We find that the usual parameter restrictions (requiring all smoothing parameters to lie between 0 and 1) do not always lead to invertible models. Conversely, some invertible models have parameters which lie outside the usual region.

3. Prediction intervals for exponential smoothing state space models

Anne Koehler, Rob J Hyndman, J Keith Ord, Ralph D Snyder

Dept of Decision Sciences and Management Information Systems, Oxford, USA

The main objective of this paper is to provide analytical expressions for forecast variances that can be used in prediction intervals for the exponential smoothing methods. These expressions are based on state space models with a single source of error that underlie the exponential smoothing methods. Three general classes of the state space models are presented. The first class is the standard linear state space model with homoscedastic errors, the second retains the linear structure but incorporates a dynamic form of heteroscedasticity, and the third allows for nonlinear structure in the observation equation as well as heteroscedasticity. Exact matrix formulas for the forecast variances are found for each of these three classes of models. These formulas are specialized to non-matrix formulas for fifteen state space models that underlie nine exponential smoothing method, there is an equivalent state space with the same variance expression. We also discuss relationships between these new ideas and previous suggestions for finding forecast variances and previous suggestions for finding methods.

Room H



Monday 24th June 2002

Monday 24th June 2002 1500 - 1620

Forecasting Practice

Chair: Nigel Meade

1. Forecasting Call frequency at a financial services call centre

Nigel Meade, A. Antipov

Imperial College Management School, Exhibition Road, London, UK

A forecasting model is developed for the number of daily applications for loans at a financial services telephone call centre. The purpose of the forecasts and the associated prediction intervals is to provide effective staffing policies within the call centre. The model building process is constrained by the availability of only two years seven months of data. The distinctive feature fo the data is that demand is driven in the main by advertising. The analysis given focuses on applications stimulated by press advertising. Unlike previous analysis of broadly similar data, where ARIMA models are used, a model with a dynamic level, multiplicative calendar effect and a multiplicative advertising response is developed and shown to be effective.

2. Modelling and forecasting call frequency within the day at a financial services call centre

Alexander Antipov, Nigel Meade

Imperial College Management School, Exhibition Road, London, UK

The frequency of calls to a financial services call centre is mainly driven by marketing initiatives. In a separate paper the problem of forecasting the number of calls per day is dealt with. We are concerned here with problem of predicting how the calls will be spread through the day. This is important information for call centre managers concerned with staff scheduling and the timetabling of shifts. Thus, the purpose of the forecasts is to provide effective staffing policies within the call centre on a daily basis. Data are available on half-hourly for thirty months. The modelling framework is a daily profile that apportions the total daily call into half-hour slots. This within-day profile is modelled in two ways using Fourier and wavelet analyses. Other issues examined are the differing profiles between days of the week and the effect of seasonality. The different approaches are compared using out of sample forecasting performance from one to thirty days ahead.



3. Annually recurring fluctuations in call centre demand

John Davies

Pattishall, Towcester, UK

This paper presents some unexpected results from analysis of short periodicity time series data over timescales of several years.

The author worked with a group from CRES/IENS, Lancaster University, on the development of a forecasting tool to predict hourly telephone call demand at the Barclaycard call centres.

Part of the functionality is off line data analysis of the time series. Use of this to examine several years of data revealed an expected annual variation in underlying workload, but in addition, variations of shorter timescales not linked to the normal weekly workload cycle. These are between three to five weeks in length, and were found to recur annually over periods of up to five years.

This has enabled forecasts of hourly call demand to be extended from the anticipated three-week horizon to as far as ten to twelve weeks with acceptable accuracy.

4. Large-scale Automatic Forecasting: Millions of Forecasts

Michael J Leonard

SAS Institute Inc, SAS Campus Drive, Cary, USA

Web sites and transactional databases collect large amounts of time-stamped data. Businesses often want to make future predictions (forecasts) based on numerous sets of time-stamped data (sets of transactions). There are many time series analysis techniques related to forecasting, and an experienced analyst can effectively use these techniques to analyze, model, and forecast time series data. However, the number of time series to forecast may be enormous or the forecasts may need to be updated frequently, making human interaction impractical. Additionally, these time series analysis techniques require that the data be recorded on fixed time intervals. This paper proposes the following technique for automatically forecasting sets of transactions. For each set of transactions recorded in the database: The time-stamped data are accumulated to form a time series. The time series is diagnosed to choose an appropriate set of candidate forecasting models. Each of the diagnosed candidate models are fitted (trained) to the time series data with the most recent data excluded (holdout sample or test data). Based on a model selection criterion, the best performing candidate model within the holdout sample is selected to forecast the time series. This automatic forecasting technique can efficiently generate millions of forecasts related to time-stamped data. This paper demonstrates this technique using SAS(r) High-Performance Forecasting Software.


Monday 24th June 2002 1010 - 1120

Technology Forecasting

Chair: Alan Porter

1. Foresight: the recent Brazilian experiences

Dalci Maria dos Santos, Maria Cristina Soares Guimaraes, Cicera Henrique da Silva, Gilda Massari Coelho

Centro de Gestao e Estudos Estrategicos, SPO Area 5 Quadra 3, Bloco A, Brasilia DF, 70610-200, Brazil

Brazil lives a particularly promising moment regarding Science, Technology & Innovation -ST&I. In the last years, a set of governmental initiatives culminated in the assembly of two programmes of prospective studies, one lead by the Ministry of Science and Technology - MCT (Prospectar) and another one by the Ministry of Development, Industry and Trade -MDIC (Prospectiva). Moreover, the creation of sectorial funds in support to technological development - a new modality of funds from the private sector - represents the necessary supply of resources that will make possible the implementation of priority actions for ST&I projects and programmes.

This favourable environment is complemented by the accomplishment, in 2001, of the National Conference and the edition of the green book of ST&I, that establishes the policies guidelines for the sector and, also, by the creation of the Centre of Management and Strategical Studies - CGEE.

The main attribution of the CGEE is to think strategically - through foresighting, forecasting and evaluation - the Brazilian scientific and technological questions, involving the private sector, academy, government and the existing prospective programmes.

This work presents the current Brazilian scenario, focusing the two prospective initiatives in progress (Prospectar and Prospectiva) and its intra and inter-institutional relationships, the macro-study of ST&I (green book) and, also a specific vision of one of the sectorial funds, namely the one on Oil and Gas.

2. Modelling the dependence between the times to adoption of two technologies

Towhidul Islam, Nigel Meade

University of Northern British Columbia, Business Program, Prince George, British Columbia, Canada

The structure of the dependence between the times to adoption by a country of two related innovations, the fax and cellular telephone, is modelled in two stages. The first stage is the choice of density function for the time to adoption. The second stage is describing the dependence relation. For the first stage, a Weibull density function is used with its scale factor adapted to account for the economic and technological environments in different countries. Environmental data are collected from several sources. Copulas are used to model the dependence relation, three single parameter copulas are considered, those due to Farlie-Gumbel-Morgenstein (FGM), Frank and Placket. Their properties are described and a combined estimation of the copula and density function parameters carried out. The limitations of the FGM copula rule it out from further consideration. The other copulas coupled with the Weibull, using eight environmental variables, are shown to provide valuable insights into the effects of environmental variables on adoption times. Given that a country has adopted one technology, the model of the dependence relation is used to provide the conditional density of the time to adoption of the other technology.

Room I



Monday 24th June 20021010 - 1120Technology Forecasting

3. Modelling the GAP of technology benefits: implementation vs realization

Mo Onsi

Syracuse, USA

In recent years, many companies championed the importance of technology development and technology implementation to gain competitive advantage. These technology investments were attributed as the reason for productivity improvement and profitability growth in the 90's. However, in the last two years, questions were raised as to why the expected benefits from technological investment did not reach the expected goals.

Room I

To address this issue, a questionnaire was developed and tested before sending it out to several companies that participated in the study. Personal interviews were also conducted with some key executives.

The purpose of this research is to empirically determine the factors that impact a firm's technology development and implementation, with an emphasis on manufacturing automation. Forecasting models of expected benefits from manufacturing technology are developed. The differences between the expected and actual benefits are analyzed to determine the factors that could explain such variances. Three models were used to identify the important factors that could explain such a gap. The results of the three models were consistent. The key factors explaining the differences between technology planning and technology realization were due to implementation-based factors.

The lesson learned is that failure to closely monitor the subsequent steps and issues of technology execution can contribute significantly to this gap, which has a time lag for detection and reporting.



Monday 24th June 2002

Monday 24th June 2002 1150 - 1300

Technology Forecasting

Chair: Alan Porter

1. Forecasting the critical mass of cellulars and fax machines

Seppo Pitkanen, Lauri Frank, Sanna Sundqvist, Kaisu Puumalainen Lappeenranta, Finland

Network effects play an important role in the diffusion of network-related innovations. The more users in a network already are, i.e. the bigger the installed base, the more attractive it is for a potential adopter to join the network. Alternatively, also negative network effects might arise as a network congests.

Network effects also create a so-called critical mass point in an innovations' diffusion process. In the early phase of the diffusion the network does not seem attractive to potential adopters: Because there are only few users, the network effect is not strong enough, i.e. does not create enough utility for a potential adopter to join the network. Only if critical mass is fulfilled, the network has enough users to be attractive to the rest of the users' and the diffusion is a success. Thus, it is very valuable to identify the critical mass in order to have an innovation with network effects diffused successfully.

The aim of this paper is to determine and forecast the timing and size of critical mass. Critical mass is defined as fulfilled when the acceleration of the diffusion process is at its maximum. In practice, this point is determined by calculating the second derivative of the diffusion path with respect to time.

The diffusion of cellular phones and fax machines in some 50 countries is modelled employing the Bass diffusion model. These functions' second derivatives' maximums yield the critical mass points, sizes and times. The sizes and points of time of critical masses are regressed with explanatory variables, reflecting characteristics of the countries. Thus, two regression models for estimating critical mass are created. The validity of these two regression models is tested as they are used for explaining the critical mass of those countries, where the Bass diffusion model did not succeed.

Room I



Monday 24th June 2002		Room I
1150 - 1300	Technology Forecasting	

2. Non-linear optimization and algebraic geometry applications in remote sensing technology forecasting

Anantha S Sundararajan

Purdue University, 1395 Mathematicall Sciences Building, West Lafayette, USA

Using Algebraic geometry we generate an algebraic surface as an optimal dominating and efficient region as opposed to merely obtaining curves as efficient frontier thereby increasing the set of efficient points significantly. This greatly improves the accuracy of forecasting methods and also makes it feasible to accommodate non-linear problems in the theory of forecasting.

In non-linear multi-objective optimisation problems, the constraints geometrically represent a hypersurface or many hypersurfaces given by several polynomials in more than one variable.

The simultaneous solutions of these polynomials represents an "algebraic variety" which is extensively studies in Algebraic geometry. This gives a wonderful relation of Algebraic geometry to optimisation theory ie via the relationship of solution set of polynomials (algebraic variety) to optimising functions with algebraic curves. We seek to use these ideas to forecasting methods in remote sensing technology.

Using Algebraic Geometry and Complex Analysis an algorithm is given to reduce noise from the enormously complex image data sets resulting in improved image processing and pattern recognition. To achieve this new mathematical modelling techniques were applied to Hyper-spectral Data Analysis and Signal Processing Problem for achieving certain controlled Optimisation Conditions to minimize noise. Using Algebraic geometry we generate an algebraic surface as an optimal dominating and efficient region as opposed to merely obtaining curves as efficient frontier thereby increasing the set of efficient points significantly. This translates to increased dimensionality for analysing non-linear data in signal processing.

As an application to remote sensing forecasting -the central problem is that of collecting image data in different bands, possible very high. The volume and complexity of the data that the satellite sends is enormous and so it becomes essential to mathematically understand and model such a system. This is crucial in minimizing noise during signal processing. Since the data is collected in very high bands and so this increased dimensionality of such hyper-spectral data greatly enhances the data information without much disturbance from the medium. We apply our geometric method to analyze how differently the data behaves in higher dimensions from our conventional three dimensions.

3. Entropy as a measure of technology diffusion

Robert J Watts

US Army Tank-automotive and Armaments Command, Attn: AMSTA-TR-N, Warren, MI 48397-5000, USA

Entropy represents a measure of disorder in a system. A field of research, as described by published technical papers, delineates a system, which can be depicted by cluster groupings of dominate (i.e., high frequency) terms and/or phrases used by individual researchers. Disorder within this field of research may be a result of technology diffusion. Entropy, therefore, may be an indicator of technology diffusion. Such a measure is of potentially great interest as an indicator of technological maturation & nearness to commercialization. However, research system entropy (i.e., disorder) may also reflect other factors, such as a lack of agreement of the research direction or of a common language between researchers in the field. These latter two characteristics depict an immature field of research, from which few expect immediate or near term economic benefits.

We explore how entropy for a particular field can be measured, then tracked over time. We demonstrate that a technologys' life cycle relates to entropy in an interpretable way. Furthermore, this indicator could be used to measure the emergence of splinter fields and applications. In this paper, research abstracts published over a ten-year period are segmented into two-year time periods. We determine cluster groupings for each time period using keywords from the abstract records. These are then assessed for their individual and composite entropy, exploring alternative measurements. Finally, we assess the value of research cluster groupings entropy for technology forecasting.

Room I



Monday 24th June 2002

Monday 24th June 2002 1500 - 1610

Forecasting Methods

Chair: John Haslett

1. Trend Forecasting: a model identification procedure

Natasha Atanackov, John Boylan

Buckinghamshire Business School, Gorelands Lane, Chalfont St Giles, UK

Forecasting-method selection is an important issue in both forecasting theory and practice. The answer to the question: "Which forecasting method is the 'best' for a given situation?" has remained under-researched. Some recent empirical findings suggest that a distinction between forecasting methods can be done using the time series features identification procedure. This paper develops a potential diagnostic tool for a method selection purposes based upon mathematical models of time series data. Moreover, Harrison's Serial Variation Curves (SVB) of the first differences of the data has been extended. The extended SVC diagnotic is an automatic procedure designed for making a choic between the following forecasting methods: simple exponential smoothing method. Holt's linear exponential smoothing and Gardner-McKenzie's damped-trend method. A simulation analysis has been conducted to test the viability of employing the SVC for making a distinction between trended and non-trended data. The results have been compared to the Box Jenkins methodology for ARIMA models and the Gardner-McKenzie's variance procedure. The results are analysed and the next phase of this research is discussed.

2. Forecasting Austrian HICP and its components using VAR and ARIMA models

Friedrich Fritzer, Gabriel Moser, Johann Scharler

Oesterreichische Nationalbank, Economic Analysis Division, Otto-Wagner-Platz 3, Vienna, Austria

The purpose of this paper is to evaluate the performance of VAR and ARIMA models to forecast Austrian HICP inflation. Additionally, we investigate whether disaggregate modelling of five subcomponents of inflation is superior to specifications of headline HICP inflation with monthly data. Our modelling procedure is to find adequate VAR and ARIMA specifications that minimise the 12 months out-of-sample forecasting error. The main findings are twofold. First, VAR models outperform the ARIMA models in terms of forecasting accuracy over the longer projection horizon (8 to 12 months ahead). Second, a disaggregated approach improves forecasting accuracy substantially for ARIMA models. In case of the VAR approach the superiority of modelling the five subcomponents instead of just considering headline HICP inflation is demonstrated only over the longer period (10 to 12 months ahead).

3. Uncertainty in numberical weather prediction

Adrian Raftery, Montserrat Fuentes, Tilmann Gneiting, Yulia Gel University of Washington, Dept of Statistics, Seattle, USA

We will briefly review the goals of a new Multidisciplinary University Research Project aimed at developing methods for assessing and communicating uncertainty in numerical weather prediction. Our goals are to develop methods for evaluating the uncertainty of mesoscale meteorological model predictions, and to create methods for the integration and visualization of multisource information derived from model output, observations and expert knowledge. We take several approaches to this, including one based on the recently developed Bayesian melding approach (Poole and Raftery, 2000, JASA). Direct application of Bayesian melding is not feasible in this problem because of the very high dimensionality, and we will outline an alternative based on generating ensembles of initializations from a posterior distribution of the initial state of the atmosphere. The project also aims to develop tools and methods for visualizing predictions of quantities of interest and the uncertainty about them by (i) choosing appropriate quantities of interest for display based on cognitive factors, and (ii) developing appropriate plots, maps, three-dimensional displays, and video displays for decision support.



Forecasting Methods

Room I

Chair: John Haslett

1. Exponentially weighted kernals in the prediction of irregular demand processes

Antonio J Rodrigues

University of Lisbon, DEIO-CIO, Faculdade de Ciencias, Lisbon, Portugal

Wherever the simple exponential smoothing method is appropriate, we may consider the possibility of heuristically estimating the probability density function around the point estimates through exponentially weighted gaussian kernel estimators. Then, only two hyperparameters have to be optimized: the forgetting factor and the bandwidth. This is particularly useful in decision-making applications, including inventory control or financial investing, where optimal decisions based on point forecasts must take into consideration that the cost function is asymmetrical, and possibly discontinuous, and simple risk estimates are insufficient. We produce some empirical evidence of the adequacy of this methodology from the study of simulated, as well as real, time series and cost functions. The approach can be generalized to more complex situations, as in the problem of predicting irregularly spaced and variable demand processes. It is reasonable to simultaneously estimate the date of the next occurrence of demand and its magnitude, as these two underlying variables can be correlated. In previous work, driven by a production planning applied project, we assessed the feasibility of using radial basis function networks for computing point forecasts for such bivariate processes. In the present study, we investigate adjustments required for the application of exponentially weighted kernels, either as alternative or complementary models to the previous ones.

2. A genetic algorithms approach to growth phase forecasting of wireless subscribers

Rajkumar Venkatesan, V Kumar

University of Connecticut, Dept of Marketing, School of Business, Storrs, Connecticut, USA

In order to effectively make forecasts in the telecommunications sector during the growth phase, we evaluate performance of an evolutionary technique: genetic algorithms (GAs), used in conjunction with the Bass model. During the growth phase of a product life cycle, managers want to predict (1) future sales, (2) the magnitude of sales during peak, and (3) when the industry would reach maturity. The Bass (1969) model is of particular interest here. Reliable estimation of parameters of diffusion models is possible, when sales data includes the peak sales also. Cellular phone adoption data from seven Western European Countries is used in this study to illustrate the benefits of using the new technique. The parameter estimates obtained from GAs exhibit good consistency comparable to NLS, OLS, and a naïve time series model when the entire sales history is considered. When censored datasets (data points available until the inflection point) are used, the proposed technique provides better predictions of future sales; peak sales time period, and peak sales magnitude as compared to currently available estimation techniques.

3. Forecasting the size of the teaching force in Israel using Stochastic Models

Albert Vexler, David Maagan

Central Bureau of Statistics, 66 Kanfey Nesharim, Jerusalem, Israel

Continuing concern of education policy makers over the adequacy of the prospective supply of teachers has stimulated efforts over the past years to develop tools to forecast the size of the teaching force. Projection models are often used to predict trends in the teacher labour market and estimate imbalances in supply and demand. Most of these models are based on times series analysis of aggregate data and require databases with reliable historical information about the teaching force. In Isreal, the lack of such data has led to a different approach. In this paper, we propose a forecasting procedure based on Markovian models developed at the teacher level. Logistic regression models estimate teacher retention/attrition and entry transitions. Teacher characteristics such as age, sex, religion, level of education, years in teaching profession and weekly teaching hours are used to predict transition probabilities. The teacher supply projections for year t+1 are then obtained by applying the estimated transition matrix to the stocks at time t. The validity of the stationarity and homogeneity assumptions is investigated using the bootstrap method. The performance of the models for different educational levels is illustrated using data from the Israeli education system for the years 1999-2000.



Details of Sessions Tuesday 25th June 2002

Tuesday 25th June 2002 1010 - 1120

Tourism Forecasting

Room A

Chair: Dominic Dillane

1. Long term forecasts for International tourism

Egon Smeral

Austrian Institute of Economic Research, Austria

Modifications of earlier versions of the world tourism forecasting models - make it possible to trace the effects of changes in income and prices emanating from each individual country considered in this model. At the theoretical level, this paper examines the assumptions underlying partial demand models and points out the implications of these assumptions in the context of models of international tourism. The new model WTTOUR-2001 is used to generate forecasts of tourism imports and exports for 25 countries for the period up to 2020. It allows a more realistic simulation of the impact of political events (ie, EU-Eastern Enlargement) and of changes in framework conditions.

2. Statistical testing in tourism forecasting model selection

Haiyan Song, Pano Louveris, Stephen F Witt

University of Surrey, School of Management, Guildford, UK

The ability of various econometric and univariate time series models to generate accurate forecasts of international tourism demand is evaluated. Accuracy is assessed in terms of error magnitude and also directional change error. Statistical testing for both forecasting bias and directional change forecasting performance is introduced. The empirical results show that for one-year-ahead forecasting the time varying parameter model performs consistently well. However, for two - and three - years - ahead forecasting the best model varies according to the forecasting error criterion under consideration. This highlights the importance (for longer - term forecasts) of selecting a forecasting method that is appropriate for the particular objective of the forecast user.

3. An application of PAR models for tourism forecasting

Paulo M M Rodrigues, Pedro M D C B Gouveia

University of Algarve, Faculty of Economics, Campus de Gambelas, Faro, Portugal

In this paper we extend existing literature on Tourism Forecasting by developing an application study of periodic models. The motivation for this type of approach results from the classification of the tourism series into three main seasons (peak, shoulder and off-peak) as is frequently done in the literature. This classification allows us to identify more parsimonious models when compared with periodic monthly models, and implying an excessive parameterisation. Several tourism series from Portugal's southernmost province, Algarve, (representative of an important and expanding industry catering largely to the European market) are analysed and the application of proposed models statistically validated. Furthermore, the forecast performance of these proposed models is compared with other models currently employed in the literature. It is shown that the models presented can have superior forecasting performance.



Tuesday 25th June 2002		Room A
1150 - 1300	Tourism Forecasting	

Chair: Noel O'Connor

1. A review of empirical studies about tourism demand in Portugal

Ana Cristina M Daniel

Instituto Politecnico da Guarda, Escola Superior de Tecnnologia e Gestao - gab 44, Guarda, Portugal

Today, tourism is one of Portugal's most important economic activities. In fact, the admission of this country in the European Union, was the most relevant factor of the increasing on it's importance as a tourism destination. The main emitting countries of tourists to Portugal are Spain, United Kingdom, Germany, France and Netherlands. At international level, the forecast tourism demand has been object of a considerable number of studies. With respect to Portugal, a review of literature about this specific subject revealed that few studies have been done by the institutions directly connected to the tourism area DirecÁ, o Geral do Turismo (DGT), Investimentos, ComÈrcio e Turismo de Portugal (ICEP), among others. However, in the last few years, the interest for this subject has been growing and some studies are being elaborated, either at the level analysis of the influence of some variables in tourism demand or at the level of application of forecasting methods (causal or non causal methods). The aim of this study is then to do a review of empirical research about what has been done in Portugal in these areas.

2. Walla Walla wineries and tourism

Pete Parcells

Whitman College, Dept of Economics, Maxey Hall, 345 Boyer, Walla Walla, Washington 99362, USA

This paper reports on research undertaken to analyze and forecast the local social, economic, and tourism impacts that are taking place in the Walla Walla Valley economy. These impacts have resulted from the decline of manufacturing, the establishment and growth of a wine region in the Walla Walla Valley, and the targeting of tourism as the new local growth industry.

Walla Walla, Washington is situated in the southeastern corner of Washington State in the United States of America. Historically, the area has been primarily a rural agricultural community. The local economy also consisted of a small number of manufacturing businesses, a sizeable government sector, and several institutions of higher learning. A recent decline in the local manufacturing sector has lead to the demise and departure of several of the key businesses in the area. Concerned local officials have promoted the establishment and growth of a local wine industry in an attempt to attract new business to the area and are promoting tourism as the new local growth industry. The goal of the research project was to collect and analyze local agricultural, economic, and social impact data (e.g., number of tourists, environmental impacts, the change in the size and type of the local job market), which have resulted from the promotion, establishment, and growth of a wine region in the Walla Walla Valley.

A careful analysis of the data and a comparison to the experience of other similar developing rural wine regions, allow specific recommendations to be made with respect to future growth and development of the local Walla Walla wine and tourist industry.

Room A



Tuesday 25th June 2002	
1150 - 1300	Тс

Fourism Forecasting

3. Forecasting tourism demand for Portugal with ARDL, VAR and Univariate models

M De Mello, K S Nell, L D Santos

Faculdade de Economia, do Porto Rua Dr. Roberto Frias, 4200 Porto, Portugal

This study analyses the tourism demand of several European countries for Portugal using annual data for the period 1977-2000. Our choice of the countries included in the empirical analysis takes into account the fact that Portugal is ranked as one of the twenty most visited countries in the world, that tourism is a major economic activity in this destination and that the European origins considered provide most of the incoming tourists in the period under analysis.

The purpose of the study is to implement alternative methodological approaches to demand analysis and forecasting which contribute both to strengthening the theoretical foundations of currently used models and to apply, in a tourism context, recent methodologies in econometric modelling and its quality evaluation. To predict tourism demand we use, univariate models, ARDL models as an alternative to the error correction specifications based on the Engle and Granger (1987) two-stages approach, and unrestricted and cointegrated VAR models. The theoretical framework of the dynamic error correction models follows that of Pesaran and Shin (1995, 1996) and Pesaran et al. (1996). The econometric methodology applied to the VAR models draws extensively on the concepts and techniques showed in Engle and Granger (1987, 1991), Granger (1988, 1997), Harris (1995), Johansen (1988, 1996) and Johansen and Juselius (1990).

The econometric models are constructed using a general to specific approach which subject them to rigorous quality scrutiny based on current methodological rules such as structural constancy, impulse response, causality, exogeneity, cointegration and encompassing. We compare the forecasting ability of the alternative models and analyse their different performances.

4. Analysis of Tourist Flow at the National Park of Iguaçu-Brazil

Wagner Moura Lamounier, Aureliano Angel Bressan

Rua Padre Francisco Arantes n.141 apt 303, Bairro Vila Paris, Belo Horizonte, Brazil

The main goal of this research work was to detect and analyze the existence of the stochastic (and/or deterministic) components of Trend, Cycles and Seasonality in the tourist flow at the most important natural park in Brazil, called National Park of Iguaçu. The sample was composed of monthly data from 1991 to 2001 provided by the Secretary of Tourism of the State of Paraná where the park is situated. The methodology employed was the analysis in the time domain (to trend and seasonality) and the analysis in the frequency domain, also knew as spectral analysis to the study of cycles in the series. The results found that there was no significant trend in the tourist flow. With relation to the cycles in the series, the spectral analysis has shown the existence of short-run cycle (3 months) in the tourist flow. With relation to seasonality the research found that in the series analyzed this component is very important and has a deterministic instead of stochastic nature, and varied very little in the decade. The results found points that the Cyclic and Seasonal components are the most important to be included in any time series model to forecast the tourist flow in the park. Also, these components must be emphasized by the park administration to the best resource location in the park of employees and efforts to control of environment and rational use of the installations of the National Park of Iguaçu.



Tuesday 25th June 2002		Room A
1500 - 1610	Tourism/Transportation Forecasting	

Chair: Peg Young

1. The impact of September 11, 2001 on Transportation Indicators

Keith Ord, Peg Young

Georgetown University, The McDonough School of Business, Washington DC, USA

The Bureau of Transportation Statistics produces a monthly report, called Transportation Indicators, which reports on key measures related to the transportation enterprise. The co-authors of this paper have created a procedure, using STAMP, to decompose the time series of interest and to create monthly forecasts of these indicators. In addition, the procedure compares the new actual values of these measures to the one-step-ahead forecasts in order to provide alerts for those measures that deviated more than expected every month. This presentation will show the results of this forecast and statistical process control procedure, particularly in light of the events on September 11, 2001 on transportation data.

2. The impact of terrorism on tourism by use of time series methods

Brian Sloboda

US Department of Transportation, Bureau of Transportation Statistics, Washington DC, USA

Terrorists use exta-normal violence or threaten to engage in violent acts to gain a political objective through intimidation or fear. They often unleash their attacks at targets which are not directly involved in the decision-making process that the terrorist seek to influence, ie harm people in a crowded street or passengers waiting at the airport. These acts have primarily occurred overseas, but the threat of terrorism finally hit the United States in 1993 with the bombing of the World Trade Center by Islamic fundamentalists. More recently, simultaneous attacks on the World Trade Center and the Pentagon has increased fears of subsequent attacks and these fears started an effect on the US economy. The purpose of this analysis is to determine if the degree of impact of these recent attacks and to quantify these impacts in terms of losses in tourism revenue. The empirical analysis will entail the use of an ARIMA model with a transfer function for the United States.

3. Forecasting the shape of the decline and recovery in lodging demand in three US cities: New York, Washington and Chicago following September 11th, 2001

D. C. Frechtling

The George Washington University USA

The U.S. economy officially entered an economic recession in March 2001, and lodging demand in two major cities began to decline. The September 11 tragedies produced an immediate, accelerated drop in demand, followed by recovery. This paper sorts out the effects of recession and catastrophe on the monthly demand for hotel rooms in New York City and Washington, D.C., the sites of the two September 11 attacks. Forecasts for the coming year and recommendations for modeling future catastrophic events are presented to help destination officials deal with such future events.



Tuesday 25th June 2002 1640 - 1750

Tourism Forecasting

Chair: Noel O'Connor

1. The influence of Outliers on the forecasting in tourism

Ante Rozga

Vukovarska 166, Split, Croatia

Forecasting in tourism can't be separated from analysis of seasonal variations. Seasonal and trend-component are sometimes under strong influence of outliers in time series. These outliers are: level shift, additive outliers and transitory change. We analysed Croatian time series in tourism with two dominant methods for seasonal adjustment, namely: X-12-ARIMA which is the most recent representative of empirical approach and TRAMO/SEATS as model-based approach. Most of Croatian time series are treated as difficult, due to war operations (1991-1995). These difficulties could be best-recognised in tourism since it is the most affected of all industries in Croatia. Croatian GDP was badly affected, but tourism is more sensitive to intervention variables. The most important outlier is level shift in 1991 at the beginning of war. Also, there were other interventions in time series such as: operation "Storm" in August 1995, and also problems caused by the allied intervention in Kosovo in 1999. These outliers should be recognised by the seasonal adjustment method in the process of pre-treatment of time series. Their effect should be removed in order to do better estimate of seasonal component and to do better forecasting. At the end of analysis these outliers are integrated into components. We compared differences in results obtained with these two methods. The number of outliers depends on critical values determined. Shorter the series lower the critical value and vice-versa. The critical value may be chosen smaller to increase the number of outliers an thus to improve the residual characteristics of the ARIMA model. Outlier detection procedures of X-12-ARIMA and TRAMO/SEATS are not identical and thus identifying different number of outliers. Applied to number of nights spent by tourists in Croatia results were similar in number of outliers but somewhat different in their structure.

2. Tourism in Spain

Isabel Fernandez, Alberto Gomez Gomez, Javier Puente Garcia, Nazario Garcia Fernandez ETSIIG, Edificio de Energia, Campus de Viesques, Gijon, Spain

Figures yield by tourism sector in Spain amount, at present, to 12% of the Spanish Gross National Product. This fact along with being one of the top tourism destination, make this sector of the Spanish economy appealing enough to modelling and forecasting.

In this paper, we estimate several real series (nights in a hotel, number of staff engagements, average stay, number of establishments, between others) by means of three alternative techniques such as ARIMA methodology, Artificial Neural Nets and the Kalman Filter. After considering the adequacy of the respective models obtained to reproduce the pattern of the series, we have used them to forecast their values in the next immediate future.

Box-Jenkins results were obtained by using SCA package. Regarding Artificial Neural Nets, the training algorithm used was "back-propagation", and overfitting was avoided by using the "early-stopping" method. The training of the net was carried out with the SNNS program. Finally, the results derived from Kalman Filter were obtained by using MATLAB software.

We evaluate the above mentioned competing methodologies in forecasting and put forward the results obtained through this research.



Tourism Forecasting

Room A

3. A neural network model to forecast Italian demand for travel to Sicily

Benedetto Torrisi, Giorgio Skonieczny

corso Italia 55, Catania, Italy

Chaos theory and its companion model, complexity theory, are emerging as legitimate schools of thought to describe how complex systems function. This paper argues that tourism essentially functions as a chaotic, non-linear, non-deterministic system. As such, existing tourism models fail to explain fully the complex relationships that exist between and among the various elements that constitute a tourism system. Apart from simple guesswork, time-series and regression techniques have largely dominated forecasting models for international tourism demand. This paper presents a new approach that uses a supervised feed-forward neural network model to forecast Italian tourist arrivals in Sicily. The input layer of the neural network contains six nodes: Service Price, Average Hotel Rate, Foreign Exchange Rate, Population, Marketing Expenses, and Gross Domestic Expenditure. The single node in the output layer of the neural network represents the Italian demand for travel to Sicily. Officially published annual data were used to build the neural network. Estimated Italian arrivals were compared with actual published Italian arrivals. Experimental results showed that using the neural network model to forecast Italian arrivals outperforms multiple regression, moving average, and exponent smoothing. The paper concludes by proposing an alternative model of tourism based on the principles of chaos theory that incorporates the nine elements that combine to explain how tourism functions.

4. A Vision of Tourism and the Hotel Industry in the 21st Century

Ivanka Avelini Holjevac

University of Rijeka, Faculty of Tourism and Hospitality Management, Opatija,

The aim of this paper is to indicate the aspects of tourism and the hotel industry of the future in view of predictable social and economical conditions, and changes in the lives and work of people - tourists of the 21st century.

Tourism and the hotel industry will become one of the largest world industries. The globalization (unification) and localization (diversification) processes will designate both world tourism and regional tourism. A balance of economy and ecology will be achieved in tourism. This paper pursues the answers to the questions: Who will be the tourists of the future? What kind of needs and wishes they will have? Work composition: following the introduction, detailed guidelines for tourism and the hotel industry of the future are proposed, and future hotel models delineated.

5. Forecasting the tourist flow at Itatiaia National Park in Brazil

Aureliano Angel Bressan

R. Grao Mogol, 320/202 Carmo, R. Aimores 1451 Lourdes, Belo Horizonte, Minas Gerais, Brazil

This paper focuses on the univariate forecasting of the touristic flow at the Itatiaia National Park, in the state of Rio de Janeiro, Brazil, with data concerning the visitors to that natural space, starting from January 1994 to December 2001. The main purposes are the identification of the series unobservable components: trend, seasonality, cycle and irregular. The forecasts are constructed for the touristic flows within the sample (6 and 12 months ahead in 2001) and outside the sample (from July to December/2001 and January to December/2002). For this intent, the methodology adopted was based on the Structural Time-Series approach proposed by Harvey (1989). The model was estimated using the Kalman Filter, and the components that best describes the stochastic behaviour of the series were: a local level (concerning the trend), trigonometric seasonal and a AR (1) term (which is used to incorporate the influence of the first lag of the endogenous variable), along with interventions in two observations, concerning outliers generated by unpredictable factors (such as fires). The results indicate that there are no cycles in the visitors+U85 flow during that period, although there is a strong seasonal factor of 12 months determining the behaviour of the series. The ex-post forecasts captures the basic seasonal behaviour of the series, with reasonable values for the RMSE, specially for short term forecasts. Ex-ante forecasts are also estimated for 2002, with the intent to be useful as a decision tool for the park management staff.



Tuesday 25th June 2002 1010 - 1120

Forecasting Practice in Organisations

Chair: Moira Hughes

1. Incorporating market knowledge into forecasting

Mike Bonnici

H J Heinz Ltd, Hayes Park, , Hayes, Middlesex, UK

Forecasting is a pivotal activity in manufacturing industry, in food manufacturing which comes into the "Fast Moving Consumer Goods" category it is even more important. The best practise concept of "One Plan" requires a collaborative approach to Managing Demand, an approach which recommends multi-sourced forecast data to be integrated into "One Plan".

With the concentration of selling power into fewer Key Accounts, the approach to forecasting needs to evolve to meet our customers' needs whilst recognising that our customers are the Key Accounts and not the end consumer. This presentation explores an approach to forecasting which involves building on a history-based statistical model by the addition of Market intelligence.

2. The role of forecasting and modelling in complex systems

Michael Lyons

Btexact Technologies, Antares 2/3, Adastral Park, Martlesham Heath, Ispwich, UK

The theory of complex adaptive systems, when applied to social systems (such as firms), emphasises the dynamic and unpredictable nature of both organisations and their environment. As a result, there is an emphasis on strategic approaches that enable flexible and rapid responses to the environment rather than on approaches based on forecasting models and planning.

However, forecasting and modelling are essential elements of an effective strategic decision-making process (Lyons, 1999). Holland (1995) suggests that complex adaptive systems anticipate the future by means of various internal models. Thus, decision-makers have an implicit model of their commercial environment which shapes their expectations and is used to forecast the outcomes of alternative strategies. By making such models explicit, it is possible to examine their underlying assumptions and also test the impact of specific interventions.

This paper considers the role of forecasting and modelling in the wider strategic decision-making process. In particular, the use and value of dynamic methods developed for complex systems, such as agent-based models, is discussed

Room B



Tuesday 25th June 2002		Room B
1010 - 1120	Forecasting Practice in Organisations	

3. The Evolution of Forecasting Management: A 20 -year longitudinal study of forecasting practices

Teresa McCarthy, Susan L Golicic, Donna F Davis

The University of Tennessee, 310 Stokely Mangement Center, Knoxville, USA

Advances in information technology and increasing globalization of markets have contributed to a business environment characterized as fast-paced, dynamic and uncertain. In such an environment, effective and efficient forecasting management is becoming widely recognized as critical to obtaining a sustainable competitive advantage. Reliance on forecasts for implementation of current business strategies compels an answer to the question, "Have sales forecasting practices evolved over the last two decades?"

This study presents a longitudinal update of surveys undertaken by Mentzer and Cox (1984) and Mentzer and Kahn (1995) exploring the degree of familiarity, usage, satisfaction, and accuracy associated with several forecasting techniques. In addition to the four objectives of the original surveys, the present study adds a fifth objective identified as important in discussions with forecasting executives. Specifically, this paper will report results of a web-based survey of forecasting managers designed to determine: 1) how familiar executives are with various forecasting methods and what sources are used to learn about new methods, 2) which forecasting techniques are most commonly used for different time horizons and forecast levels, 3) how satisfied managers are with using different forecasting practices and accuracy levels with individual incentives and business performance measures. Data analysis in the present study will compare results to those of the Mentzer and Cox (1984) and Mentzer and Kahn (1995) studies - for which data were collected in 1982 and 1993, respectively - to determine if and how forecasting management has evolved over the past two decades. Future research suggestions and managerial implications for forecasting management will be offered.

4. Do better export sales forecasts lead to superior export performance? Empirical evidence from UK firms

Heidi Winklhofer, Adamantios Diamantopoulos

Nottingham University Business School, Jubilee Campus, Wollaton Road, Nottingham, UK

A large body of literature has focused on ways to improve forecasting performance and identify the factors affecting it. Better forecasts have been associated with improved decision making thus presumably leading to superior firm performance. Although this assumption is widely accepted, empirical research focusing on the link between forecasting performance on the one hand and overall firm performance on the other is rare. This is certainly the case in an exporting context. Although export performance is one of the most widely researched areas of international marketing, no attempt has so far been made to link export sales forecasting performance to a firm's export performance.

Drawing from a survey of the export sales forecasting practices of UK firms, the present study explores the links between forecasting performance (as captured by short- and medium term accuracy and bias), use of export sales forecasts in decision making (as captured by the diversity of planning situations in which forecasts are used as input), and export performance (as captured by sales, growth and profitability criteria), while controlling for the impact of environmental turbulence. The findings provide insights into the impact of forecasting on export performance and relevant future research avenues are identified.

Room B



Tuesday 25th June 2002 1400 - 1450

Tourism Forecasting

Chair: Dominic Dillane

1. Models of air passenger traffic flows: a comparison of their forecasting effectiveness

Suzilah Ismail, Robert Fildes, Annie Wei, Mohd Alias Lazim

Lancaster University, Dept of Management Science, School of Management, Bailrigg, Lancaster, UK

Airline traffic forecasting in the medium term is important to airlines and the various regulatory authorities that attempt to plan and schedule capacity. This paper examines a number of alternative approaches to forecasting the medium term (1 to 3 years) air passenger flows. The data examined are flows from the UK to six other countries over the period of 1961 - 98, which has seen substantial changes in both transport technology and economic development. The models employed in the paper include two "naÔve" models, autoregressive of order 3 [AR(3)] models, autoregressive distributed lag (ADL) models, pooled autoregressive distributed lag models and time varying parameter (TVP) models. This paper also takes into account the question whether the six routes considered simultaneously (using appropriate statistical methodology) would improve overall forecasting performance. Based on the analysis of forecasting error measures, it can be concluded that time varying parameter models perform better that other models.

2. Forecasting tourism demand for Ireland

Dominic Dillane,

Dublin Institute of Technology, Faculty of Tourism and Food, Cathal Brugha Street, Dublin, Ireland

The need for accurate forecasts of tourism demand to assist managerial decision making is well recognised. Empty hotel rooms and unfilled airline seats is lost revenue. Tourism providers and policy makers need forecasts of different time horizons and levels of aggregation. In this paper Governments are interested in total international inbound and outbound expenditures at a country level, hotels in tourism demand by city or region and airlines in tourism demand by route. This paper considers Irish tourism and compares extrapolative, causal and qualitative techniques for forecasting tourism demand in Ireland. Empirical comparisons of the accuracy of these techniques are described.



Tuesday 25th June 2002 1400 - 1450

Tourism Forecasting

Room B

3. A User's Perspective of Tourism Statistics

Brian Maher

Irish Tourist Board, Dublin, Ireland

Forecasting is an integral part of any economic activity. For most people in the tourist industry the forecasts they will come across most frequently are those produced by the World Tourism Organisation (WTO). The current WTO forecasts are a product of the Tourism 2020 Vision programme of research and forecasting and have three main objectives:

- to identify the key trends in tourism supply and demand world -wide, by region;
- to determine their impact on the various sectors of the tourism trade;
- · the implications for policymaking and relevant strategies.

The results of the programme are comprehensive, including analysis of the factors determining tourism. The information provided is very useful for benchmarking performance, for identifying broad areas of tourism potential, and for advocacy purposes. The detailed information is at a macro level and information at a more disaggregated level, for example by market segment, is presented in a qualified rather than a quantified manner.

This brings us to one of the problems inherent in tourism forecasts. Unlike other economic sectors, which enjoy a certain homogeneity of product, tourism covers a multiplicity of segments some of these segments are more important than others.

It is very common in the tourist board to get a call from an individual who is considering establishing an accommodation in a particular region, or to set-up a tourist related activity or attraction. In many cases the individual is required to provide a business plan in order to fund their acquisition or expansion. Data at a sectoral or local level, and frequently both, is essential to their plans and the quality of such data will facilitate forecasts or projections likely to influence financial institutions in their favour. The type of macro forecasts mentioned earlier are unlikely to help them significantly.



Tuesday 25th June 2002 1500 - 1610

Time Series Analysis

Room B

Chair: Geoff Allen

1. Transfer Function Models and Spectral Analysis: A Stock Market Application

Paul Johnson

Davis, USA

The SAS procedure "proc arima" is used to find the best fitting transfer function for 254-paired time points (stock data). The stock market data used consists of daily closing values collected from October 6, 1999 to October 5, 2000. The three pairings considered were: i) Amgen, Inc. (AMGN), a global biotechnology company; and Merck & Co., Inc. (MRK), a pharmaceutical company; ii) OXY, involved in the exploration, development, production & marketing of crude oil and gas; and ONEOK, Inc. (OKE), engaged in the production, processing, distribution, and marketing of environmentally clean fuels and iii) Microsoft Corporation (MSFT), develops, manufactures, and supports a range of software products; and Oracle Corporation (ORCL), develops, manufactures, and distributes systems software. The autocorrelation function, the inverse autocorrelation function and the partial autocorrelation function of the input/output time series are examined. Models are fit and parameter estimates for the three models are obtained. Predicted stock values are estimated from these models. The SAS procedure "proc spectra" is then used to find the sinusoidal components of a model for the MRK data. The prediction interval for a new observation is discussed. These macros require base SAS and SAS/STAT software to run. The macros (called "transfer" and "spectral") are available from the author at URL http://pages.prodigy.net/johnsonp12/tseries.html.

2. Detecting Financial statement fraud using Box-Jenkins modeling

David Reilly, Paul Foote, David Lindsay, Annhenrie Campbell

California State University Fullerton, Fullerton, USA

The recent collapse of Enron accentuates the need for early detection of financial statement fraud. Traditionally, auditors and investors used manual approaches to financial statement analysis in an effort to detect fraud. Recently, some auditors have used logistic regression, probit, and neural network approaches. The objective of this study is to determine whether a Box-Jenkins modeling approach can be used to discriminate between firms that are engaged in fraud and firms that are not.

The test sample consists of eight firms known to have engaged in financial statement fraud. Researcher one pair matched each of these firms to two non-fraud firms with the same Standard Industrial Classification (SIC) code. For each firm, forty-five financial statement data items over a ten-year period were extracted from the COMPUSTAT Industrial Annual file. The last year of the ten year period was at least one year prior to the public announcement of the fraud. To assure a blind study, the data for each fraud firm and its pair matches were unidentified when forwarded to researcher two.

Researcher two used a Box-Jenkins modeling program, Autobox, to detect outliers in the data. For any given SIC code, the firm with the most outliers in the forty-five data items was "predicted" to be the fraud firm. If two firms with the same SIC code had an equal numbers of outliers, the firm that had the most outliers in any single year was predicted to be the fraud firm. Using this heuristic, the fraud firm was correctly detected in seven out of eight cases, for a success rate of 87.5%. A random selection would be expected to correctly detect the fraud firm in 33% of the cases.

The results are consistent with the proposition that Autobox is an effective tool to distinguish between fraud and non-fraud firms.



Tuesday 25th June 2002		Room B
1500 - 1610	Time Series Analysis	

3. On the relative performance of ridge-type estimators vs principle components methods: Further simulation results

Sal Amirkhalkhali, Sam AmirKhalkhali

Saint Mary's University, Dept of Economics, Halifax, Nova Scotia, Canada

This simulation study examines the estimation and forecasting performance of ridge-type estimators vs. principal components methods in a structural model using the most recent observations. To this end, using antithetic variates, we experimented with a large model which approximates a typical macroeconomy of the real world with several behavioural structural equations. We employed their relative efficiencies based on mean square errors as well as interdecile range of coefficients as bases for comparison of the estimators within and among these equations. We also compared the forecasting performances of the estimators in terms of the accuracy of the within-sample as well as post-sample predictions by using the mean absolute percentage error of forecasts. Our simulation results seem to lead us to some definite conclusions.



Tuesday 25th June 2002 1640 - 1750

Forecasting Methods

Chair: Michelle Hibon

1. Nonlinear models and the evaluation of probabilistic forecasts

Patrick McSharry

Mathematical Institute, 24-29 St Giles', Oxford, UK

The improvement of forecast accuracy obtained by employing nonlinear models is often judged to be negligible. This judgement, however, is often based on skill scores designed to identify optimal least squares predictors. Given imperfect observations of a nonlinear system, this approach may reject the system which generated the data as a relatively poor model. Alternatively, by evaluating the forecast probability density function (PDF), it can be shown that nonlinear models provide significantly more valuable (PDF) forecasts, while correctly selecting the (linear) optimal least squares predictor when it is appropriate to do so. A number of cost functions for evaluating both point and probabilistic forecasts are compared; the approach is illustrated both with data generated from traditional linear models and observed time series from real physical processes.

2. Consensus Measurement using M-estimators and Stacked Generalisation

Ray Nelson

Brigham Young University, Marriott School, 665 TNRB, Provo, Utah, USA

Two problems often arise when reporting consensus estimates that are derived from surveys of forecasters. First, as suggested by Batchelor (1990), some survey participants have incentives to issue consistently biased forecasts. Second, sometimes extreme forecasts occur that potentially compromise central tendency and risk measures such as the mean and the variance. McNees (1987) has proposed using the median as a resistant summary statistic rather than the mean. Other alternatives exist, however, such as M-estimators that control the influence of potential outlier observations. Wolpert's (1992) stacked generalisation uses neural networks in a bias correction procedure. The present paper explores the value of M-estimators and stacked generalisation in gleaning consensus measures from survey data. This investigation first evaluates the alternatives by using simulated data that have known characteristics. Then similar tests occur based on two real datasets that have documented biases and anomalies: GDP forecasts reported in the Wall Street Journal and equity-market earnings estimates assembled by IBES.

Room B



Tuesday 25th June 2002		Room B
1640 - 1750	Forecasting Methods	

3. A comparison of the time series modelling methods, GARCH(1,1) and GP-SR

Abdel Salhi, E. Zamudio-Gomez, S Markose, E Tsang

University of Essex, Dept of Mathematics, Wivenhoe Park, Colchester, Essex, UK

We consider the problem of modelling short time series, mainly related to stock prices and volatility, using the well established GARCH approach and the more recent approach which consists of combining Symbolic Regression with Genetic Programming (GP-SR). The problem of modelling short time series is relevant in a number of circumstances, including when there is a shortage of data, missing data and a time constraint. It will be shown that, in these situations, an acceptable estimation of GARCH(1,1) using Maximum Likelihood is unlikely. Moreover, the GP-SR method appears to be more competitive in that it provides more accurate models based on relatively few points (in the order of 200). The GP-SR approach is applied to pre-processed data according to a novel way, which we call "data enrichment". Comparative results on simulated data will be presented.

4. Density forecasting of daily temperature using ensemble predictions and ARMA-GARCH models

James W Taylor, Roberto Buizza

University of Oxford, Said Business School, Park End Street, Oxford, UK

Weather ensemble predictions consist of multiple scenarios for the future value of a weather variable. They provide the user of the weather forecast with an understanding of its uncertainty, and are thus useful for risk analysis purposes. The distribution of the scenarios can be used as an estimate of the probability density function of the weather variable, and the standard deviation of the scenarios can be used as a volatility forecast. This study investigates the accuracy of the density and volatility forecasts provided by temperature ensemble predictions for lead times from 1 to 10 days ahead. We compare these forecasts with those from an ARMA-GARCH time series model for the temperature variable. Since the two approaches are based on different information, we consider combinations of the forecasts in order to produce an improved prediction through the synthesis of the information.



Tuesday 25th June 2002 1010 - 1120

Technology Forecasting

Chair: Alan Porter

1. Forecasting: self-fullfilling, self-destroying or creative?

Kazem Chaharbaghi

East London Business School, University of East London, Longbridge Road, Dagenham, Essex, UK

The future cannot be accessed through forecasts. It can only be anticipated and prepared for. Forecasts that prove to be accurate tend to be self-fulfilling in nature where expectations shape reality. Although accurate forecasts are considered as desirable, they can also be harmful. This is because by reinforcing past behaviour through forecasts that assume "the past repeats itself" or "past trends will continue", decisions and actions are limited in a way that can conceal emerging or new opportunities.

Forecasts that are self-fulfilling act like a cycle and cycles can be broken as well as reversed. Thus, selfdestroying forecasts become less real the more they are reinforced as they stoke up false confidence, reveal secrets or divert action by denying the kind of thinking that leads to more desirable ends. The distinction between self-fulfilling and self-destroying forecasts demonstrates why the purpose of forecasting should not be limited to predicting a future event. Forecasting is also useful when it is applied as a creative tool to support policy design. Creative forecasting can help establish how behaviour can be improved, what higher goals to achieve and what futures to avoid by shifting the emphasis from "what is/what will be" to "what is not/could be".

The above concepts present the practice of forecasting, futurology and policy-making with a number of application questions, which include: does predictability or choice determine future? Is life a struggle to be or become? Does forecasting drive policy design or vice versa? Is the relation between predictability and choice, being and becoming, and forecasting and policy design complementary, competitory or symbiotic?

2. Scenario forecasting of US retail food prices

Annette L Clauson

Economic Research Service/USDA, Rm S2094, 1800 M Street NW, Washington DC, USA

Along with energy prices, food prices are the most volatile consumer price category that the U.S. government tracks. Many of the models available for forecasting retail food prices assume that past cycles, seasonality, and trends repeat themselves. When disruptions such as floods, droughts, crop disasters, recessions, and attacks occur, the traditional models fail to accurately forecast each of the food categories that comprise the all food Consumer Price Index (CPI) and food expenditures. This paper will look at past disruptions that have effected U.S. food prices and analyze forecasting scenarios of food prices and expenditures if unexpected changes occur in the future. An ARIMA forecasting model with judgmental knowledge and adjustments will be used in this analysis.



Tuesday 25th June 2002		Room (
1010 - 1120	Technology Forecasting	

3. Correspondence to what? Coherence to what? What is good scenario-based decision-making?

Clare Harries

University of Leeds, Leeds University Business School, Leeds, UK

Scenario-based decision-making is widespread in business and organisations. Although several guidelines as to its practice are available, there is little, if any, economic or psychological theory underpinning this approach. In addition, there is little evaluation of it. There are numerous case studies purporting to demonstrate the successful use of scenario-based decision-making, where other strategies might have failed. But, given the possibilities of confirmation bias, a more rigorous assessment is needed. This paper examines the potential correspondence and coherence measures for evaluation of scenario-based decision-making.

From a traditional perspective, good decision-making corresponds to good outcomes over a number of decisions across time, over a number of simulations or it corresponds to an intuitive perception of the correct choice. Decision-making can be evaluated in terms of coherence for example within a decision analytic and logical framework. The components of the decision analytic process - identification of options, probabilities and utilities can also each be evaluated in terms of coherence (for example within probability theory) and correspondence (for example to statistical data).

Can we evaluate scenario-based decision-making in a similar manner? Decision outcomes can be compared to their goals, or one decision can be evaluated with intuition. It can be evaluated in terms of its coherence to a particular scenario-planning perspective. Its components can also be evaluated. For example, good scenario-based decision-making will accurately portray the potential volatility and potential interactions of key variables within the environment in which the decision-maker operates.

But avoidance of probability measures during scenario-based decision-making reflects a deliberate lack of concern for average performance over time. Therefore neither a blanket correspondence evaluation nor evaluation of the components of scenario-based decision-making is appropriate. Here we consider alternative forms of evaluation.

Room C



Tuesday 25th June 2002 1150 - 1300

Supply Chain Forecasting

Chair: Hans Levenbach

1. Creating a forecasting model for intermittent demand at store locations

Hans Levenbach, William Sichel

Delphus Inc, 152 Speedwell Avenue, Morristown, USA

Forecasting approaches used by practitioners for intermittent demand (infrequent demand patterns) are mostly based on exponential smoothing techniques and Croston's method. The shortcomings of these approaches have been well-documented in the literature. We describe a new, data analytic approach that derives its support from looking at patterns of intermittent demand at store-level locations in a retail environment. Our findings suggest an inferential model that distinguishes the pattern of non-zero demand from the time-lapses between these events without specific distributional and interdependence assumptions. The methodology is illustrated with some real-life data from the retail industry.

2. Forecasting, ordering and stock-holding for erratic demand

Andrew Eaves

Lancaster University, Lancaster, UK

A modern military organisation like the Royal Air Force (RAF) is dependent on readily available spare parts for inservice aircraft and ground systems in order to maximise operational capability. The RAF consumable inventory, comprising some 700 thousand stock-keeping units, is classified according to the observed demand, resulting in smooth, slow-moving, irregular and erratic demand categories. A large proportion of parts with erratic or slow-moving demand present particular problems as far as forecasting and inventory control are concerned.

Recent forecasting developments are compared against more commonly used methods for each demand pattern, with the performance assessed using traditional measures of accuracy, such as MAD, RMSE and MAPE. The results are not considered ideal in this instance as different conclusions arise depending on which measure is utilised, and whether the one-period ahead or the replenishment lead-time is considered. As an alternative, the implied stock-holdings resulting from the use of each method are compared. One recently developed method, a modification to Croston's method referred to as the approximation method, is observed to provide significant reductions in the value of the stock-holdings required to attain a specified service level for all demand patterns.



3. Comparison of Intermittent Demand Forecasting Models

Lydia Shenstone, Rob J Hyndman

Monash University, Dept of Econometrics & Business Statistics, Monash, Australia

Intermittent demand commonly occurs with inventory data, with many time periods having no demand and small demand in the other periods. Croston's method is frequently used for intermittent demand forecasting (IDF). This paper explores the underlying models of Croston's method and related methods, and develops two alternative methods for IDF based on Poisson Conditional Linear Autoregressive (CLAR) models. We compare all these models by investigating their mathematical properties such as forecast distributions and lead-time demand distributions, etc, and by assessing the forecast accuracy when applying these models to real industry datasets that display intermittent patterns.

4. A case study of retail fulfillment from the CPG perspective

Renee Speicher, Chi Hing Ho, Mayank Mishra

KPMG Consulting, 8275 W Higgins Road, Chicago, USA

Retailers are serving more consumer channels and require high velocity inventory replenishment be competitive. Consumer packaged goods (CPG) companies must be agile and flexible to respond to the retailers' requirements. Moreover, CPG companies must balance inventory holdings and the associated working capital with the retailers' demands. This balance is very difficult, but can be achieved with statistical demand prediction to increase demand accuracy and linear programs to constrain the order fill rate based upon fulfilment limitation. This pilot study reveals how a CPG company could increase the forecasting accuracy of key products by 3-19% while simultaneously increasing their inventory turn by over 100%, translating into a working capital savings over \$15 million dollars per year. The analysis was comprised of time series forecasting techniques, stepwise regression and econometric modeling as well as MILP (multiple integer linear program) to constrain limitations in the fulfillment model. Taken together, the analysis provided the CPG company with the data and results to meet requirements of retailers such as Wal-Mart, Target and K-Mart.



Tuesday 25th June 2002 1500 - 1610

Technology Forecasting

Chair: Alan Porter

1. Better technology forecasting using systematic innovation methods

Darrell Mann

University of Bath, Dept of Mechanical Engineering, Bath, UK

The Soviet-originated Theory of Inventive Problem Solving, TRIZ has, after a comprehensive programme of research into the evolution of technical systems, identified a number of generically applicable technology evolution trends. The paper describes a programme of research to first validate and then extend the original research to encapsulate new and emerging trends.

In addition to identifying a host of trends not found in the original TRIZ work, the research has developed a number of tools to enable engineers, scientists and strategists to identify the evolutionary potential and limitations of systems, and to better match implementation timing to shifting market dynamics.

Case study examples of the new tools being used to project the evolution trajectories of a variety of systems are presented.

2. Nitrogen Oxides and volatile organic compounds emission reduction scenarios: Quantifying the emission impact on non-cooperative drivers in Atlanta ozone non-attainment air shed

Asim Zia

Atlanta, USA

Mandated by the Clean Air Act Amendments 1990, the Georgia State Implementation Plan of 2001 forecasts that, by the year 2004, the enhanced Inspection and Maintenance (IM) program is expected to generate nitrogen oxide (NOx) emission reductions to the tune of 12.25 tons per day and volatile organic compounds (VOCs) emission reductions to the tune of 11.33 tons per day. This emission reduction scenario is built on the key normative assumption that all human actors inside the IM program boundaries would behave cooperatively with the federal and state- regulations. However, in-program IM emissions data (1994-2001) and out-of-program remote sensing data (1994-2001) coupled with vehicle registration data (1994-2001) show us that preemptive behavioural strategies of human actors, particularly drivers expecting their cars to fail the IM test, have a significant negative impact on attaining normative and legally mandated emission reduction scenarios by the year 2004. Though some (initial fail expectant) drivers cooperate by actually repairing the catalytic converters and exhaust pipe systems in their cars, many others do not cooperate and pursue one of the following noncooperative strategies. (1) Re-register their cars in the nearest county that is outside the IM program boundaries; (2) Keep on driving inside the program boundaries without valid registration permits; (3) Seek illegal registrations without actually appearing in the IM tests; (4) attempt to pass the IM test by temporary repairs. First, by constructing discrete choice LOGIT models, we quantify the emission impact of these non-cooperative strategies. Next, by simulating context-sensitive Markov games, we analyze incentive-based strategies, which may be implemented by the regulator to induce a voluntary change in the preemptive behaviour of these noncooperative drivers and attain normative emission reduction scenarios.

Room C



Tuesday 25th June 2002Room C1500 - 1610Technology Forecasting

3. Foresight Technology and Strategic Planning for the Mexican Petroleum Sector

N Dominguez, et al

Eje Central Lazaro Cardenas 152, Col. San Bartolo Atepehuacan, Mexico City, Mexico

We developed a methodology to identify R&D areas of opportunity in which the Mexican Petroleum Institute (IMP) should become strategically involved in the next 23 years [1]. The model consisted in part in developing macroeconomic scenarios and in a systematic analysis of the Technology Platforms of the Mexican Oil Industry. The methodology allowed to identify generic or emergent technology areas in which IMP should develop, adapt or adopt technologies in order to trigger innovation and economic competitiveness in the Mexican oil industry. The model is appropriate for Mexico and is being used by the Mexican Energy Secretariat to identify R&D areas of opportunity for the Mexican energy Sector.

We will present 1) results of using the methodology for several R&D areas, 2) proposals to improve this appropriate methodology for Mexico and 3) the current efforts in implementing the results of the technology foresight to the strategic planning of the IMP considering the close relation with the its principal client: the Mexican Petroleum Company (PEMEX). The IMP is the largest R&D institution in Mexico and PEMEX is one of largest oil companies in the world.

Room D



Tuesday 25th June 2002 1010 - 1120

Leading Indicators

Chair: Lars-Erik Oller

1. Forecasting the recession 1990-1993 in Sweden and Finland

Lars-Erik Oller

Statistics Sweden, Box 24300, Stockholm, Sweden

Can recessions be forecasted, or at least "nowcasted"? From where is one to get timely and accurate warning signals? It is argued that on top of macroeconomic analysis and models one needs adequate leading indicators that are calibrated to turning points. The crisis in Sweden and Finland 1990 -1993 is studied as a case in point. Mainly judgmental methods failed to give correct signals while a proper use of indicators, had they existed and been used at the time, could have provided early and accurate warnings of both the down - and the upturn.

2. On the use of Markov Switching Models applied to business survey data for the prediction of turning points.

Marlene Amstad

Swiss National Bank, Research, Fraumunsterstrasse, Zurich, Switzerland

This paper investigates the use of Markov Switching Models (MSM) applied to Business Survey Data (BSD) as a predictor of business cycle turning points. Results of the quarterly Swiss industry survey are converted to a dichotomous signal by using Hamilton's Markov Switching Model. The derived series tends to coincide with phases of excess boom and the end of recessions, respectively. It thus leads the turning points in the growth cycle. After determining the potential contributors to a leading indicator, the corresponding filtered series are combined in a single variable (H-Signal), which can be considered to perform reasonably well. The H-Signal outperforms the barometer of the Swiss Institute for Business Cycle Research in terms of a longer lead and less false signals in forecasting growth cycle phases. The proposed method can easily be applied to other countries.

3. Common trends and seasonal factors and the effects of sectoral disaggregation on forecasting

Antonio Garcia-Ferrer, Pilar Poncela, Marcos Bujosa

Universidad Autonoma de Madrid, Economia Cuantitativa, Madrid, Spain

This paper focuses on the effects of sectoral dissagregation on forecast accuracy and how the presence of common factors also help in forecasting. The results are applied to the Spanish IPI index. The Industrial Production Index (IPI) is a broad measure of production in manufacturing, mining and utilities. It is also a main indicator of the state of the business cycle. The monthly Spanish IPI can be disaggregated into three components: equipment, intermediate and consumption goods. The behaviour of the three components does not need to be simliar. In this work we analyze the presence of common trends and/or seasonality among these three components using a multivariate dynamic factor model. We will also analyze if the common information can help to forecast the aggregated index. Alternatively, if the dissimilarites among the IPI components are quite strong, a disaggregated approach will be preferred.



Tuesday 25th June 2002 1150 - 1300

New Forecasting Methodologies

Chair: Ullrich Heilemann

1. Have macro economic forecasts for Germany improved?

Ullrich Heilemann

RWI, Hohenzollernstr 1-3, Essen, Germany

The last 50 years have seen a spectacularly increased demand for macroeconomic forecasts and even more efforts to meet it. Considerable human capital and material resources were spent on it and macroeconomic forecasting became a highly sophisticated and competitive branch of economics. Did it pay? This paper examines this question for one-year-ahead forecasts of growth and inflation for (West) Germany over the period 1967 to 2000, the largest time span for which quantitative forecasts can be evaluated. The forecasts to be examined are those of major national forecasters ("Gemeinschaftsdiagnose" der 6 deutschen Wirtschaftsforschungsinstitute ["Joint Diagnosis"], Sachverst‰ndigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung [Council of Economic Experts]) and of the OECD. The analysis employs the usual criteria to measure the absolute, relative, and comparative forecasting accuracy and a quantitative measure to evaluate predictions of cyclical movement. To get an idea about possible causes of forecast errors, the influence of forecasting errors for major assumptions (world trade, import prices, interest rates, fiscal policy) is tested. Particular attention is given to the question whether any signs of improvement of forecasting accuracy can be detected. Finally, the results are compared with the precision of growth and inflation forecasts for the G7 countries. The paper starts with a short description of goals and methods of macroeconomic forecasting in Germany and reports on previous findings on its accuracy. Section II presents the results of the accuracy analysis for various forecasters and sample periods and examines the role that wrong assumptions may have played. The next section looks at the results for Germany from an international perspective. Finally, the paper asks to which extent the forecast errors have impeded the efficiency of macroeconomic policy.

2. Are forecasters reluctant to revise their predictions? Some German evidence

Ulrich Mueller, Professor Gebhard Kirchgassner

University of St Gallen, SIAW-HSG, Institutsgebaeude, Dufourstr. 48, St Gallen, Switzerland

People are reluctant to admit mistakes. This could also be true with respect to economic forecasters. If revisions of past forecasts are costly, then it will become optimal for forecasters to only partially adjust a past forecast in the light of new information. The unwillingness to admit to the mistake in the old forecast then translates in a bias of the new forecast in the direction of the old forecast. We test this hypothesis for the joint predictions of the Association of German Economic Research Institutes over the last 30 years. We find some evidence for such a bias and compute the implied unwillingness to revise forecasts.

3. Stable multivariate prediction of business cycles over time.

Claus Weihns, Ursula Sondhauss

University of Dortmund, FB Statistics, Vogelpothsweg 87, Dortmund, Germany

In order to replace the univariate indicators standard in the literature by a multivariate representation of business cycles, those 'stylised facts' were to be identified which optimally predict the business cycle. Based on various statistical classification methods we found that, somewhat surprisingly, only two variables, 'wage and salary earners' and 'unit labour costs', are sufficient to predict the German business cycle quite reasonably from the 1950s up to today.



Tuesday 25th June 2002 1500 - 1610

Time Series Analysis

Chair: Ron Bewley

1. A prescription for the nervous forecaster

Ronald Bewley, Joanne Haddock

UNSW, School of Economics, Sydney, Australia

Forecasts from simple time series models do not typically perform well, even when compared to a naive nochange model. Moreover, expert forecasts of many macroeconomic variables, such as the rate for Australian 90 day bills considered here, are not much more accurate than the naive model in the short run and are even worse in the long run. The generic difficulties of real-time forecasting are described in detail which leads to the conclusion that time series models need to be augmented with a local estimate of the mean or trend in a time series if they are to perform well. Simple so-called intercept correction methods do not work well but a Bayesian variant is shown to outperform both expert and time series forecasts of 90 day bills by a substantial margin. In this paper, the concept of a Bayesian intercept correction method is extended to accommodate structurally stable, but dynamically inadequate, models.

2. Exponential Smoothing Models for Periodic Times Series

Kevin Albertson, Jonathan Aylen

UMIST, Centre for Manufacture, PO Box 88, Sackville Street, Manchester, UK

Exponential Smoothing models, despite, or perhaps as a result of, their simplicity continue to be applied with a deal of success to the problem of forecasting time series data. Recent improvements in spreadsheet algorithms enable "optimal" smoothing coefficients in such models to be "fitted" with ease. Intuitively appealing, potentially powerful and easy to understand, smoothing models are a useful forecasting tool, providing a benchmark for, and often outperforming, more sophisticated models.

A "deterministic" process, to wit, the inclusion of additive or multiplicative dummy variables to the local mean and trend estimation, has traditionally described seasonality in smoothing models. Increasingly, however, time series forecasters are turning from such seasonal processes to consider whether or not more general processes, such as periodic seasonality or seasonal unit roots, may be more appropriate descriptors of seasonal fluctuations. It is in this spirit that we re-examine seasonal influences in the context of exponential smoothing and develop formulae that more closely describe the seasonal trends and periodicity found in some economic data.

In an empirical example we compare the in-sample fit and out-of-sample performance of our formulae to those of traditional time series techniques. Clearly there are gains to be made "fitting" an appropriate smoothing model to seasonal data.



3. Stylized facts of Euro area monetary aggregates - a time series perspective

Peter Brandner, Helene Schuberth

Oesterreichische Nationalbank, Institute for Advanced Studies, Stumpergasse 56, Vienna, Austria

The monetary policy strategy of the Eurosystem assigns a prominent role to money. Since the introduction of the common currency, M3 growth has been above the reference value for most of the time. It is important to know whether this rise reflects an upward distortion, and if so, if it is likely to be transitory or permanent. Different implications arise for monetary policy as well as for investigating the predictive power of M3. Applying an outlier adjustment procedure, we estimate ARIMA models for monthly monetary euroaggregates (1980:1 to 2001:12) and identify the location and dynamic pattern of various special factors simultaneously. We find - among other outliers - an innovational outlier for all series - M1, M2 and M3 - in January 1999 ("EMU effect"). This outlier, which shows the highest statistical significance, increased M3 monetary growth not just temporarily in 1999 but permanently after February 2000 (by 0.5 percentage points). Interestingly, our results are robust against the recent redefinition of M3 by the ECB, which excluded non-resident holdings of some long term components. We perform the same analysis for the national contributions to M3. Surprisingly, the changeover to EMU is not reflected in the national aggregates, which points to a common "EMU effect" across all countries. We discuss these phenomena in statistical as well as in economic terms. Finally, the analysis is extended to base money and to the counterparts of M3 in order to get a better understanding of how money reacts to various shocks.

4. Modelling the Daily Banknotes in Circulation in the Context of the Liquidity Management Operations of the European Central Bank

Gonzalo Camba-Mendez, Alberto Cabrero, Astrid Hirsch, Fernando Nieto

European Central Bank, Kaiserstrasse 29, Frankfurt am Main, Germany

The main focus of this paper is to model the daily series of banknotes in circulation in the context of the liquidity management operations of the Eurosystem. The series of banknotes in circulation displays very marked seasonal patterns. To the best of our knowledge the empirical performance of two competing approaches to model seasonality in daily time series, namely the ARIMA-based approach and the Structural Time Series approach, has never been put to the test. The application presented in this paper provides valid intuition on the merits of each approach. The performance of the models is assessed in the context of their impact on the liquidity management operations of the Eurosystem.



Tuesday 25th June 2002 1640 - 1750

Time Series Analysis

Chair: Ron Bewley

1. Forecasting some low-predictability time series using diffusion indices

Bryan Campbell, Marc Brisson, John Galbraith

Concordia University, Dept of Economics, Montreal, Ontario, Canada

The growth rates of real output and real investment are two macroeconomic time series which are particularly difficult to forecast. This paper considers the application of diffusion index forecasting models to this problem. We begin by characterizing the performance of standard forecasts, via recently-introduced measures of predictability and the forecast content, noting the maximum horizon at which the forecasts have value. We then compare diffusion index forecasts with a variety of alternatives, including the forecasts made by the OECD. We find gains in forecast accuracy at short horizons from the diffusion index models, but do not find evidence that the maximum horizon for forecasts can be extended in this way.

2. Interest Rates and Exchange Rates: the Turkish case

Zelal Kotan, Aldonso Mendoza

Central Bank of the Republic of Turkey, Stiklal Cad. No. 10, Ulus, Ankara, Turkey

Raising interest rates high enough can defend the value of the national currency according to the conventional wisdom. However, high interest rates may have mixed signals over the value of the exchange rate during crisis periods. First, high interest rates impose high costs on both growth and public debt. Hence, people are unlikely to believe that high interest rates would continue for a long period. Second, high interest rates may result in increased risk premium as a consequence of decreased credibility, which would raise devaluation expectations. The main question to be revealed in this study is to investigate evidence suggesting that a rise in interest rates by monetary policy action succeeds in defending the national currency during 1990-2001 period in Turkey using weekly data. Though a direct estimation of the relationship between interest and exchange rates supports the conventional wisdom, an increase in interest rates is more likely to cause a depreciation of the exchange rate during crisis periods. This result is stronger once risk premium is taken into consideration. The study considers two methods to approximate risk premium. While the first method approximates it as the interest rate differential derived from the uncovered interest rate parity condition (UIP), the second one defines the risk premium as a function of the conditional variance of the UIP condition. A simple GARCH(1,1) process is assumed for the latter method. Both methods suggest that there is a high sensitivity of risk premium to interest rates and there is no significant evidence to support the conventional approach. In other words, there exists a high response of risk premium to interest rate movements. Therefore the policy implications would be that policy makers should not insist on raising interest rates to avoid further depreciations or there would be further interest rate increases and devaluation.



Tuesday 25th June 2002		Room D
1640 - 1750	Time Series Analysis	

3. Modelling Exchange Rates: Smooth Transitions, Neural Networks, and Linear Models

Marcelo Medeiros, Alvaro Veiga, Carlos E Pedreira

Pontifical Catholic University of Rio de Janeiro, Dept of Economics, Rio de Janeiro, Brazil

The goal of this paper is to test for and model non-linearities in several monthly exchange rates time series. We apply two different non-linear alternatives, namely: the artificial neural network time series model estimated with Bayesian regularization and a flexible smooth transition specification, called the neuro-coefficient smooth transition auto regression. The linearity test rejects the null hypothesis of linearity in ten out of fourteen series. We compare, using different measures, the forecasting performance of the non-linear specifications with the linear auto regression and the random walk models.

4. Comparing structural and time series based forecasts: real-time evidence from South Carolina

Don Schunk

The University of South Carolina, Moore School of Business, Columbia, USA

The purpose of this paper is to examine the relative forecast accuracy of a structural economic model with several alternative time series forecasting models. Specifically, this paper compares the forcast accuracy of a structural econometric model of the South Carolina economy with forecasts generated from alternative times series models, including ARMA and VAR models of the state economy. The comparisons focus on alternative forecasts of state employment and personal income, and are made using standard metrics such as root mean squared error. Particular concern is placed on making realistic forecast comparisons. This is accomplished by constructing a series of real-time data sets for each quarter of the 1990's. The use of these real-time data sets, that is, using only data that were actually available during each quarter, ensures that the forecast comparisons are meaningful.



Tuesday 25th June 2002 1010 - 1120

New Forecasting Methodologies

Room E

Chair: Herman Steckler

1. Combining the results of rationality studies

Herman Stekler, Robert Goldfarb

George Washington University, Dept of Economics, Washington DC, USA

Numerous empirical literatures display conflicting results. This paper examines the conflicting results concerning the rationality of forecasts and expectations. Meta-techniques are used to examine the empirical studies that tested the rationality hypothesis. What did we know and when did we know it, about the rationality of forecasts? Our purpose is to systematically document how conclusions changed over time and to investigate whether meta-analysis techniques might have been useful in shedding light on these findings. The results differ depending on which meta null is used, but there is no definitive finding about the rationality of these forecasts.

2. Decomposition by causal forces: applications to transportation safety data

J. Scott Armstrong, Fred Collopy, J Thomas Yokum

University of Pennsylvania, The Wharton School, Philadelphia, USA

We describe decomposition by causal forces. This procedure was hypothesized to be more accurate than direct forecasts when the components can be forecast as accurately as the target series and the target series is complex. Complex time series are defined as those subject to different causal forces. We made forecasts for five such series drawn from airline and motor vehicle safety data, containing 275 forecasts. Causal decomposition produced a substantial error reduction compared with making direct forecasts of the target series.

3. The benefits of model choice?

Robert Fildes, Wlodek Tych, Michele Hibon

Lancaster University, Dept of Management Science, Lancaster, UK

The M3 competition has shown that various standard univariate forecasting methods such as damped trend are hard to beat when the data series are heterogeneous. Further progress on forecast improvement can only be achieved through either a new and better methods or an approach that effectively selects the methods (from a range of alternatives) that best suits an individual series, an approach known as 'individual selection'. It has already been established that the potential exists ex post for improvements. This research examines a sub-set of monthly data from the M3 competition using multiple time origins to examine different ex ante approaches to individual selection to establish whether gains can be made from selection.



Tuesday 25th June 2002		Room E
1150 - 1300	Non-parametric Forecasting	

Chair: Rob Hyndman

1. A comparison of three nonparametric local linear extrapolation methods

Rob Hyndman, Baki Billah, Ivet Pitrun

Monash University, Dept of Econometrics & Business Statistics, Monash, Australia

We compare three nonparametric forecast methods: smoothing splines, local linear regression and Holt's method. Each produces forecasts using local linear extrapolation. We show that smoothing splines and Holt's method can be derived using state space models. The properties and performance of the three methods are compared.

2. Estimation and prediction for linear processes

Sucharita Ghosh

Swiss Federal Research Institute WSL, Landscape Department, Birmensdorf (ZH), Switzerland

Nonparametric estimation of distribution functions for short memory processes using kernel estimators (see e.g. Wand & Jones 1995) was considered in Abberger (1996, 1997). Ghosh, Beran & Innes 1997 and Ghosh & Draghicescu 2002 generalize this approach to transformations of Gaussian processes with long-memory. Thus let $\{Y(i)=G(Z(i),i/n), i=1,2,..,n\}$ denote the observed process, Z(i) being a zero mean stationary Gaussian process, t a re-scaled time point in [0,1] and G a suitably defined function. Then estimation of F(t,y)=P[Y(t)<y] at t, where y is real, can be carried out assuming that the centered indicator function $1\{Y(t)<y\}$ -F(t,y) admits an appropriate Hermite expansion (see Major 1981). Among other studies, density estimation and nonparametric regression for Gaussian processes with long-memory were considered in two articles by Csorgo & Mielniczuk in 1995. Also, forecasting of trend functions for processes with long-memory, short-memory as well as anti-persistence was considered in Beran & Ocker (1999) using SEMIFAR models (Beran 1999 and Beran & Feng 2002).

In contrast to the model Y(i)=G(Z(i)) (see Taqqu 1975, Dehling & Taqqu 1989), Giraitis and Surgailis (1994) consider linear processes {Y(i), i=1,2,...} that are infinite weighted sums of iid innovations. Properties of Y(i) then depends on the behavior of the weights {b(j), j=1,2,...} and when they decay hyperbolically, Y exhibits long range dependence (see e.g. Beran 1994 & Cox 1984). Estimation of F(y) = P[Y(i) < y] is then carried out using Appell polynomial expansions (Giraitis & Surgailis 1986) of the relevant indicator functions.

In this article we consider nonparametric estimation and prediction of distribution functions of processes that may have been generated from suitably defined linear processes. We derive limit theorems and provide prediction limits for the quantiles.



Tuesday 25th June 2002 1150 - 1300

Non-parametric Forecasting

3. Smoothing offical time series with TSMARS

Gerard Keogh

CSO, Ardee Road, Dublin, Ireland

Time Series Multivariate Adaptive Regression Splines (TSMARS) is a data driven time series smoothing technique based on Friedmans' Multivariate Adaptive Regression Splines (MARS) algorithm. Specifically, MARS fits a linear combination of tensor product spline functions on the set of independent predictor variables to the dependent variable. In contrast TSMARS uses lagged dependent variables as the set of predictor variables. The principle objective of TSMARS is to recover non-linear threshold structure in a time series in the presence of noise.

Certain series arising in official statistics pose problems when modelled with linear methods and appear to leave a non-linear signature in the residual. In this presentation we report on experience gained using TSMARS to smooth some of these series. Issues that influence the quality of the smoothed estimate such as ARCH effects and outliers are assessed through simulation studies. An outlier treatment strategy is proposed for TSMARS that does not interfere greatly with its efficiency. A variation that involves using (block) TSMARS separately on regular and seasonal elements of a time series is also proposed. These strategies are applied in modelling the selected official series and the smooths obtained are compared with the "basic" TSMARS smooth. We find that the proposed outlier treatment strategy improves the quality of the smooths both in appearance and statistically.

4. Modeling Vector Nonlinear Times Series Using POLYMARS

Bonnie K Ray, Jan de Gooijer

IBM Watson Research Centre, Dept of Mathematical Sciences, Yorktown Heights, USA

A modified multivariate adaptive regression splines method for modeling vector nonlinear times series is investigated. The method results in models that can capture certain types of vector self-exciting threshold autoregressive behaviour, as well as provide good predictions for more general vector nonlinear time series. The effect of different model selection criteria on fitted models and predictions is evaluated through simulation. The method is illustrated for a real date example, to model a series of intra-day electricity loads in two neighbouring Australian states.

Room E



Tuesday 25th June 2002Room E1500 - 1610Developing Corporate Forecasting Expertise

Chair: Hans Levenbach

1. From Forecasting to Drink - and how we could be more sociable with business

Peter Gormley, Gordon MacMillan

Scottish Courage, Edinburgh, UK

The presentation covers the developments in forecasting and market modeling within Scottish Courage Brands, the major brewer in the UK take home market. It illustrates the joint development of new methods of demand modeling with staff and post graduates from Lancaster and Napier Universities.

The areas covered will include regression modeling of the major factors affecting demand, developing elasticities and cross-elasticities, and more recent developments on profit and promotional modeling.

Finally, there will be a focus on some benchmarking activity, and the wish to further develop a practitionerfocused group within IIF to advance the application of forecasting in business.

2. Job market demands for forecasters in industry: A US experience

Hans Levenbach, Bill Sichel

Delphus Inc, 2147 Route 27, Edison, USA

In this paper we present an informal survey of the employer requirements for forecasters in industry as experienced in a recent job search. This analysis is focused on non-Ph.D. positions and we used as sources the more popular job search web sites and conversations with search firms in the U.S. These represent two of the three important mediums for job searching, the third of which is networking. Issues of interest included: type of academic background, transferability of skills from one industry to another, level of experience, salary ranges and the importance of software experience. In addition, we explore the changes that have occurred in qualifications required by potential employers of candidates for forecasting positions. We believe this information is important in developing and understanding the benefits an IIF certification program could offer business forecasters. It will also offer new and experienced forecasters a better understanding of the market, provide useful information to educators in the construction of curriculum and provide direction for more active involvement and integration of the academic community with the business forecasters community.

3. Making Forecasting effective in BT

Clive Mason, Glyn Williams BT Retail, UK

This paper discusses a number of changes to forecasting processes & systems within BT, and their impact on the quality of the overall Business Planning Process. It will show how we have built on the experience gained from the development and running of the TIDeS Forecasting System (Winner of the IIF Corporate Forecasting Award in 1999), and how the introduction of a Virtual Forecasting Team within the BT Retail Division has contributed towards a raising of forecasting standards across the Division. It will also touch on our efforts to implement an Accreditation Scheme for forecasters in BT.
Room E



Tuesday 25th June 2002 1640 - 1750

Business Cycles Forecasting

Chair: Lars-Erik Oller

1. Forecasting European growth rates with factor structure and regime switching

Jose Ramon Cancelo

Dpto. Economia Aplicada II, Facultad C. Economicas, Campus de La Zapateira, La Coruna, Spain

The formation of the European Union (EU) suggests that observed comovements among national rates of growth reflect the evolution of a single, unobserved variable that represents the general state of the European economy. Besides, modern research has given special attention to the asymmetries of business cycle expansions and contractions, both in an univariate framework and in dynamic factor models. Hence it appears that an estimate of the state of the European economy that takes into account changes in regime would improve univariate forecasting of national rates of growth, the resulting forecasting errors being idiosyncratic components that are independent across countries within the EU.

In this paper we investigate empirically whether this hypothesis holds. We consider GDP quarterly data of seven major European economies from 1980:1 to 1997:4, build a dynamic factor model with regime switching and compute the filtered (concurrent) estimates of the unobserved factor. Next we compute causality tests to determine whether: (1) the filtered estimates of the factor help to predict observed growths; (2) knowing the performance of any other single country in the recent past provides better forecasts once the factor has already been included in the set of information. The tests are carried out for the seven countries that were used to derive the index and also for some other countries within the EU, in order to verify that the factor is actually reflecting the performance of the European economy as a whole and not merely the observed comovements among the selection of countries. Finally we forecast the period 1998:1 to 2001:2 with four different types of models (univariate linear, univariate with Markov Switching, linear dynamic factor and dynamic factor with regime switching) and forecasting horizons ranging from 1 quarter to 1 year.

2. Price behaviour in the spot market of Brazilian coffee: analysis in the time and freqency domain.

Wagner Moura Lamounier

Rua Padre Francisco Arantes n.141 apt 303, Bairro Vila Paris, Belo Horizonte, Brazil

The main goal of this research work was to detect the existence of the stochastic (and/or deterministic) components of Trend, Cycles, Seasonality and Conditional Volatility in the spot market prices of the most important Brazilian agricultural commodity: the coffee. Analyzing how the dynamics of these prices is influenced by these components and providing theoretical and empiric evidences to the forecasts of the economic agents involved with operations with this commodity in the spot and future market. The sample was composed of monthly data from 1950 to 2000. The methodology employed was the analysis in the time domain (to trend, seasonality and volatility) and the analysis in the frequency domain, also knew as spectral analysis to the study of cycles in the prices. The results found that the trend in the coffee prices is compounded by a mix of deterministic and stochastic trend. With relation to the cycles in the prices, the spectral analysis has shown the existence of a biannual cycle (24 months). This cycle reflects the influence of the biological cycle of coffee production. With relation to seasonality the research found that in the international prices of the Brazilian coffee this component is not deterministic or regular; it has a stochastic nature, and varies in function of the time. The results pointed too that the conditional variance of the model to the coffee prices has a unit root and will not return to its historic mean with the time flow, after a shock. This means that shocks in the volatility will persist in these prices, indicating a very high degree of risk (of price and income) to the economic agents operating in the Brazilian coffee spot market and pointing that forecast in the long-run will tend to be very misleading.



The sector OF the law second		Deces 5
Tuesday 25th June 2002		Room E
1640 - 1750	Business Cycles Forecasting	

3. Current Quarter GDP forecasts and coincident indicator models

Luis Nunes, Alda Rito

Universidade Nova de Lisboa, Faculdade de Economia, Tv Estevao Pinto, Lisbon, Portugal

Coincident indicator models for the economic activity must rely on economic time series that are readily avaiable in order to produce timely estimates of the state of the economy. However, one of the most important measures of economic performance, real GDP, is usually available with substantial delays. This fact explains why researchers have not included this variable in coincident indicator models when prompt estimation of the state of the economy is required. In this paper we show how a modification of the Kalman filter used in the Stock and Watson (1989, 1991) model allows for a prompt estimation of the coincident economic indicator using all available information at each point in time, either current or lagged. Since the evolution of GDP should be highly correlated with the state of the economy, more stability and precision may be obtained when estimating the model with this variable included. Moreover, the proposed methodology also allows forecasting current GDP. We present an empirical application for the Portuguese economy. Results show that our approach compares favourably with alternative models.

Room F



Tuesday 25th June 2002 1010 - 1120

Financial Forecasting

Chair: James Doherty

1. Forecasting with Rissanen's Context Tree model: The case of stock market efficiency

Yael Alon-Brimer, Armin Shmilovici, Shmuel Hauser

Ben Gurion University, Industrial Engineering & Management Department, Beer Sheva, Israel

Universal coding methods were developed within the context of coding theory to compress data sequences without any prior assumptions about the statistics of the generating process. The universal coding algorithms constructs a model of the data that will be used for coding it in a less redundant representation. Rissanen's context tree algorithm was recently proved to have the best asymptotic convergence rate. This means that it can be used to compress even relatively short data sets - like the economic time series. Since the compressibility of a data set indicates that the data is not random, we can use the model that was used for compressing the data, for prediction of a future outcome. In this research, Rissanen's context tree algorithm was first used to test the compressibility of a data sequence above the threshold of random compressibility. If the compressibility threshold is surpassed, we can expect a better than random forecast for the time series. We used the daily returns of the 25 stocks that compose the TA25 stock exchange index between the years 1993 - 2000. The daily stock returns were encoded to binary strings indicating positive and negative return. Forecasts were made using sliding windows of 50, 75 or 100 previous trading days. For each financial series, a context tree was computed and used for generating a next day forecast e.g. a forecast of the 51st day was generated based on the previous 50 days. The forecasts were compared with the actual next day returns. In 60% - 85% (depending on the window length) of the stocks tested, which demonstrated compressibility above the random, successful prediction was detected. This method was used for testing the weak efficiency form of market efficiency. This research demonstrated that the TA25 stock exchange is efficient most of the time but not all the time.

2. A Quantile regression analysis of the cross section of stock market

Michelle Barnes, Anthony Hughes

Federal Reserve Bank of Boston, 600 Atlantic Avenue, Boston, USA

Traditional methods of testing the Capital Asset Pricing Model (CAPM) do so at the mean of the conditional distribution. Instead, we test whether the conditional CAPM holds at all points of the conditional distribution by utilizing the technique of quantile regression (Koenker and Bassett (1978), Buchinsky (1998)). This method estimates the marginal effect of a change in an independent variable on any conditional quantile of the dependent variable. Further, we model the performance of firms or portfolios that under or over perform in the sense that the conditional mean over or under predicts the return of the portfolio and evaluate associated forecasts of beta and returns.

3. House prices and housing investment in Sweden and UK. An econometric q-model for the period 1970-1994

Bharat Barot, Hans-Martin Krolzig, Zan Yang

Uppsala University, Institute for Housing and Urban Research, PO Box 785, Gavle, Sweden

We estimate quarterly dynamic housing demand and quarterly supply models for Sweden and UK for the sample period 1970-1998. using an Error Correction Method (ECM). This method requires as a preliminary step that we test for the order of integration and co-integration. The ECM models seem appropriate as the dynamics of both short-run (changes) and long-run (levels) adjustment processes are modelled simultaneously. To facilitate comparisons of results between Sweden and UK we model both countries identically with almost the same exogenous variables. The results indicate that the volatility in house prices and housing investment can be sought in the fundamentals representing the demand and supply sides in accordance with theoretical conceptions and experience of how the housing market works. The long run income elasticities for Sweden and UK are 1.5 and 1.9 respectively. The long run semi-elasticity for interest rates are 1.9 and 1.4 for Sweden and UK. The speed of adjustment on the demand side is 0.15 and 0.18 and on the supply side is 0.41 and 0.39 for Sweden and the UK respectively. Granger causality tests indicate that income Granger causes prices for Sweden, while for UK there is also a feedback from house prices to income. House Prices Granger cause financial wealth for Sweden, while for UK there is a feed back from debt. Interest rate Granger cause Granger cause house prices for UK and Sweden.



Financial Forecasting

Room F

Chair: James Doherty

1. SIMPLER: Synthesis of Information Minimised Projections with Learning Error Reduction

James Doherty

University College, Dept. Computer Science, Cork, Ireland

A simple information theoretic paradigm is adopted to minimise both information processing needs and model complexity throughout all stages of the forecasting process whilst attempting to maximise transparency, confidence, utility, and hopefully accuracy, or at least, risk aversion. Several reported promising methods are a natural consequence of this minimalist information-theoretic perspective, including: time-series conversion to alphabet strings; multiple unbiased experts; regime and adaptive model shifts; and short and long term memory effects. Additionally, somewhat simple unorthodox approaches are suggested, which exhibit interesting performance, some of which have analogues within general resource allocation policies. Financial markets are clearly competitive, where the mutual interplay of several competing factors significantly affects participant expectation and consequently, strategy adopted, thus playing a major role both in individual and in overall system response, which should be incorporated into any predictive model. Moreover, with increasingly rapid, widespread news dissemination, and diminishing automated response times, market participants and strategies are becoming increasingly competitive. A simple causal model is developed to emulate these competitive processes, including increasing competition, itself, within a single formalism. It is therefore essential, that any forecasting system can learn and adapt. This is achieved by synthesising forecasts through a typical neural network structure with inputs from each predictive model expert, regardless of the individual model being explicitly or implicitly causal, stochastic, based on domain specific rules, user preferences, or news derived sentiment. Confidence measures are obtained naturally within a neural formalism both for individual predictors and the overall combined forecast, through a combination of intrinsic self-monitored confidence estimates and by correlation with past historical performance in comparable circumstances. The method is applied to standard financial forecasting data sets, but the framework is not domain specific and is applicable to general forecasting problems.

2. Can the Arms Index predict future stock returns?

Dennis Olson, Jorg Bley

American University of Sharjah, School of Business, PO Box 26666, Sharjah, United Arab Emirates

The Arms Index developed in 1967 by Richard Arms has become one of the most popular indicators used in technical analysis. This volume-weighted advance-decline ratio is a money flow indicator that forecasts future stock market direction by assuming the short-term persistence of historical supply-demand imbalances. The Arms index is defined as (A/D)/(AV/DV), where A is the number of advancing issues on a stock exchange, D is declining issues, AV is advancing volume, and DV is declining volume. If more volume is associated with advancing stocks, Arms < 1 and the interpretation is that prices will rise short-term as money flow continues to fuel further price advances. If Arms < 1, money is flowing into declining stocks and this has a bearish interpretation. This paper tests the information content of the Arms index for the three major US stock exchanges over the period 1978-2001. Models constructed with lagged values of the Arms Index and various moving averages of the index are examined for in-sample and out-of-sample forecasting performance judged on the basis of forecast error and trading rule profits. Preliminary analysis indicates that the Arms Index has some predictive value and that statistically significant abnormal returns can be earned using this information-even when paying moderate commissions. We also examine nonlinearities in the use of the Arms Index by constructing neural network models analogous to regression-based models that were shown to have some forecasting ability. In-sample results are excellent, but out-of-sample results for the neural network model have, as yet, been no better than for other models or techniques.



Tuesday 25th June 2002Room F1150 - 1300Financial Forecasting

3. New Evidence on the longer horizon predictability of return volatility of the German DAX: An assessment with model-free test procedures

Burkhard Raunig

Oesterreichische Nationalbank, Economic Studies Division, Otto-Wagner-Platz 3, Vienna, Austria

Volatility of financial returns as a measure of risk is a key parameter in asset pricing and risk management and holding periods for financial instruments of several weeks or months are common in may financial institutions. Nevertheless, little is known about the predictability of return volatility at longer horizons. This paper investigates the predictability of return volatility of the German DAX for forecasting horizons from one day to 45 days. To avoid joint assessments of predictability and assumed volatility models three model-free test procedures, which are based on an intuitive definition of predictability, are considered. Contrary to earlier findings according to which the return volatility of the DAX is only predictable for 10 to15 trading days, the empirical evidence provided in this study suggests that the volatility of DAX returns is predictable for horizons of up to 35 trading days and may be forecastable at even longer horizons.

4. Short ratio and stock market prices

Kemal Saatcioglu, Celal Aksu

Koc University, Graduate School of Business, Rumeli Feneri Yolu, Sariyer, Istanbul, Turkey

We test for the presence of a unit root and cointegration between stock prices and short ratio. We find stock prices and short ratio to be cointegrated which renders the level and first differences specifications used by previous researchers inappropriate. We also find stock prices to be exogenous. Estimated error correction models indicate that stock prices affect changes in short ratio but not the other way around.



Tuesday 25th June 2002 1500 - 1610

Financial Forecasting

Room F

Chair: Richard Gerlach

1. Sensitivity of VaR with respect to the fit of fat tails

Susana Alvarez, J. Samuel Biaxauli

Universidad de Murcia, Dpto Metodos Cuantitativos para la Economia, Facultad de Economia, Murcia, Spain

In the last decades, Value at Risk (VaR) has been become in a relevant topic for risk management research. Different methods have been proposed to calculate VaR: Historical Simulation Approach, Monte Carlo Simulation Methods and Variance-Covariance Methods. The last method relies on the hypothesis of normality. However, this hypothesis has been widely tested in financial literature as the true underlying distribution of high frequency data is more peaked and has fatter tails than the normal distribution. At present, several studies concerning with the validity of the normality hypothesis on calculating VaR have appeared.

The objective of this paper is to obtain a more accurate measure of VaR using the distribution function that better fits the conditional behaviour of the tails. In doing this, we consider several alternative specifications: Student, mixtures of normals, logistic, Edgeworth-Sargan and Generalized Student's t. We compare the performance of these specifications using bootstrap procedures (parametric bootstrap), based on approximating the distribution of CramÈr-von Mises statistic (CVM), when it is constructed with the standarized residuals of the model and the parameters of the distribution postulated under the null hypothesis are substituted by their maximum likelihood estimates. This methodology is required to implement the goodness of fit test because the tabulated critical values can not be used.

After fitting the conditional behaviour of the tails, we compare the value of VaR provided under the chosen distribution and the VaR is obtained if another specification is selected or if the empirical distribution function is used.

2. A Bayesian approach to using fundamental date to enhance a value investment strategy: US, UK and Australian evidence

Richard Gerlach, Ron Bird

University of Newcastle, School of Mathematics and Physical Sciences, University Drive, Callaghan, Australia

This paper presents a fully Bayesian technique for analysing and forecasting discrete count data using generalised linear regression models. This technique uses Markov chain Monte Carlo sampling and extends the variable selection method of Smith and Kohn (1996) as well as utilising the slice sampler of Mira and Tierney (2001).

The method is advantageous as it can be applied in situations with a large number of potential variables to choose from. The technique is illustrated by an application to do with stock selection, based on one-year ahead forecast return performance, to enhance a simple value investment strategy. Value investing has been around since the 1930's and simply ranks stocks based on mulpitples such as book-to-market and price-to-earnings ratio. We enhance this strategy by selecting a significant subset of accounting variables (from a superset of 24 potential explanators), linked to stock performance by a logistic regression model, forecasting the direction of 'value' stocks (above or below the market return) and investing appropriately. Each year the investment portfolio is based on a new forecast model, estimated using the last five years of data.

The results from this strategy are encouraging but not popular with classical economists.

Room F



Tuesday 25th June 2002 1500 - 1610

Financial Forecasting

3. An exit-probability-based approach for the valuation of defaultable securities

Gabriella Iovino, Lucia Caramellino

Member of Management, Risk & Knowledge, Swiss Re, Mythenquai 50/60, Zurich, Switzerland

This paper presents a methodology to handle the pricing of contingent claims subject to default risk as well as interest rate risk. The uncertainty is driven by a 3-dimensional diffusion process whose components represent the short-term interest rate, the bankruptcy process and the asset underlying the derivative security. By operating a change of probability measure, the price of a defaultable contingent claim is shown to depend on two factors: the price of its default free counterpart and a suitable exit probability. In general such a probability does not admit a closed form, so it is numerically computed through Monte Carlo methods corrected by means of Sharp Large Deviation techniques.

This approach has several notable features. First it allows for an interesting representation of credit spreads in terms of the probability of default. Second, it provides a martingale property for the ratio between the price of the defaultable contingent claim and its associated default-free counterpart. Finally, it can be used for the pricing of a range of defaultable contingent claims whose default-free counterpart admits a closed-form solution.

4. Price discovery, causality and forecasting in the freight futures market

Manolis Kavussanos, N Nomikos

Athens University of Economics and Business, Athens, Greece

This paper investigates the causal relationship between futures and spot prices in the freight futures market. Being a thinly traded market whose underlying asset is a service, sets it apart from other markets investigated so far in the literature. Causality tests, generalised impulse response analysis and forecasting performance evaluation indicate that futures prices tend to discover new information more rapidly than spot prices, which is in line with the empirical evidence from other markets. Sub-period results, corresponding to revisions in the composition of the underlying index, show that the price discovery role of futures prices has strengthened as a result of the more homogeneous composition of the index in the recent years. Finally, the information incorporated in futures prices, when formulated as a VECM, produces more accurate forecasts of the spot prices than the VAR, ARIMA and random-walk models, over several steps ahead. However, despite the market performing its price discovery function efficiently, trading on the contract will stop in April 2002 as it has failed to attract trading interest from market participants. It seems that this is a result of the poor hedging performance in the market and the emergence of a competing over-the-counter forward market offering risk protection against the fluctuations in the individual routes which constitute the general index.



Tuesday 25th June 2002		Room F
1640 - 1750	Transportation Forecasting	

Chair: Peg Young

1. Periodic approaches to traffic flow forecasting

Roberto Camus, Gianfranco Fenu, Giovanni Longo, Fabio Pampanin, Thomas Parisini University of Trieste, Dept of Civil Engineering, P. le Europa, 1, Trieste, Italy

Different kinds of models have been proposed for the simulation the flow behaviour within the motorway system according to traffic counts, while the in-flow forecasting for the next time slice is seldom considered. In this context the development of short or medium-term forecasting models is of basic importance for the implementation of suitable control strategies.

Typically, traffic flows present daily, weekly and also seasonal variations. Standard approach to deal with these variations consists in filtering the original data, to obtain stationary signals, and then applying the conventional theory, such stationary Auto-Regressive (AR) or Auto-Regressive Moving Average (ARMA) models.

A different approach is proposed in this paper, which uses the periodic variations of the traffic flow to increase the efficiency of the forecasting model. In fact, the traffic flow is analysed as a cyclo-stationary process, that is a non-stationary process, characterized by periodically time-varying statistics. The analysis has been carried out by resorting to a Periodic Auto-Regressive Moving Average model (PARMA model), i.e. an ARMA model with periodic coefficients.

In order to calibrate and validate the models, real traffic data have been used. These data have been collected through the pay-toll system of the Italian motorway A4 from Venice to Trieste. For each vehicle on and off ramp, time of entrance and exit, class and day are known, so both O/D matrix and class flow may be easily obtained for each time slice. With reference to different time slices, a comparison among the different models is presented in the paper, in order to exploit the improvement of the forecasts due to the implementation of the periodic approach.

2. A monthly coincident index of the US Transportation sector

Kajal Lahiri, Herman Stekler, Wenxiong Yao, Peg Young

University of Albany:SUNY, Dept of Economics, BA 110, 1400 Washington Avenue, Albany, USA

We construct a coincident index for the U.S. Transportation Service (TS) sector using monthly data from 1979. First, we develop an output measure for TS consisting of passenger travel and freight movement. The passenger travel includes air, rail, transit and highway. The freight includes trucking, air, rail, waterborne, and pipelines. Using these two separate sectoral output indices we construct total TS output index that is consistent with the Department of Commerce BEA Transportation Satellite Accounts. We then combine this index with employment, real income, and real sales of TS to construct the Transportation Service Coincident Index (TSCI) using the NBER approach. We study the business cycle characteristics of the series, and compare them with the business and growth cycles of the U.S. economy. We find that TSCI leads the growth cycles of the economy both at peaks and troughs consistently without giving false signals.

3. Revenues forecasts and elasticities estimation of public transport

Antonio Garcia-Ferrer, M Bujosa, A de Juan, P Poncela

Universidad Autonoma de Madrid, Dept de Analisis Economico, Campus de Cantoblanco, Madrid, Spain

Our interest in this project is related to the choice of alternative types of public transport and its incidence on the Madrid Metropolitan Area. When planning transportation facilities two conditions are needed: i) reliable predictions of demand and, ii) efficient estimation of the users response to changes in prices and in the characteristics of the service. Therefore, these two conditions are the main objectives of this paper. We address the problem of forecasting a large number of tickets demand on a monthly basis that are subject to the types of multiple, complex calendar effects, superimposition of outliers, changing supply service and changing seasonality that arise in many applications. New variants of unobserved components models implemented in the new BGF algorithm together with standard statistical alternatives provide some interesting forecasting comparisons where the pooling forecast option is also contemplated.



Tuesday 25th June 2002 1010 - 1120

Forecasting Methods

Chair: Robert Raeside

1. Robust demographic forecasting

Robert Raeside, Krishna Gayen

Napier University, School of Mathematics and Statistics, Sighthill Court, Edinburgh, UK

The predominant method of forecasting in demography is the component method, which is an inherently bottom up methodology. This method is reliant on making predictions of population at various ages by using accounting procedures based upon input predictions of the vital rates of fertility and mortality and making allowances for migration. In uncertain conditions, such as in the developing world, these methods have proved far from accurate. In this paper a top down methodology is presented in which an attempt is made to limit the potential error in forecasts. The method is based on predicting total population, then proportioning into genders, and then by use of rational life table projections obtaining forecasts of the number of births and the population in different age ranges for each sex. The forecasting performance of this methodology is evaluated and it is shown that the approach is worthy of further consideration and will be particularly helpful in the developing world

2. Forecasting industrial production from qualitative survey data: a new method

Oscar Claveria, Ernst Pons, Jordi Surinach

Dept of Econometrics, Barcelona, Spain

Business surveys have become a useful source of information for macroeconomic analysis. One of the reasons that explains the increasing importance of business surveys steams from the qualitative nature of the expectations data. The fact that the results of the surveys are available several months before the official quantitative series conferes them a great value.

The aim of this paper is to use business test data for short-term forecasting. In order to do so, a new estimation method based on a time-varying parameters model is developed. The methodology described in the paper allows for a more general modelling of the response thresholds.

With the purpose of evaluating the forecasting ability of the new methodology an application to Spanish manufacturing expectations is undertaken. It is found that the method purposed in the paper is superior to the most common converting procedures for converting qualitative response data to quantitative expectations, both in terms of producing lower forecast root mean square error (RMSE) values and in detecting turning points in the actual data.

Room G



Tuesday 25th June 2002		Room G
1010 - 1120	Forecasting Methods	

3. "Caterpillar" - SSA methods for times series forecasting

Nina Golyandina, Vladimir Nekrutkin

St Petersburg University, Mathematical Department, Bibliotechnaya sq, 2 Petrodvoretz, St Petersburg, Russia

Caterpillar'-SSA forecasting is based on the corresponding technique of time series analysis (see Golyandina, Nekrutkin, and Zhigljavsky (2001) Analysis of time series structure: SSA and related techniques') and inherits its features. One of them is an ability to analyze the time series without a priori assumptions about time series structure (in particular, stationarity assumption isn't necessary; the model isn't enforced). The other is visual control based on the theoretical results.

SSA-decomposition and identification of additive components of the time series lead to construction of the trajectory space and the corresponding linear recurrent formula (LRF). Therefore, for forecasting we should suppose that the time series or the forecasted component (signal, trend, or periodicity) could be (at least, approximately) described by a certain LRF. Note that the class of time series governed by linear recurrent formulas is wide enough: any sum of products of polynomials, exponents and sines/cosines belongs to this class.

We consider the modification of the SSA recurrent forecasting. This modification is called vector forecast and is based on the trajectory space rather than the LRF. Model examples show that the long-term vector forecast can be more stable. For qualitative estimation of accuracy, empirical and bootstrap confidence intervals are suggested.

The proper SSA-analysis allows us to get reasonable and interpretable forecast. The best results are achieved for detection and forecast of the periodic components. The advantage of the `Caterpillar'-SSA methods in comparison with some other methods is that we don't need to know the period; the form of periodicity (i.e., seasonality) can be complex and can have variations with time. Several examples are provided.



Tuesday 25th June 2002 1150 - 1300

Forecasting Methods

Room G

Chair: Robert Raeside

1. An application of predictive least squares principles to forecasting exchange rate volatility

Anthony W Hughes

Vanderbilt University, Dept of Economics, Box 351819 Station B, Nashville, USA

This paper considers the problem of optimally forecasting exchange rate volatility using model selection methods. More specifically, we consider the properties of a new approach based on Rissanen's (1986) predictive least squares (PLS) and the associated predictive least absolute deviations (PLA). These criteria select the model that minimizes the accumulated ex ante prediction errors while treating the observed data as a holdout sample. Given that the practitioners' aim is to minimize subsequent out of sample forecast errors, model selection criteria based on the predictive power of the model, in terms of volatility forecasting, should be ideal, particularly since standard model selection criteria were not designed with volatility forecasting in mind. We then follow Brooks and Burke (1998) and compare the performance of the PLS-type criteria to that of standard model selection criteria in forecasting the volatility of the CAD/USD, DEM/USD and JPY/USD exchange rates. We find that the PLS and PLA criteria generally outperform all methods under consideration when the model choice set contains only models in the GARCH(p,q) framework.

2. Determining smoothing parameters to use for exponential smoothing methods

Richard Lawton

University of West of England, Faculty of Computing Engineering and Mathematical Sciences, Coldharbour Lane, Bristol, UK

Exponential smoothing methods are widely used forecasting methods, which involve the use of smoothing parameters. This paper investigates the problem of estimating the most appropriate values for these, and establishes that the widely used method of using gradient search techniques, like that in Microsoft Excel's Solver, can find local optima rather than the global minimum.

The paper goes on to examine the effect this may have on the method's ability to forecast and the ability of method selection techniques to determine the correct model.



Tuesday 25th June 2002		Room G
1150 - 1300	Forecasting Methods	

3. A system to combine forecasts based on State Space models and Kalman filter

Carlos Mate, Jose Benitez

c/ Alberto Aguilera 23, Paseo de la Florida 59, Esc. B, 2 Izda, Madrid, Spain

Over the years, the traditional approach to the forecasting problem laid in the selection of the forecast method which was judged the most suitable for the specific problem. An alternative to this approach is the combination of the information provided by different forecasting methods into a combined forecast, which prevents from choosing the "best" method.

This paper reviews some of the main problems to combine efficiently forecasts, and studies some of the most used methods to do it. Moreover, an approach to obtain individual forecasts is proposed, which is based on the state space formulation of each model, and the estimation of their parameters by using the Kalman filter. Finally, this framework is used to optimise the combination of forecasts. To evaluate the performance of this method, a case study is developed with time series of electrical energy price and demand in Spain from 1998 to 2000. This new method of optimisation generates better forecasts than traditional methods of combination in short-time forecasting.

4. Analysing longitudinal count data with an application to the patents and R & D relationship: Estimating equations approach

Vandna Jowaheer, R P Rao, B C Sutradhar

University of Mauritius, Dept of Mathematics, Faculty of Science, Reduit, Mauritius

In many manufacturing sectors it is important to find the relationship between the research and development (R&D) expenditures of firms and the number of patents applied for and received by them. For the purpose, it is standard to collect this type of discrete count responses along with covariates such as R&D, from a large number of firms, successively over a small period of time. As the responses are collected repeatedly, it is likely that the number of patents collected over the years are correlated, also the covariates such as R&D are time dependent. In 80's, some authors, for example, Hausman, Hall and Griliches (1984, Econometrica, 52, 909-938) considered a mixed effects approach for modelling such longitudinal count data with possible overdispersion. This approach is however not able to model autocorrelation structures such as AR(1) and MA(1), appropriate for repeated count data. In this talk, following Jowaheer and Sutradhar(2002, Biometrika, to appear in June issue), we discuss an observations driven autocorrelation process to model the longitudinal correlations of the patent counts, which is then used in estimating equations to find the effects of the covariates such as R&D on the number of patents collected over the years. The issue of forecasting the future patent numbers is also addressed.



Tuesday 25th June 2002 1500 - 1610

Long Memory & Forecasting

Chair: Chris Chatfield

1. Forecasting by wavelets and hierarchical models

Mark Heiler, Jan Beran, Dirk Ocker

University of Konstanz, Fach D 147, Konstanz, Germany

We consider prediction based on wavelet decomposition and other hierarchical models (some with special modelling of long memory). Explanatory time series and their wavelet components are used to improve the quality of forecasts. Another approach is based on renewal processes. The methods are applied to different types of German interest rates as well as to the federal funds rate.

2. The local whittle estimator of long memory stochastic volatility

Bonnie K Ray, Clifford M Hurvich

IBM Watson Research Centre, Dept of Mathematical Sciences, Yorktown Heights, USA

We propose a new semiparametric estimator of the degree of persistence in volatility for long memory stochastic volatility (LMSV) models. The estimator uses the periodogram of the log squared returns in a local Whittle criterion which explicitly accounts for the noise term in the LMSV model. An extensive simulation study reveals that the local estimator is much less biased than the widely-used GPH estimator. In an empirical analysis of the daily Deutschemark/Dollar exchange rate, the new estimator indicates stronger persistence in volatility than the GPH estimator, provided that a large number of frequencies is used.

3. On estimation and prediction for long memory stochastic volatility models

Rohit Deo

8-57 KMEC, 44 West 4th Street, New York, USA

We consider semi-parametric as well as parametric GMM and QML estimation of long memory stochastic volatility models. We show that moment conditions currently used in the literature for GMM estimation have a slower rate of convergence than root n for the long memory SV model, while the QML estimator still preserves the root n rate. We provide a new set of moment conditions which are able to preserve the root n rate for GMM estimation. We provide theory for semi-parametric estimation of the memory parameter. We then consider issues pertaining to prediction of squared returns based not only on past squared returns but also on general powers of past absolute returns.

Room G



Long Memory & Forecasting

Room G

Chair: Gopal Basak

1. Forecasting sardine fisheries

Nuno Crato, Fatima Borges, Miguel Santos, Hugo Mendes ISEG, R. Miguel Lupi 20, Lisbon, Portugal

Forecasting stocks of fish species is of utmost economic importance for many countries. Recently, various researchers have tried to improve these forecasts by considering climate variables. We consider long series of North Atlantic sardine catches and show how the consideration of wind variables is potentially able to improve forecasts for a two-year horizon.

2. Finite linear predictors of long-memory time series

Wilfredo Palma, Pascal Bondon

Facultdad de Matematicas, Casilla 306, Correo 22, Santiago, Chile

In this work we analyse the rate at which the best linear predictor based on a finite number of past observations of a stationary long range dependent process converges to the best linear predictor given the entire infinite past, as the sample size goes to infinity. For these processes, we establish that the difference between the two predictors converges to zero at a hyperbolic rate.

3. Cointegration in fractional systems with unknown integration orders

Peter M Robinson, Javier Hualde

London School of Economics, Dept of Economics, Houghton Street, London, UK

Cointegration of nonstationary time series is considered in a fractional context. Both the observable series and the cointegrating error can be fractional. We allow their integration orders to be unknown, with also parametric modelling of short memory components, in formulating optimal estimates of the cointegrating coefficient. We establish desirable asymptotic properties of these estimates, which can readily be used in testing hypotheses on the cointegrating coefficient. A Monte Carlo study of finite-sample performance is included.



Tuesday 25th June 2002 1010 - 1120

Econometrics & Economic Forecasting

Room H

Chair: John Fitzgerald

1. The use of LEB (Linear-Ellipsoidal-Bounded) models in financial forecasting and estimation

Claudio Antonini

Greenwich, USA

In the field of forecasting and estimation it has been traditional to resort to assumptions that could facilitate the analytical manipulation of density functions, more for convenience than for exactness. Examples of deviations from the usual 'independent samples from a normal distribution' include skewness, leptokurtosis, jumps, and heteroscedasticity. However, there are situations, such as when using returns of high frequency data, which need to use non-normal models.

We present a procedure that does not need to consider the density function of the underlying process in the derivation of estimators, but that relies on the process' temporal behaviour. The equations that describe the process are similar to the familiar least-squares or Kalman filters, but the interpretation and behaviour are different.

Using this procedure, for example, one can include information that usually cannot be incorporated into the forecasting, such as the daily maximum and minimum of prices, still conserving the simplicity of well-known formulations, but adding more information that potentially can help in the forecasting.

A numerical example is presented, showing how the LEB procedure is applied to estimate conjunctly the DAX, Nikkei and Dow Jones indices returns, and comparing the results to a traditional Kalman filter. Extensions to other financial applications will be mentioned, including the use of the formulation for multivariate GARCH and the interpretation of volatility.

2. Consumer confidence indicators and private consumtion expenditure in 13 OECD countries

Bengt Assarsson

Sveriges Riksbank, Stockholm, Sweden

Consumer confidence indicators are frequently used by forecasters of the business cycle. This paper examines the predictive power of such indicators in predicting aggregate private consumption expenditure in 13 OECD countries. There is clearly a high degree of correlation between these indicators and private consumption expenditure in the data. However, an evaluation of the forecasting performance of the indicators should be done with reference to reasonable benchmark models. In this paper indicators are added to five different consumption models and the predictive power of the indicators are examined. If the indicators help predict consumption expenditure, independently of the information set used, it is considered useful. A distinction is done between indicators available simultaneously with other data and indicators known in advance. The evaluation is done by comparing predictive performance both within and out-of-sample. The results show that the confidence indicators help predict consumption for some countries, especially when the indicator is known in advance. However, it is also shown that when there is an improvement of the within-sample standard error of the regression or the out-of-sample RMSE it is quite small and economically insignificant.

3. Empirical information criteria for time series forecasting model selection

Baki Billah, Rob J Hyndman, Anne B Koehler

Monash University, Dept of Econometrics & Business Statistics, Clayton, Melbourne, Australia

In this paper, we propose a new empirical information criterion (EIC) for model selection. It is applicable to situations involving a large number of time series to be forecast. For example, it can be applied to a large inventory of products for which sales need to be forecast on a monthly basis. Our new criterion provides a data-driven model selection tool which can be tuned to the particular forecasting task.

The penalty function for each series is chosen based on the other series. We compare the EIC with other modelselection criteria including Akaike's Information Criterion (AIC) and Schwartz's Bayesian Information Criterion (BIC). The comparison show that for the M3 forecasting competition data, the EIC outperforms both the AIC and BIC.



Tuesday 25th June 2002		Room H
1150 - 1300	Econometrics & Economic Forecasting	

Chair: John Fitzgerald

1. Preliminary data and econometric forecasting: an application with the Bank of Italy quarterly model

Fabio Busetti

Bank of Italy - Research Department, Via Nazionale 91, Rome, Italy

This paper considers forecasting by econometric and time series models using preliminary (or provisional) data. The standard practice is to ignore the distinction between provisional and final data. We call the forecasts that ignore such a distinction "naive forecasts", which are generated as projections from a correctly specified model using the most recent estimates of the unobserved final figures. It is first shown that in dynamic models a multistep-ahead naive forecast can achieve a lower mean square error than a single-step-ahead one, intuitively because it is less affected by the measurement noise embedded in the preliminary observations. The best forecasts are obtained by combining, in an optimal way, the information provided by the model with the new information contained in the preliminary data. This can be done in the state space framework, as suggested in numerous papers. Here we consider two simple methods to combine, in general suboptimally, the two sources of information: modifying the forecast initial conditions via standard regressions and using intercept corrections. The issues are explored with reference to the Italian national accounts data and the Bank of Italy Quarterly Econometric Model. A series of simulation experiments with the model show that these methods are quite effective in reducing the extra volatility of prediction due to the use of preliminary data.

2. Inflation forecasts in non-stationary conditions

Gudmundur Gudmundsson

Central Bank of Iceland, Reykjavik, Iceland

Inflation in Iceland has been variable in past decades, often very high but moderate in the nineties. Most inflation forecasts have been based on assumed or estimated relationships with wages and import prices which, when inflation is high, depend mainly upon the rate of exchange. Wage bargaining is fairly centralized so that considerable knowledge is often available of future wages.

The observed series are not readily transformed into approximately stationary series. There are strong economic and statistical arguments against the notion that the logarithm of the price series is an I(2) process. Spells of inflation above or below average last for intervals of the order of 10 years so that meaningful estimates of first or second order properties from a series of first differences are not attainable.

Models used for forecasting are based on first differences and contain error correction terms including wages, productivity and import prices. Because of missing variables or long term bias in the calculation of the wageand price indices these models need adjustment of long-term variations by linear trends or random walk terms. GARCH modelling or other adjustment is necessary to account for changes in residual variance but the series are too short to determine the best form of this with much certainty.

Models of first differences including linear trends or random walk terms are obviously a misspecification of the long run properties of the series. But experiments with predictions beyond the data used for estimation indicate that these models produce useful predictions, conditional upon future wages, for 1-3 years ahead.

3. Deterministic Seasonality in Dickey-Fuller tests: should we care?

Artur Silva Lopes

ISEG-UTL, Rua do Quelhas 6, Lisbon, Portugal

We certainly should! Why? a) obviously, because otherwise tests will not be invariant to the parameters of the seasonal cycle; b) because neglecting its presence in the case of the simplest I (1) process, i.e., the random walk, may be disastrous for the size properties of the tests, and the general-to-specific t-sig lag selection method is a poor remedy for the problem in this case and in more empirically relevant settings; c) because size adjusted power may also be much lower than usual. Our numerical evidence also adds to the one recently presented on the shortcomings of currently used procedures for lag selection in Said-Dickey-Fuller test regressions containing deterministic regressors.



Tuesday 25th June 2002 1500 - 1610

Forecasting Inflation Rates

Chair: David Hendry

1. Forecasting Annual UK Inflation using an Econometric Model over 1875 - 1991

David F Hendry

Oxford University, Economics Department, Wellinton Square, Oxford, UK

The model of annual inflation in Hendry (2001b) includes excess demand forces from all sectors of the economy (goods and services, factors of production, money, financial assets, foreign exchange, and government deficits), represented by equilibrium-correction terms. One through 4 year ahead inflation forecasts are compared for five individual forecasting devices (original model, general model, a model selected for each horizon, a naive forecast, and a joint model), as well as four 'pooling' approaches (average of the individual forecasts, a 'factor' forecast, a 'fitted' forecast, and a 'trimmed' mean). Here, combination improves accuracy, especially over longer horizons.

2. The information content of M3 for future inflation

Juan Luis Vega, Carmine Trecroci

Frankfurt am Main, Germany

The information content of broad money M3 for future GDP inflation in the euro area is investigated from a number of perspectives. Firstly, tests that money does not Granger-cause prices are conducted within a cointegrated VAR system comprising real M3 holdings, real GDP, inflation and short -and long- term interest rates. Secondly, this empirical framework is extended to investigate the claim that -in the context of an extended P-star model- the real money gap has substantial predictive power for future inflation. And thirdly, the P-star type of model developed is compared with an existing rival model of inflation in the euro area where no explicit role is given to monetary developments.

Our empirical results confirm that a significant positive association exists between the real money gap and future inflation up to five to six quarters ahead, reaching a maximum at the three-to-four quarter horizon. It is also shown that, although the extended P-star model outperforms the competing model in terms of out-of-sample forecast accuracy (as measured by the root mean square forecast errors) at horizon above two quarters, the hypothesis that no useful information is contained in rival evidence can be rejected at standard confidence levels.

3. Econometric Modelling for short-term inflation forecasting

Antoni Espasa, Rebeca Albacete

University Carlos III of Madrid, C/Madrid 126, Getafe, Madrid, Spain

Inflation forecasts with monthly updates are highly demanded. At monthly level it is difficult to construct causal models. As an alternative, this paper - originated in previous works of the first author and colleagues- proposes a disaggregated econometric modelling of a CPI using leading indicators and formulating non-linear structures if required.

Disaggregation by relatively homogeneous groups of markets is important because the components of a CPI have generally more than one common trend. On explaining inflation, different economic theories have been proposed, but real data require eclectic models (Hendry 2001). If for a given group of markets a certain theory is more important than others, then our approach, giving forecasts for the different components of a CPI, provides solid hints to venture a explanation about the causes driving the aggregate forecast.

This approach has been successfully applied for USA, EMU, Spain, etc.

Room H



Tuesday 25th June 2002		Room H
1640 - 1750	Econometrics & Economic Forecasting	

Chair: Geoff Allen

1. Levels, differences and ECMs: the role of unit root testing in econometric forecasting

P. Geoffrey Allen, Robert Fildes

University of Massachusetts, Dept of Resource Economics, Amherst, USA

Within the realm of time-series econometric modelling there is some minimal reliance on economic theory to select the variables to be included, after which data-dependent methods are used to discover the dynamic structure. Following a general-to-specific strategy one can specify an equation in either autoregressive distributed lag or error correction form (or for more than one-step-ahead forecasts, the vector equivalents). The questions that arise are: Should the forecaster use unit root and cointegration tests as a first step, to give guidance on the initial specification? Or should such tests be used as part of the model simplification procedure? Or should one avoid unit-root testing completely?

All of these strategies have their supporters and detractors. We examine the impact of the different strategies on forecasting performance. Weak evidence from published studies supports using unit root and cointegration tests to improve the starting specification, before imposing simplifying parameter restrictions to get to the final model.

2. A choice based diffusion model for multi-generations of products with multiple-option

Won-Joon Kim, Jeong-Dong Lee, Tae-Yoo Kim

Seoul National University, 38-402, San56-1, Shinlimdong, Gwanakgu, Seoul, Korea

This study extends the mult-generation diffusion model to incorporate the possibility of substitution among products. The proposed diffusion process is supported by the discrete consumer choice theory over multi-generation and multiproduct based on the concept of utility maximisation. The model is applied to the case of semi-conductor industry

3. The order of Integration for Quarterly Time Series: a simple testing strategy

Artur Silva Lopes

ISEG-UTL, Rue do Quelhas 6, Lisbon, Portugal

Besides introducing a simple and intuitive definition for the order of integration of quarterly time series, this paper also presents a simple testing strategy to determine that order for the case of macroeconomic data. A simulation study shows that much more attention should be devoted to the practical issue of selecting the maximum admissible order of integration. In fact, it is shown that when that order is too high one may bet (spurious) evidence for an excessive number of unit roots, resulting in an overdifferenced series. The proposed testing strategy is designed to avoid this problem and hence it is expected that it might contribute to improve the forecasting performance of univariate and multivariate models. However, further research is needed on this issue.

4. Model Builder - an automated general-to-specific modelling tool

Michal Kurcewicz

Warsaw University, Dept of Economics, ul. Dluga 44/50, Warsaw, Poland

The general-to-specific methodology (also known as the London School of Economics, LSE, methodology) is one of the most widely used methods of econometric model construction (see for example [Hendry]). Recently, specification search algorithms that automate some stages of the general-to-specific methodology have been proposed [Hoover, Krozlig].

In this paper we present an enhanced specification search algorithm. Extensions include cointegration analysis and handling of structural breaks. The current implementation allows for automated construction of Error Correction Models.

Although, specification search algorithms were originally developed to analyse how well does the LSE modelling approach work in controlled conditions [Hoover], they are also a valuable tool for empirical research. As an empirical example, an automated construction of a demand function for narrow money in Austria is presented. Results are similar to those obtained in a more traditional way [Hayo] - a stable money demand function is found.



Tuesday 25th June 2002 1010 - 1120

Sales & Marketing

Chair: Moira Hughes

1. On combining revealed and stated preferences to forecast customer behaviour: three case studies

Philip Hans Franses, Peter Verhoef

Erasmus University Rotterdam, Econometric Institute, PO Box 1738, Rotterdam, The Netherlands

Many companies collect stated preference data (SP) like intentions and satisfaction as well as revealed preference data (RP) like actual purchasing behaviour. It seems relevant to examine the predictive usefulness of this information for future revealed preferences, that is, customer behaviour. In this paper we address this issue by considering three case studies.

2. Sports forecasting: ranking predictors' performance and forecast outcomes from ranks -English Premier soccer league

Ronald Giles, John Fleming

South Bank University, Business School, Borough Road, London, UK

In the literature, performance based on ranking prediction and on soccer predictors has been considered separately. Sufficient data is now available to assess the contribution ranking makes to soccer outcomes. The English premier league has existed for ten seasons. Its creation captured revenue from increased television coverage. The prize money is devolved to the soccer clubs on the basis of end of season league position and expected league ranking. Higher placed teams compete in European competitions, offering additional revenue. The bottom three teams are relegated, losing most of their television funds. Soccer managers are regularly fired after a short run of poor results or underperformance. Directors of such clubs base their finances on the expected end of season position, using ad hoc indicators. The object of this paper is to provide better predictors based on statistical theory. The performance of alternate ranking predictors is evaluated. Ranks as forecasts of soccer outcomes are assessed as performance indicators. Prediction of rankings is becoming easier but no method dominates, whilst forecasting outcomes have been more random.

3.Sales Forecast for Pharmaceutical Product based on Historical Data and Market Research Study

Alex Yaroshinsky, Greg Vontz

Connetics Corp, 3400 West Bayshore Road, Palo Alto, California, USA

Sales forecast for pharmaceutical products serves as a basis for both marketing and business plan development for a one-year period. The time-series and non-linear regression models were used to forecast sales of existing products as a function of sales force expansion, pricing, competition and preferences of the prescribing physicians. The relative effect of these parameters on time-dependent sales trend was determined and statistically significant parameters were selected. Market research study was used to identify the factors affecting physicians' decision to prescribe various products. Seventy-five physicians (15 patients per physician) participated in this study. Physicians were given a choice of products (including competition) to prescribe to the patients and were asked to identify factors they based their decision upon. The logistic model was used to determine significant factors motivating physicians to prescribe certain product. The bias in physicians prescription trend was determined by evaluating their actual prescriptions based on the patients' charts. These factors, as well as physicians' assessment of the future prescription rates were used in a new product forecasting model. Effect of the new product on the existing product market share was estimated based on the physicians' responses. The sales forecasts for existing and new products were combined to produce a one-year sales forecast for the company. The combination of historical sales trends and marketing research studies proved to be an effective methodology to build a reliable forecasting model for a family of existing and new products.

Room I



Tuesday 25th June 2002 1150 - 1300

Time Series Analysis

Room I

Chair: Jan de Gooijer

1. Establishing a solution strategy for electrical demand forecasting in Ireland

Damien Fay, John Ringwood, Marissa Condon, Michael Kelly

Dublin City University, School of Electronic Engineering, Control Systems Group, Dublin, Ireland

Electrical demand is driven by economic and human activity, which has obvious daily, weekly and yearly cycles as well as a long-term trend and special periods such as bank holidays, Christmas etc., all of which are reflected in load data. These characteristics of electrical demand must inevitably be incorporated into any demand-forecasting model. However, with the exception of a few papers [1,2], the vast bulk of the literature on electrical demand forecasting is concerned with forecasting techniques, without a-priori quantifying the characteristics of the data which these techniques must model.

This paper quantifies the characteristics of electrical demand data in Ireland. The characteristics identified are:

- The connection between trend and variability (daily maximum minus minimum) of load (using the Box-Cox transform),
- The different day-types in the data (using a Kohonen map),
- The relationship between load and the dominant causal variable, temperature (using coherence and regression analysis) and
- The transition between day-types (using Fuzzy c-means clustering),

The results of the analysis show that:

- The variability is proportional to the trend,
- Ten different day-types exist,
- Temperature is correlated to demand at maximum daily, but not higher, frequencies,
- The relationship between temperature and demand is non-linear for most day-types, and
- The transition between day-types is not always crisp.

Finally a solution strategy for Irish load forecasting is proposed which encapsulates all of the above characteristics.

2. Protecting the Public Health - Forecasting Fine Particulate Matter

William Hunt, Michael T. Crotty

Dept of Statistics, NC State University, Campus Box 8203, Raleigh, USA

We live in a technical society that collects vast quantities of environmental data. The Pollutant Standards Index (PSI), the U.S. air quality index, translates air pollution data from six major air pollutants into a form readily understood by the public. Those asking questions seek answers in the simplest form. What will the air quality be tomorrow? The PSI plays an important communications role and has many uses: daily reporting to the general public (for those pollutants with short-term health effects), for trends analysis, and for the overall effectiveness of environmental policies and regulations across multiple pollutants. This paper will examine the difficulty of forecasting fine particulate matter, an important pollutant used in the PSI. Many areas in the US exceed the fine particulate matter standard. Around the world, the problem is much worse, especially in Third World Countries. Fine particulate matter consists of particles that are less than 2.5 microns in diameter. They are associated with adverse health effects including decreased lung function, increased hospital admissions and emergency room visits, increased respiratory symptoms and disease, and premature death. The most sensitive groups include children, the elderly and individuals with cardiopulmonary disease, such as asthma. The use of forecasting techniques to predict PM fine in both summer and winter will be examined. The PSI currently uses the 24 hour PM fine standard in its calculations, which is difficult to forecast using meteorological data because of the 24-hour time frame. A question raised in the recent workshop held by Environment Canada, "Towards a Canadian Air Quality Index" will be explored: "Could a three hour standard be used instead of a 24-hour standard and would this be easier to forecast?".



Tuesday 25th June 2002 1150 - 1300

Time Series Analysis

3. Forecasting the electricity market in Spain

Jose Parreno, Raul Pino, David de la Fuente, Paolo Priore

Edificio Energia, Campus de Viesques, Gijon, Spain

The main objective of this job, is the obtention of forecasts for the price of the electric power in the Electricity Stock Market in Spain. For this purpose, two time series were analysed, those corresponding to hourly prices and demands during the last two weeks of April, 1999. Forecasts were obtained applying two of the most recognized techniques: Box-Jenkins and Artificial Neural Networks; univariate and transfer function models, in which the demand was introduced as explanatory variable, were built. From both kinds of models, forecasts were calculated for the twenty four hours of April 30th, and the results show that transfer function models slightly outperform the univariate ones.

4. Stochastic modelling of concentration fluctuation of atmospheric pollutants

Reginaldo Rosa Cotto de Paula, Valderio Anselmo Reisen, Jane Meri Santos Av Vitoria 1729 Jucutuquara, CEFET, Vitoria -ES, Brazil

A review of air pollution literature in an isolated building suggests that time series analysis methods are not being widely used by those studying air pollution. This work studies the application of the time series to describe the behaviour of the fluctuations of atmospheric pollutants concentration in an isolated obstacle surface. The aim is to apply the modelling of times series, using Box-Jenkins (1976) methodology, implementating stationary models in time domain and finally, observe the series in their domain of frequency. The data was obtained from a field experiments, conducted by Santos (2000) at Dugway Proving Ground, Utah, USA, under a wide range of atmospheric conditions ranging from neutral to unstable. A gaseous source was located about 3.5Hb upwind of the central face of the frequency of 50 Hz, using photo ionisation detectors (PID's). The present study investigates both the influences of the changes of thermal stratification and the different orientations of the obstacle in relation to the wind in the statistical concentration fluctuation related to the stochastic nature of the atmospheric turbulence.

Room I



Tuesday 25th June 2002		Room I
1500 - 1610	Time Series Analysis	

Chair: Kajal Lahiri

1. Testing forecast efficiency with cross-country data

Kajal Lahiri, Prakesh Loungani, Gultekin Isikler

University of Albany:SUNY, Dept of Economics, BA 110, 1400 Washington Avenue, Albany, USA

We test forecast efficiency using Consensus Forecasts on a large number of countries after taking into account the cross-country error covariance structure due to propagation of shocks among countries in a GMM framework. The error covariance matrix incorporates the correlation of forecast revisions i) between two countries due to common shocks, ii) for the same country due to same targets, and iii) made at same time but for different countries and targets. We reject rationality in almost all cases. Using a VAR model and generalized response functions, we study the degree of inefficiency of the forecasters. We find that forecasters take 1-5 months to adjust their forecasts to "news".

2. A partitioning approach to the specification of large VAR models: with an application to the DAX30 series

Michael A Hauser

Vienna University of Economics and Business Administration, Augasse 2-6, Viennna, Austria

The paper proposes a new specification approach for large VAR models in standard form by partitioning the left hand side variables into a fixed number of groups, so that for each group a "best" set of explanatory (lagged endogenous) variables is given. We start with a collection of different sets of lagged endogenous variables, which are valued with respect to the predictive power (Geweke(1982)) for all endogenous variables. The grouping of the left hand side variables and the selection of the "best" explanatory sets is performed simultaneously by the partitioning algorithm which solves the p-median problem of the uncapacitated facility location problem. In order to improve the first collection of explanatory variable sets a systematic iterative search is performed. An application to 26 daily stock return series of the DAX30 is given.

3. A BVAR with endogenous Priors: an application to regional forecasting

Teresa Leal, Jesus Rodriguez Lopez

Universidad de Huelva, Dpto. de Economia General y Estadistica, Plaza de la Merced 11, Huelva, Spain

Vector autoregression (VAR) models have become a widely-used tool for forecasting economic time series. In an attempt to improve the out-of-sample forecasting accuracy, Litterman (1979) and Doan, Litterman and Sims (1984) proposed a random-walk-inspired prior restrictions on the coefficients of the model. Based on the work by Alvarez, Ballabriga & JareÒo (1998), this paper focuses on a method for improving forecasting accuracy where the Litterman prior is relaxed. A menu of prior distributions is offered in order to minimize the U-Theil of each variable in the system and for every period ahead to be forecasted. The method is applied to a Bayesian VAR (BVAR) for output, unemployment and the price level in Andalusia. Our approach reveals that a substantial forecasting capability might be reaped with respect to the classical VAR, Litterman-prior BVAR and ARIMA models. Finally, this approach can be used for predicting other sort of time series (i.e. financial (series), with minor adjustments.



Tuesday 25th June 2002

Tuesday 25th June 2002 1640- 1750

Time Series Analysis

Chair: Kajal Lahiri

1. Agglomerations and regions: do we need integrated or hybrid models?

Dirk Stelder

University of Groningen, Faculty of Economics, PO Box 800, Groningen, The Netherlands

In the Netherlands, academic and policy interest is shifting from regions to agglomerations. At the level of provinces substantial regional divergence in terms of unemployment or GDP per capita no longer exist. Instead, a dramatic rise of traffic congestion, housing prices and economic-environmental conflicts throughout the country reflect the growing urgence of scarcety of space and the need for policy at lower spatial levels as subregions, specific agglomerated clusters or individual cities. This trend puts a growing pressure on the academic world to come up with simulation and forecasting models that can produce results at lower spatial levels than ? as was the case in The Netherlands- the traditional level of provinces. The classes of regional models at our current disposal can be roughly divided into the integrated input-output/econometric approach aimed at forecasting and the (inter)regional CGE approach aimed at simulation. At the level of cities and agglomerations, however, the rapidly growing literature in New Economic Geography has come up with a third class of methods, models and techniques. This paper discusses the question whether these classes of models need and can be integrated. A framework of a hybrid prototype model for the Northern Netherlands is presented in which two spatial levels, regions and cities are modelled together.

2. Tree-structured smooth transition (auto) regression models

Joel Correa da Rosa, Alvaro Veiga, Marcelo Medeiros

Rua Voluntarios da Patria O1 apto 206, Rio de Janeiro, Brazil

This work aims to present a proposal of a parametric tree-structured model which differs from others approaches due to the intensive use of statistical hypothesis testing. Our approach combines ideas from two methodologies: Classification and Regression Trees (Breiman, 1984) and Smooth Transition (Auto) Regression (Granger and Terasvirta, 1993). In order to take decisions during the tree growing procedure, the Lagrange Multiplier (LM) test is used. The regimes obtained from the use of this model can be interpreted through the hierarchical structure of a binary tree and a set of fuzzy rules leads to the response prediction. The results show empirical properties of the estimators and the empirical power of the LM test applied to this situation. Finally, we show some applications of this proposal using benchmark data sets and its performance is compared to other non-linear modelling alternatives.



3. Tree structure threshold autoregressive models

Alvaro Veiga, Christian Aranha

1640-1750

Rua Margues de Sao Vicente 225, Rio de Janeiro, Brazil

Regression trees (CART), proposed by Freidman (1979) and Breiman (1984), are widely used in non-parametric modelling. One of the main advantages of this methodology is that the resulting hierarchical structure can be easily interpreted. Unfortunately, this method suffers from some drawbacks such as: instability, need of large samples and the lack of inferential procedures that assures the significance of the results. The central idea of CART is to find a partition of the explanatory variables space where the data can be approximated by a piecewise constant function. In this sense, CART method is closely related to the Threshold Autoregressions (TAR) models by Tsay (1979) and extended to multiple thresholds (MTAR) by Medeiros, Resende and Veiga (2001), which associate a different autoregression - instead of just a mean value - to different regions of the explanatory variables space. The main advantage of the MTAR is its statistical set-up, which allows for inference methods to be applied. The results of MTAR, however, are difficult to interpret due to the way the partition is determined. In this paper we propose a variation of the MTAR model where that partition is given by a hierarchical structure as in the CART method, combining a statistical modeling framework and an efficient partitioning algorithm. This new model is called Tree Structure Threshold Autoregression (TS-TAR). We present a complete estimation/specification methodology based on information criteria and statistical tests, which is evaluated throughout a Monte Carlo experiment. Finally, the model is applied to several time series classically analysed in the non-linear modelling literature.

4. On the interactions between growth and volatility in a Markov switching model of GDP

Peter M Summers, Penelope A Smith

The University of Melbourne, Faculty of Economics & Commerce, Parkville, Australia

In this paper we present a Markov-switching model of GDP, in which the variance also depends on an unobserved state variable that is independent of that driving the mean. The model is a Bayesian version of that estimated by McConnel & Perez-Quiros (American Economic Review, 12/2000) in a slightly different context. It also nests the model of Kim & Nelson (Review of Economics and Statistics, forthcoming), in which the variance shift is restricted to be a one-off structural change. Our main findings are summarised as follows. First, there does seem to be a significant reduction in the variance of US GDP growth in early 1984, supporting earlier results. However, it is not clear that this change represents a permanent shift.

Second, unlike Kim and Nelson, we find no evidence that the mean growth rates in expansions and recessions has narrowed in the low-variance regime.

Third, when we look across countries, we find similar shifts in the variance of growth in Canada, the UK, Australia and Japan. Japan is the only country in which the variance has increased.

Finally, for all the countries we study, Bayes factors provide support for a linear mean process, but overwhelmingly reject the constant variance hypothesis.



Details of Sessions Wednesday 26th June 2002

Wednesday 26th June 2002 1010 - 1120

Innovations in Forecasting Practice

Room A

Chair: Sandy Balkin

1. Are we any good at forecasting? Ten years of industrial forecasting - a case study

Jonathan Aylen, Kevin Albertson

UMIST, Centre for Manufacture, PO Box 88, Sackville Street, Manchester, UK

One principle of forecasting is there should be a formal review of forecasting procedures and outcomes. An audit of forecasting practice is also one way of demonstrating professional competence to a client.

The authors provide forecasting services for a large European steel producer. Forecasts have covered inventory behaviour, demand and prices for raw materials. The concern here is a ten year sequence of time series forecasts for a key commodity, US ferrous scrap prices.

The requirements of a successful forecast are analysed. Out-turn results are compared with a null of no change. ARIMA forecasting is shown to face difficulties predicting the timing of turning points, but performs well over a shorter horizon up to nine months. In truth, the year ahead is the most crucial for budgetary purposes.

Modelling practice has evolved over time with experience. For example, the treatment of inflation has been improved. Models have been up-dated. Later specifications are retrospectively evaluated on earlier data periods.

This paper confronts realities of using time series techniques for practical forecasting over a long period of time. It concludes with implications for model selection and discusses alternative forecasting procedures.

2. Nonlinear Forecasting of Physicians' Choice

Sandy Balkin, Edward Bryden

Pfizer Pharmaceuticals, 235 East 42nd Street, New York, USA

Marketing strategies used in the pharmaceutical industry are very different than those used in other areas in that the ultimate consumer is not the decision maker. Physicians choose between a variety of available therapies for a diagnosed condition. In addition, there are strict government regulations on who can be marketed to and what can be advertised. As the key decision maker, physicians are typically the target of marketing campaigns through personal visits from the sales force (details) and free trials (samples) of prescription drugs to dispense to patients. For the usual reasons, pharmaceutical companies need to forecast future sales of their products, but also need to determine optimal levels of details and samples as they are a large promotional expense. The relationship between details, samples and sales is typically nonlinear. This presentation describes various nonlinear forecasting techniques and demonstrates and evaluates their use in forecasting sales of a prescription drug using details and samples as explanatory, controllable variables.



Wednesday 26th June 2002		Room A
1010 - 1120	Innovations in Forecasting Practice	

3. Mining a large data set to predict peoples' behaviour

Gordon Blunt, David J Hand

Barclaycard, 1234 Pavilion Drive, Northampton, UK

Data mining is the process of finding interesting or valuable structures in large data sets. It is a modern discipline, and takes ideas and methods from statistics, machine learning, data management and other areas. In many ways, it is similar to exploratory data analysis, although the size of current data sets distinguishes between data mining and standard exploratory data analysis.

Databases maintained by today's companies typically contain gigabytes of data (or more), and can yield valuable insight if explored and modelled appropriately. We describe how a large data set can be used for predicting customers' behaviour, and will show applications and examples of this. We describe two aspects of the modelling credit card holders' behaviour, which we call descriptive and predictive. The former describes how customers have been observed to behave, while the latter seeks to predict how customers are likely to behave in the future.

We give illustrations of the detection of patterns in the ways customers use their card accounts, and distinguish between patterns and models. We also draw an important distinction drawn between clustering and segmentation, because the latter is often important in a business context. We use simple graphical tools to illustrate the unearthing of unexpected patterns and relationships, and show how more sophisticated modelling can build on such discoveries to help in forecasting future customer activity.

Room B



Wednesday 26th June 2002 1010 - 1120

Seasonality

Chair: Dan Williams

1. Price level forecasts from seasonal cointegration models of money demand

Klaus Eberl

KU Eichstatt-Ingolstadt, Faculty of Business, Auf der Schanz 49, Ingolstadt, Germany

In this paper price level forecast accuracy of vector autoregressive money demand systems is investigated using quarterly data for Germany, Japan, and the United Kingdom. For each country several restricted versions of a general VAR(p) model are compared, including both seasonal and standard (non-seasonal) cointegration analysis of seasonally unadjusted data, and cointegration analysis of seasonally adjusted variables. With regard to forecast accuracy over the one year horizon seasonal adjustment or restriction to deterministic seasonality seem most appropriate.

2. The consistency of a seasonal index with trended data

Peter T Ittig

University of Massachusetts, Dept of Management Science and Information Systems, Boston, USA

An earlier paper showed that estimates of a seasonal index in the standard manner (from a moving average) introduce systematic error into the seasonal estimates if a trend is present. That paper also introduced an alternative based upon a logarithmic regression that is consistent with a trend. This paper shows that there are several ways to generate a multiplicative seasonal index that is consistent with a trend and explores issues concerning when these might be used as alternatives in forecasting applications.

3. Seasonal cycles in retail interest rates

Robert Kunst, Adusei Jumah

University of Vienna, BWZ, Bruenner Strasse 72, Vienna, Austria

The incidence of seasonality in interest rates has been a major issue in historical episodes in the US. Due to the manner in which the Fed conducts monetary policy, most of these seasonal cycles have been smoothed away. However, there is still some evidence on seasonality in today's rates (for example, the "January and October effects", reported by Ward and Huffman, 1997). We provide evidence on the optimal seasonal model selected by recent advances in the joint usage of seasonality tests (Kunst and Reutter, forthcoming). We compare this model selection result, where the best model is chosen according to hypothesis testing, to the outcome of a forecasting comparison, where the best model is chosen according to ex-ante prediction. We use monthly data of retail interest rates in Australia, Germany, Japan, the United Kingdom, and the United States of America.



Wednesday 26th June 2002		Room B
1150 - 1300	Seasonality	

Chair: Dan Williams

1. Seasonal Adjustment of European Aggregates: Direct versus Indirect Approach

Dominiqui Ladiray

INSEE, Statistical Indicators for Euro-zone Business Cycle Analysis, BECH Building - Office B3/419, Luxembourg, Luxembourg

European seasonally adjusted series can be derived from Member State series by applying various strategies: seasonal adjustment of the aggregated series (direct approach), aggregation of the seasonally adjusted sub series (indirect approach) or aggregation of the seasonally adjusted series provided by Member States (mixed approach). This paper reviews the statistical criteria proposed in the literature to choose between the different approaches. These criteria are applied to the seasonal adjustment of European GDP, IPI, Unemployment and External Trade. Both TramoSeats and X 12Arima softwares are used and their performances can therefore be compared.

2. Shrinkage techniques for reducing overestimation of seasonal variation in Census X12-ARIMA

Don Miller, Dan Williams

VCU School of Business, Box 844000, Richmond, USA

In a previous paper, we demonstrated that the use of two proposed shrinkage techniques can improve the accuracy of the seasonal estimates of ratio-to-moving-averages (classical) decomposition. In this paper we demonstrate that these techniques also improve the accuracy of seasonal estimates developed by the Census X-12-ARIMA procedure. Through simulation, we compared the accuracy of the shrinkage techniques to that of X-12-ARIMA (without shrinkage) for a set of conditions that mirror the characteristics of the monthly series in the M3-Competition. We found that applying shrinkage resulted in consistently more accurate seasonal estimates than using X-12-ARIMA without shrinkage. The improvement in accuracy depended on characteristics of the series. Under no conditions were the shrinkage methods less accurate, and under some conditions the improvement was dramatic. These findings are particularly important because both X-12-ARIMA and the very similar X-11-ARIMA are widely used by governmental organisations such as the United States Census Bureau, the Bureau of Economic Analysis, and Statistics Canada for seasonal adjustment of major economic and governmental time series prior to releasing them and because these techniques are widely used by economists and business analysts (and recommended in forecasting texts) for seasonal adjustment prior to forecasting.

3. Benchmarking seasonally adjusted series to annual totals using the Henderson Filter

Benoit Quenneville, Guy Huot, Kim Chiu

Time Series Research and Analysis Centre, 3G-RHC-BSMD, 120 Parkdale Avenue, Ottawa, Ontario, Canada

We propose a simple iterative method to revise a seasonally adjusted series so that its annual totals converge to those of the raw series. We use the Henderson moving average method to smooth the discrepancies between the annual totals, we correct the seasonally adjusted series accordingly, and we iterate this process until the maximum discrepancy between the annual totals is smaller than a pre-determined convergence criteria set by the user. Finally, we show an application of the method with output tables from X-12-ARIMA (A1 for the raw and D11 for the seasonally adjusted), but the same procedure can be applied to seasonally adjusted series obtained with other seasonal adjustment method such as TRAMO-SEATS and STAMP.

Room C



Wednesday 26th June 2002 1010 - 1120 State and Local Government Forecasting

Chair: Roy L Pearson

1. Forecasting as a policy evaluation method (application of analytic hierarchy process to forecasting the German policy on primary labour market)

Elena Akatova

Institute of Telematics, Bahnhofstr 30-32, Trier, Germany

We may be interested in forecasting simply because of curiosity of what the future may bring. But mainly we are interested in forecasting the future in order to make better decisions. Complexity of decision making consist in such thing as a need of decision making in economic, political, social and technological environments at the same time. Especially, it is corresponded to policy decisions which involve a lot of multiply interests of multiply actors.

In order to provide the management leading to sustainable development, we are needed in a look on the forecasting as a basis for balanced and integrated decision making. Thus, we accept the certain balance of different, sometimes opposite impacts as an important criteria of effective government. This criteria seems to be difficult to put into consideration by using both of two known separate approaches used for forecasting - quantitative methods which employ a variety of mathematical models based on historical data, and qualitative forecasting methods that rely on intuition, personal experience. Upon other terms they are limited by logic of normative economic theory and could provide only local optimum for complex issue.

According to Saaty's AHP we would like use the policy evaluation method where forecasting focuses on the evaluation of alternative future outcomes. In this case the purpose is not to predict the future, but to identify some actions to be taken to formulate intelligent and consistent policy.

In this paper we will show that the Analytic Hierarchy Process can be an effective method for forecasting the end effects of a given policy and for determining the resulting impact on important variables such as unemployment or social development.

2. Modelling US Thimerosal-Containing Vaccine Inventories: The cost-effectiveness of forecasting models for decision making

Gary Coil

Centers for Disease Control and Prevention (CDC), National Immunization Program Mailstop E-52, 1600 Clifton Road NE., Corporate Square Bldg 12, Atlanta, USA

In 1999, public concern over possible adverse health effects from thimerosal (mercury)-containing paediatric vaccines prompted scientific and Congressional review of the subject. By June, 2000, almost all US paediatric vaccines were thimerosal-free; however, the amount of thimerosal-containing vaccine remaining in public sector inventories was unknown. In response to increasing Congressional and Agency inquiries, a simulation model was developed in April 2001 to forecast remaining inventories of thimerosal-containing pediatric vaccines based on 1.) CDC vaccine purchases from 1998-2001 (218 million doses); and 2.) expert opinion on vaccine inventory exhaustion rates. The model estimated 64.2% of all pediatric vaccines in public sector inventories contained thimerosal in March 2000, dropping to 1.3% by the end of Q1 2002.

The CDC subsequently conducted two convenience samples of national vaccine inventories validating model predictions. The first convenience sample in September, 2001, found 5.6% of paediatric vaccines in inventory to be thimerosal-containing. The second sample in February, 2002, found 1.9%. Model predictions for thimerosal-containing vaccines in inventory at these two time points were 6.4% and 2.2%, respectively. There was an 18-fold difference between the estimated cost for model development and the cost of conducting the two convenience samples (\$3,960 vs \$70,884).

These results support the assumption that well-designed forecasting models can be cost-effective alternatives to expensive, resource-intensive studies relied upon by public agencies for decision-making and policy formulation.

Wednesday 26th June 2002



Wednesday 26th June 2002Room C1010 - 1120State and Local Government Forecasting

3. Institutional change, the internet and medicaid forecasting in Washington State

Elaine Deschamps Indiana, USA

In Washington State, a new agency was recently created with the responsibility of producing caseload forecasts for the entitlement programs that are the foundation of the state budget. The Caseload Forecast Council (CFC) was created with the goals of 1) promoting the free flow of information and promoting legislative and executive input in the development of assumptions and preparation of forecasts and 2) making the caseload forecasts as accurate and as understandable as possible. The primary vehicles for achieving these goals include a new technical workgroup process, which has opened the forecast methods and assumptions up for scrutiny and debate by a wider group of participants, and the Internet, which has vastly improved the availability of data and forecast information.

This paper analyzes how the forecasting process and product has changed with the creation of the CFC, with a particular emphasis on Medicaid forecasting. It describes the technical workgroup process and the new approaches to Medicaid forecasting that have evolved, improving our understanding and explanatory power in an area that is receiving increasing attention in this time of rising Medicaid costs and state budget crises. Finally, this paper describes how the Internet is being used in the Medicaid forecasting process to improve forecasting methods, access to information, and agency accountability.



Wednesday 26th June 2002 1150 - 1300 State and Local Government Forecasting

Room C

1. Forecasting from a health insurance administrative data base

Antonio Gualtierotti

IDHEAP, Route de la Maladiere 21, Chavannes-pres-Renes, Switzerland

The Swiss Government has created a data base of health insurance reimbursements with the aim of managing more efficiently health costs (understanding, forecasting). The database is purely administrative and very large: it consists of irregularly spaced, short time series (one for every person insured, i.e. every resident). We describe a way to exploit statistically such a database and use its chronological structure to anticipate costs.

2. Ex Ante State and Local Regression Forecasts and Unconditional Regression Prediction Intervals, and their Ex Post Accuracy: Virginia Examples

Roy L Pearson

College of William & Mary, School of Business, Tyler Hall 237, Williamsburg, USA

Regression prediction intervals are underestimated by the standard prediction intervals conditional on known values for the regressors. Reasonable estimates of the prediction intervals for the regressors must be incorporated into the ex ante prediction intervals (PIs) in order to have a realistic assessment of the probable error range of the forecast. As Chris Chatfield notes, no generally accepted method exists for calculating PIs except for forecasts calculated conditional on a fitted probability model, for which the variance of forecast errors can be readily evaluated (Armstrong, J.S. 2001, Principles of Forecasting, p. 479). Tashman, Bakken, and Buzas address the issue of the effect of regressor forecast error and offer a method for approximating the effect on ex ante Pls (Tashman, L.J. et al 2000, Journal of Forecasting 19, pp. 587-600). They use rolling out-of-sample respecifications of the regression and rolling forecasts of the regressors to derive a relative forecast error variance, the ratio of the unconditional ex ante forecast variance to the standard conditional forecast variance. The extent to which the square root of this ratio exceeds one reveals the expected impact of regressor forecast error on the prediction interval width relative to the standard prediction intervals. This paper applies their method and an alternative one to Virginia state and local guarterly models and forecasts developed by MBA students in 1998 and 1999 and evaluates the expost results. The alternative method parallels Tashman et al in using rolling out-of-sample evaluations. However, the primary error measure is Mean Absolute Percent Error, MAPE. The conditional MAPEs in combination with MAPEs for the regressors and the model's elasticities with respect to these regressors provide unconditional ex ante estimates of the expected ex post MAPEs. This method also indicates ex ante the probable contribution of a regressor's forecast error to the overall MAPE.

3. Intra-annual fiscal indicators for the Euro area

Javier Perez, Pablo Garcia-Luna, Fabrice Orlandi

Universidad Pablo de Olavide de Sevilla, Sevilla, Spain

The forecasting and monitoring of general government accounts at the EMU level appears as crucial to the light of the operation of the Stability and Growth Pact, where countries are obliged to submit to the EU Commission multi-annual plans presenting forecasts for a certain number of years. The peer pressure at the EU level is moving in the direction of making governments firmly commit to the announced plans. Thus, both the quality of the forecasts published by the national governments, and the monitoring tools employed by the supra-national organisations when assessing those projections, should be as accurate as possible.

In this paper we develop a set of fiscal leading indicators for some EMU countries: Belgium, Germany, France, Spain, Italy, and The Netherlands. The indicators are based on infra-annual public accounts' figures for the state government in each country, and we use them to monitor and forecast general government accounts. We illustrate how the dynamics of the state government figures show a remarkable performance when anticipating general government accounts' movements. When compared to some official forecasts (EU Commission), we prove the usefulness of such indicators, both in qualitative and in quantitative terms.

Our fiscal indicators may provide economic analyst with an early-warning-signal set of tools, and help in her/his general assessment of the fiscal situation in a given country.



Wednesday 26th June 2002 Room D 1010 - 1120 Macroeconomics Forecasting

Chair: John Fitzgerald

1. Forecasting industrial production and the early detection of turning points

Giancarlo Bruno, Claudio Lupi

ISAE, Piazza Indipendenza 4, Rome, Italy

In this paper we propose a simple model to forecast Italian industrial production. We test for the predictive accuracy of our model over a fairly long forecast evaluation sample. We show that our VAR predictions outperform those produced on the basis of a robust ARIMA model, are on average at least as good as the survey-based projections elaborated by CSC (the research department of the Confederation of Italian Industry), and more accurate than those deriving from the IRS (Istituto per la Ricerca Sociale) econometric model. Furthermore, we show that using our model we are able to produce reliable forecasts on longer horizons, which is one of our main goals. We argue that obtaining good forecasts over a fairly long horizon is essential in order to derive a reliable cyclical indicator using signal-extraction (smoothing) techniques. We show that this is indeed the case by comparing the variance of revisions of a cyclical indicator estimated using our model's forecasts with that of the same indicator estimated using standard procedures: the information embodied in our predictions halves the uncertainty in the concurrent estimate of the cyclical indicator. This is also fundamental to timely detect turning points: using a standard routine to identify turning points, the average gain in the delay with which turning points are detected when using our forecasts is about nine months. We guess that a clear indication to practitioners and economic analysts arise from these results: accurate multi-step dynamic forecasts can improve substantially on the perception we can gain not only on the future, but also on the current phase of the economy.

2. Revisiting the Accuracy of Canadian Short-term Aggregate Economic Forecasts

Mervin Daub

Queens School of Business, Queens University, Kingston, Ontario, Canada

Following on earlier work by the author (Daub 1973,1981,1987,1993), the paper considers the accuracy of Canadian short-term aggregate economic forecasts over the forty-five year period since 1956. Data from diverse sources active in the forecasting "game" at the time the forecasts were made are examined. Traditional, as well as several more recently suggested, accuracy measures are used to comment on what the record has been not only overall, but also over various different sub-periods during this time. Some reflections on the impact of events such as inflation, oil shocks, free trade agreements, and changes in forecasting the aggregate economy more generally.

3. Forecasting changing headship rates and future numbers of households in England with a dynamic macroeconomic model

Alei Duan, Dave King

Anglia Polytechnic University, Population and Housing Research Group, Victoria Road South, Chelmsford, UK

Future numbers of households are important for strategic planning and developing purposes. A significant component of rapid household growth in England in the last three decades of twentieth century is changing headship rates. Although the changing headship rates mainly resulted from demographic effects, both theoretical and empirical studies have suggested that economic factors, particularly income, contribute significantly. Yet, the widely used headship rate household projection method does not fully integrate economic influences. This paper examines effects of key macroeconomic factors on changing headship rates in England using annual time series data from 1971 to 1996. It focuses on age-specific headship rates so that demographic variations of age and population size are controlled. Macroeconomic factors then modelled in a Vector Error Correction Mechanism (VECM) modelling system with a long-run cointegration relationship between headship and growth of income. The elasticities of key macroeconomic effects to changing headship rates are estimated. The model is also capable of forecasting future numbers of households and testing sensitiviites of household projections to changing macroeconomic conditions.

Room D

Wednesday 26th June 2002 1150 - 1300

Macroeconomics Forecasting

Chair: John FitzGerald

1.Modelling Energy demand and greenhouse gas emissions

John FitzGerald, Ide Kearney, Jonathan Hore ESRI, 4 Burlington Road, Dublin, Ireland

In the light of commitments enter into as part of the Kyoto Climate Change Convention it is important to be able to forecast greenhouse gas emissions and to model the effects of alternative policy regimes aimed at promoting compliance. This paper describes a set of models for the Irish economy that cover the main sectors contributing to greenhouse gas emissions. The energy sub-model is embedded within the HERMES macro-economic model of the Irish economy. This allows a macro-economic assessment to be made both of the effects of changes in taxes on carbon emissions or energy and of the effects of the introduction of an emissions trading regime. The HERMES model is already used to produce macro-economic forecasts for Ireland out to 2015. It can now produce consistent forecasts of energy demand and of greenhouse gas emissions. The modelling framework also allows elaborate simulation exercises of the effects of alternative policies on reducing emissions.

2. Efficiency of macroeconomic forecasts for Poland and Developed Countries

Michal Greszta, Wojciech Maciejewski

Dluga 44/50, Warsaw, Poland

The objective of this paper is to verify if Polish macroeconomic forecasts from the second half of the 1990s were efficient. There are many definitions of efficiency of forecasts. Imprecisely speaking, a forecast might be defined as efficient when it is the best possible. The best forecast is such that minimizes the loss function. Macroeconomic forecasts for developed countries do not always come out well in all efficiency tests (Mincer and Zarnowitz, 1969; Pain and Bitton, 1992; Nordhaus, 1987; Artis, 1997; +ller and Barot, 1999, 2000; Donders and Kranendonk, 1999; Ashiya, 2000 etc.). In Poland forecasts play a crucial role in the economic life since the 1990's, when transition from the central-planned to the market system begins. A natural question arises about the quality of these forecasts, compare to forecasts for developed countries. The quality of forecasts has been the subject of the author's research for some time. In 1995, we created a Macroeconomic Forecast Database as a part of the Independent Macroeconomic Forecasts PHARE Project. The Database is constantly updated and actually it includes over 8500 forecasts. The Database was used to describe the behaviour of Polish forecasts in the transition (Maciejewski, 1999; Greszta and Maciejewski, 2000), reduce forecast errors by combining forecasts (Grajek, 2000), verify the hypothesis that forecasts of the Polish government are optimistic (Greszta, 2001) etc. For the purpose of this paper, we use current year forecasts for GDP growth and average annual inflation for the years 1995-2001. Short time series does not allow for a strong result in every case. Thus, with the data available, only the simpler tests can be conducted. Summing up, the Polish forecasts stand most of the tests for weak efficiency and their quality does not differ significantly from that of forecasts prepared for countries where the tradition of macroeconomic forecasting is much more developed.

3. The forecasting value-added of using partial current information: an exercise with the Liverpool macroeconomic model for the UK

Kent Matthews, Laurian Lungu, Partrivk Minford

Cardiff Business School, Aberconway Building, Colum Drive, Cardiff, UK

Previous attempts at modelling current observed endogenous financial variables in a macroeconomic forecasting model have concentrated on only one variable - the short term market rate of interest. Forecasting efficiency was improved for a number of macroeconomic variables. This paper applies the techniques of signal extraction to all the observed current endogenous variables (interest rates and exchange rate) in a rational expectations model of the UK. The undetermined coefficients that relate the observed innovations to the unobserved innovations are obtained algorithmically. The informational advantage of applying the signal extraction algorithm to all the current observed endogenous variables is evaluated in terms of the forecasting efficiency of the model.



Wednesday 26th June 2002		Room E
1010 - 1120	Econometrics & Economic Forecasting	

Chair: Michael Harrison

1. Consistent testing for structural change at the ends of the sample

Mike McCracken

University of Missouri-Columbia, Depart of Economics, 118 Professional Building, Columbia, Missouri, USA

In this paper we provide analytical evidence that Wald (Chow, 1960) and Predictive (Ghysels and Hall, 1990) tests can be consistent against alternatives that allow structural change to occur at either end of the sample. Attention is restricted to linear regression models. The results are based on a reparameterization of the actual and potential break point locations. Standard methods parameterize both of these locations as fixed fractions of the sample size. We parameterize these locations as more general integer valued functions. Power at the ends of the sample is evaluated by letting both locations, as a percentage of the sample size, converge to zero or one. We find that for a potential break point function R, the tests are consistent against alternatives that converge sufficiently guickly. These rates provide some guidance as to the choice of bandwidth for intercept corrections. Monte Carlo evidence supports the theory though large samples are needed for good power.

2. Long-run forecasting in multi and polynomially cointegrated systems

Boriss Siliverstovs, Tom Engsted, Niels Haldrup

German Institute for Economic Research, DIW Berlin, Koenigin-Luise Strasse 5, Berlin, Germany

In this paper long-run forecasting in multi- and polynomially cointegrated models is investigated. It is shown that the result of Christoffersen and Diebold (1998) derived for I(1) cointegrated models generalizes to multi- and polynomially cointegrated systems. That is, in terms of the trace mean squared forecast error criterion, imposing the multi- and polynomially cointegrating restrictions does not lead to improved long-run horizon forecast accuracy when compared to forecasts generated from the univariate representations of the system variables. However, when one employs a loss function derived from the triangular representations of the (polynomially-) cointegrating systems, gains in forecastability are achieved for system forecasts as opposed to the univariate forecasts. The paper highlights the importance of carefully selecting loss functions in forecast evaluation of cointegrated systems.

3. On a threshold stochastic volatility model

Mike K P So, WK Li, K Lam

Hong Kong University of Science and Technology, Dept of Information & Systems Management, Clear Water Bay, Hong Kong, China

This article introduces a new model to capture simultaneously the mean and variance asymmetries in time series. Threshold nonlinearity is incorporated into the mean and variance specifications of a stochastic volatility model. Bayesian methods are adopted for parameter estimation. Forecasts of volatility and Value at Risk can also be obtained by sampling from suitable predictive distributions. Simulations demonstrate that apparent variance asymmetry documented in the literature can be due to the neglecting of mean asymmetry. Strong evidence of the mean and variance asymmetries was detected in U.S. and Hong Kong data. Asymmetry in the variance persistence was also discovered in the Hong Kong stock market.



Wednesday 26th June 2002 1150 - 1300

Econometrics & Economic Forecasting

Chair: Michael Harrison

1. Forecasting regional economic conditions on the fly - The Richmond Fed's Survey of Manufacturing

Raymond Owens

Federal Reserve Bank of Richmond, Research - 21st Floor, PO Box 27622, Richmond, USA

Assessing economic conditions in a flexible and timely manner is important to monetary policymakers, as a misreading of conditions increases the risk that policy actions will be mistimed and potentially ineffective or counterproductive. Regional economic conditions are among those the Fed monitors, and the dearth of timely information on regional economic activity magnifies this risk. To overcome the lack of comprehensive regional economic data, several Federal Reserve Banks collect primary data by survey. One report-introduced in November, 1993-is the Richmond Fed's monthly survey of manufacturing conditions in the Fifth Federal Reserve District-a five-state area in the eastern U.S. The survey's results closely match national measures of manufacturing shipments and new orders from the Institute of Supply Management (ISM—formerly the NAPM). The high correlation of these regional and national manufacturing measures appears to be an artifact of the similar structure of the sector in the Fifth District and in the U.S. as a whole.

The Richmond survey provides a number of benefits to analysts interested in gauging the region's manufacturing performance. First, the paper will show that survey results improve forecasts of the region's manufacturing activity and may be used to forecast key components of the ISM report. Second, the paper will describe how the survey offers analysts the ability to collect information in a flexible and timely fashion, features difficult to obtain through non-survey methods. Finally, the paper will develop a method of testing the reliability of survey results. The method first compiles information from a subset of regional survey respondents whose key aggregate characteristics mimic those of established benchmarks. This information is then compared to comparable information from the benchmark. The reliability of regional survey results is gauged by the sign and the magnitude of the correlation between the results and those of the benchmark.

Room E



Wednesday 26th June 2002Room E1150 - 1300Econometrics & Economic Forecasting

2. The performance of subspace algorithm cointegration analysis: a simulation study with new tests

Martin Wagner

University of Bern, Gesellschaftstrasse 49, Bern, Switzerland

In this paper an extensive simulation study is performed to assess the finite sample performance of subspace algorithm cointegration analysis developed by Bauer and Wagner (2000a). The method is formulated in the state space framework, which has hardly been used for cointegration analysis up to now. This is surprising to us, as this framework for representing linear stochastic processes offers two main advantages. Firstly, it clearly reveals the stationary and nonstationary system dynamics as well as their interaction. Secondly, it is equivalent to vector ARMA representations and thus offers a simple way to overcome in a fully parametric framework the restriction to VAR models.

The method developed in Bauer and Wagner (2000a) rests on computationally cheap algorithms, which do not require the solution of nonlinear optimization problem as e.g. maximum likelihood estimation. Compared to the initial paper, here six different tests for the cointegrating rank are proposed and compared. Critical values are presented for four of the tests. The remaining two tests are replicating the Johansen tests on the estimated state equation and for these the critical values provided in the literature can be used.

The following issues are investigated in the simulation study: the size performance of the proposed tests, the accuracy of the estimation of the cointegrating space and the predictive performance of the state space models estimated with the proposed method. The influence of the sample size on the results as well as the sensitivity of the results with respect to stable eigenvalues approaching the unit circle are analyzed. The forecasting performance is investigated for different forecasting horizons and various forecasts are compared. We assess the forecasts by their RMSEs but investigate also the prediction error densities. All results are compared to benchmark results obtained by applying the Johansen procedure on VAR models fitted to the data

3. Chi-squared tests of interval and density forecasts, and the Bank of England's fan charts

Kenneth F Wallis

University of Warwick, Dept of Economics, Coventry, UK

This paper reviews recently proposed likelihood ratio tests of goodness-of-fit and independence of interval forecasts. It recasts them in the framework of Pearson chi-squared statistics, and considers their extension to density forecasts. The use of the familiar framework of contingency tables increases the accessibility of these methods to users, and allows the incorporation of two recent developments, namely a more informative decomposition of the chi-squared goodness-of-fit statistic, and the calculation of exact small-sample distributions. The tests are applied to two series of density forecasts of inflation, namely the US Survey of Professional Forecasters and the Bank of England fan charts. This first evaluation of the one-year-ahead forecasts. The fan charts fan out too quickly, and the excessive concern with the upside risks was not justified over the period considered.
Room F



Financial Forecasting

Chair: Shane Whelan

1. Volatility forecast for Sao Paulo stock market index (IBOVESPA)

Tara Keshar Nanda Baidya, Joao Alberto Calvano, Paulo Henrique Soto Costa Pontificia universidade Catolica do Rio de Janeiro, Departamento de Engenharia Industrial, Janeiro, Rio de Janeiro, Brazil

The purpose of this work is to see if there exist some statistical method which can forecast the volatility of Sao Paulo Stock Market Index (IBOVESPA). For this purpose, we have used the following methods: Simple Moving Average, Exponentially Weighted Moving Average (EWMA), Generalized Autoregressive Conditional Heteroscedasticity (GARCH), Threshhold Generalized Autoregressive Conditional Heteroscedasticity (TGARCH), Exponential Generalized Autoregressive Conditional Heteroscedasticity (EGARCH), Switching Generalized Autoregressive Conditional Heteroscedasticity (SWGARCH) and Stochastic Volatility. Of all the models tested, we found the EWMA method to be the best. We have used the data from the period between July 4th, 1994 and July 17th, 2001 to do this study.

2. Volatility forecasting with GARCH and the generalised skewed T distribution

Larry Bauer

Memorial University of Newfoundland, Faculty of Business Administration, St John's, Newfoundland, Canada

The Generalized Autoregressive Conditional Heteroskedasticity (GARCH) family of models has found great popularity in the analysis of financial time series. While GARCH models have frequently been found to provide superior in-sample fit, they have been less successful at out-of-sample volatility forecasting. A potential source of this poor out-of-sample performance is that GARCH models are commonly constructed under the assumption of conditional normality. This is problematic as, even conditionally, financial time series are generally found to be leptokurtic and skewed. A second issue is that the proliferation of alternative and sometimes partially overlapping specifications for GARCH models makes it difficult to determine which particular model is appropriate in a given modelling or forecasting situation. This paper uses the skewed generalized T distribution of Thedossiou (1998) to address these issues by constructing and testing out-of-sample one-period ahead daily and monthly forecasts of volatility for a number of daily financial series. In particular, the volatility forecasting performance of a general GARCH model under the assumption of non-normally distributed errors is assessed for several stock indices, foreign exchange rates, and interest rates. The generalized skewed T distribution is an attractive choice for an alternative distributional assumption in that it allows for asymmetric response in the GARCH model and nests, among others, the student's t and normal distributions.

Wednesday 26th June 2002



Wednesday 26th June 2002Room F1010 - 1120Financial Forecasting

3. Intraday forecasting and estimating of volatility in the Black-Sholes Model

Alexandre Galvao, Gleice Pereira

Rua dos Otoni 296, Belo Horizonte, Brazil

The option is an important derivative in the financial market and even in business companies. The pricing of these options conceptualizes rights, and from that comes its relevance in corporate representativity. Thus, the Black-Sholes model (B&S) becomes a tool of expressive usefulness for the market. However, there are some concerns about the model. The implication of volatility has been one of them. At this point it seems crucial the approach to and the introduction of autoregressive models as an alternative form to the concept of implied volatility in the formula. Additionally, the intraday variables seem to predict the movements in time. Thus, with their comprehension, an anticipation of these movements are expected, and consequently, better projections. Based on these premises, this research sought to compare, through an intraday analysis, the implied volatility to the GARCH (1,1) conditional volatility of the underlying asset, in the options pricing, given by the B&S model. This study also sought to measure if an analysis with high frequency data would improve the estimates of the model. Specifically, a case of Brazilian's asset, stocks of Telemar Company, is presented after a period of elevated privatization and of greater variability on return of stocks at S_xo Paulo's Stock market (BOVESPA). The performance of the volatility in its different degrees of moneyness and at intervals of 30 minutes is compared, concerning some series of options, in the period between August, 2001 and January, 2002. The predictions of those modellings are adjusted confronting its errors and estimates. It was also made a comparison between the intraday analysis and the daily analysis, regarding the possible predicted gains. Finally, this research suggests the study and introduction of other variables in the GARCH intraday equation, with the objective of minimizing the high persistency effect of the model.



Wednesday 26th June 2002 1150 - 1300

Financial Forecasting

Chair: Phil Boland

1. Volatility forecasting with high frequency data

Siem Jan Koopman, Eugenie Hol, Marius Ooms

Free University Amsterdam, Dept of Econometrics, De Boelelaan 1105, Amsterdam, The Netherlands

The increasing availability of financial market data at intraday frequencies has not only led to the development of improved ex-post volatility measurements but has also inspired research into their potential value as an information source for longer horizon volatility forecasts. In this paper we explore the forecasting value of these high frequency series in conjunction with a variety of volatility models for returns on the Standard \& Poor's 100 stock index. We consider two so-called realised volatility models in which the cumulative squared intraday returns are modelled directly. We adopt an unobserved components model where actual volatility is modelled as an autoregressive moving average process and an autoregressive fractionally integrated moving average model which allows for long memory in the logarithms of realised volatility. We compare the predictive abilities of these realised volatility models, such as Stochastic Volatility (SV) and Generalised Autoregressive Conditional Heteroscedasticity (GARCH) models which are both extended to include the intraday volatility measure. For forecasting horizons ranging from one day to one week the most accurate out-of-sample volatility forecasts are obtained with the realised volatility and the extended SV models; all these models contain information inherent in the high frequency returns. In the absence of the intraday volatility information, we find that the SV model outperforms the GARCH model.

2. Determining winners and losers in stock indexes

Harald Schmidbauer

Bilgi University, Inonu Caddesi 28, 80310 Sisly, Istanbul, Turkey

Some recent papers investigated short-term over- and under-reactions of stocks (or stock indexes) in terms of reactions subsequent to days on which a stock experiences an abnormally good (a winner) or bad (a loser) performance.

Stochastically speaking, the sequences of winners and losers constitute point processes. If everything which is "normal" is removed from the sequence of returns, we would expect the winner and loser pattern to be a Poisson process. The usual methods of extracting winners and losers, however, lead to point processes which display over-dispersion with respect to the Poisson process. Although there are stochastic models which can account for this kind of over-dispersion, it seems more adequate to define days of abnormal returns in a different way.

We propose to classify returns as "normal" or "abnormal" with respect to GARCH predictions, abnormal meaning: extraordinarily high or low in the light of all the information available the previous day. The Poisson property of the point processes of winners and losers is thus preserved. Among our examples are the Dow Jones Industrial Average and the DAX, for both of which we find significant short-term under-reactions after winners, but no significant reactions after losers.

Room F



Wednesday 26th June 2002		Room G
1150 - 1300	Financial Forecasting	

Chair: Geoff Allen

1. Price forcasting models applied to agricultural future contracts

Aureliano Angel Bressan, Joao Eustaquio de Lima

R. Grao Mogol, 320/202 Carmo, R. Aimores 1451 Lourdes, Belo Horizonte, Minas Gerais, Brazil

This research deals with the usefulness of times series models as a tool for buy and sell decisions of the brazilian BM&F future contracts, in dates nearby the expiration. For this purpose, the commodities considered were live cattle, coffee and soybeans. The general objective was to verify which model generates the most accurate forecasts for each price series of the considered commodities in the spot market. The specific objective is to calculate the medium returns of each model in buy and sell operations in each commodity market, in way to provide an indication of the potentials or limitations of each one. The models considered are the Box & Jenkins (ARIMA), Neural Networks, Structural and Bayesian time series models. The data corresponds to the weekly quotations of live cattle, coffee and soybeans in the spot and futures markets. The discussion is based on the hypothesis that those models are feasible instruments to support decisions of economic agents in the agri business, reducing the uncertainty related to the future behaviour of the spot prices. The analysis is carried out, firstly, in terms of Percentage Forecast Error for the price series in the spot market. Then, it verifies the returns in simulated buy and sell of future contracts of each product, using the Sharpe Index as a tool for comparison, as well as the symmetry and kurtosis statistics. In general, the results indicate that: a) the time series forecast models capture coherently the pattern of the analyzed prices; b) there is, however, differences of forecast performance among the models and markets; and c) the financial returns are positive in most of the analyzed contracts, indicating the potential use of those models in negotiations of contracts for dates close to expiration, with prominence for operations based in the forecasts of the ARIMA and Structural Time-Series models.

2. Value at risk: a comparison of methods to choose t he sample fraction in tail index estimation of the generalised extreme value distribution

Cristiano Fernandes, Christiam Gonzales

Dept. de Engenharia Eletrica, PUC-Rio. Rua Marques de Sao Vicente 225, Gavea, Rio de Janeiro, Brazil

Value at Risk (VaR) is already part of the toolkit of financial analysts assessing market risk in the financial markets around the globe. In order to implement VaR it is needed to estimate low quantiles of the portfolio returns distribution. Traditional methodologies combine either normal or t conditional distributions together with ARCH type models to accomplish this goal. Albeit well succeed in evaluating risk for "typical" periods, this methodology has not been able to accommodate events that occur with very low probabilities. For these situations one needs conditional distributions with very fat tails. The use of distributions derived from the Extreme Value Theory (EVT), collectively known as Generalized Extreme Value distribution (GEV), together with ARCH type models have made it possible to address this problem in a proper framework. A key parameter in the GEV distribution is the tail index. Two of the estimators of the tail index are Hill's estimator and the moment ratio estimator. Both estimators are very sensible, in terms of bias and RMSE, to the sample fraction that is used in their computation. Several methods have been proposed to address the problem of the optimal finding of the sampling fraction. In our study we have compared the properties of recently suggested methods: an alternative Hill plot, the double bootstrap and Hall's method. We have estimated conditional VAR for a linear portfolio composed of stocks of the Brazilian financial market and used the goodness of fit tests of Kupiec and Christoffersen to choose among these methods.

Room G



Wednesday 26th June 2002 1150 - 1300

Financial Forecasting

3. A multi-factor model with irregular returns for missing values imputation in emergent markets: application to Brazilian equity data

Alvaro Veiga, Leonardo Rocha Souza

DEE-PUC RJ, Marques de S Vincente 225, Rio de Janeiro, Brazil

Emergent markets frequently suffer from low liquidity and tend to concentrate most of transactions on a few liquid assets. In the Brazilian market, for example, there are 1190 different stocks but almost 40% have not been negotiated in the last year and 32% of the remaining has been negotiated less than once a month. As a consequence, for many stocks, there will be no price for a large proportion of days. There will be still more days for which one cannot compute daily returns, since they require the existence of transactions in two subsequent days. Financial institutions, however, do need those prices and returns every day in order to fulfil regulatory requirements and implement their methodologies of guantitative analysis of risk and return. Here we propose a special multi-factor model that can deal with irregular spaced returns, enabling the use of every historical price available. Also, we derive the best linear estimator for the coefficients of the multifactor model considering its use in an exponential smoothing framework. To evaluate the model, we ran a back test with 389 stock prices over the period ranging from 25/08/1998 and 28/02/2001. First, we examine the model ability to produce good estimation of the missing price. Second, the h-steps-ahead predictive VaR was evaluated by comparing coverages. The same experiment was run to several other imputation methodologies. Our conclusion is that our irregular returns multi-factor model globally outperforms all the others. Furthermore, it permits calculations with percentage of existing daily equity prices as low as 5% in a year of data, whereas traditional versions do not.



Wednesday 26th June 2002		Room H
1010 - 1120	Supply Chain Forecasting	

Chair: Hans Levenbach

1. Creating an analytical system for forecasting customer-centric, operational demand

Hans Levenbach

Delphus Inc, 152 Speedwell Avenue, Morristown, USA

Forecasting systems for managing operational (SKU-level) demand and sales revenues are typically based on the spreadsheet paradigm: fields for variables and their attributes, records for the time dimension. This has had more to do with simplifying the programming of a particular system than meeting the analytical requirements of a practicing forecaster. The net result has been time consuming manipulation of data arrays for conversion into useful output. We describe a system architecture that supports the analytical needs in terms of three interrelated dimensions of the forecast: (1) Period (weekly, monthly, quarterly and annual aggregations of time series data), (2) Customer-location specific segmentations of demand, and (3) Product summaries for categorizing brands, and families. This infrastructure has become the foundation of an operational forecasting system that is being used across a variety of manufacturing, distributor and retail organizations.

2. Designing supply chain software to support collaborative forecasting?

Gareth Brentall

Mercia Software Ltd, Mercia House, Ashted Lock, Aston Science Park, Birmingham, UK

Supply Chain Management is a hot topic for companies that are involved with the manufacturing and distribution. One crucial input into any supply chain plan is the demand forecast from the market, and it is here that the art and science of forecasting comes into its own.

The role of the forecaster in this context is rapidly evolving towards a collaborative model, where forecasts are developed in partnership with both suppliers and customers, instead of each link in the supply chain trying to second guess what everybody else is up to.

This new way of working has important implications for how the underlying techniques, processes and software function. In order to move from an inwardly looking environment to an outwardly looking one needs a new methodology to be developed in support of the collaborative planning model.

This paper will discuss how advances in Bayesian statistics and the use of the Internet enable forecasters to mix subjective input from a number of sources with analysis of historical patterns of demand in order to arrive at an agreed plan for the supply chain as a whole.



Wednesday 26th June 2002 1150 - 1300

Econometrics & Economic Forecasting

Room H

Chair: Moira Hughes

1. Multi-regional econometric model of China

Qingyang Gu

Nanyang Technology University, MPE, Singapore, Singapore

This paper is about a multi-regional econometric model of China and its application on China's fiscal system. This pioneering large-sized model includes 7 blocks and 1,400 equations. It covers 29 provinces of China for 1985-1998. Panel data technique is adopted. A dynamic policy simulation on the impacts of fiscal federal tax structure on the regional economies of China has been conducted. The result shows that the decentralized fiscal system provides strong incentives for the local governments to promote economic growth. When the central government chooses to apportion high share of budgetary revenue for itself, the local government responded by choosing to shift from providing a helping hand to a grabbing hand.

2. An EM algorithm to multiple imputation in censored data

Fabiano Oliveira, Alvaro Veiga

Caixa Postal 37823, Ag Barrashooping, Rio de Janeiro, Brazil

An EM algorithm was developed to the maximum likelihood parameter estimation of a multivariate truncate normal distribution. The multiple imputation is evaluated by the conditional expectation. This expectation takes the prediction values greater or lower. The information matrix gives the confident intervals both the parameters and the estimated values. The proposed algorithm was tested with simulated and real data (where the data didn't follow a normal distribution). The problem analysis with censored or missing data is a important topic in the statistical science. The classical approach to the parameter estimation is the EM algorithm. This algorithm introduced by Dempster, Laird and Rubin gives the maximum likelihood estimators of the incomplete data parameter distribution. This technique became the classical solution to this kind of problem. Many extensions of this algorithm have been proposed in the literature in the last years. These algorithms were based in a model of variables relationship. For example, Amemiya introduced a EM based solution to the limited dependent variable model proposed by Tobin (Tobit Model). The case of a data matrix with a random pattern of censored or missing data distributed for all variables where no hypothesis are made about the model data, remains unexplored. This work proposes an algorithm under the EM framework to the maximization of the likelihood function for the multivariate truncate normal data. This algorithm generalizes some classical estimation methods found in the literature. This method works with the concept of missing by design values to reduce the complexity of the calculations in the prediction step. Since no model is necessary to the algorithm applicability, the range of problems covered by the algorithm is very large. In addition, the expressions of the Score and Hessian matrixes are obtained. A performance study was realized. In some classical situations, the algorithm results were compared with the corresponding classical solution ones.

3. Non-cointegration tests and a fractional ARFIMA process

Valderio Anselmo Reisen, Luz Amanda Melgar Santander, Bovas Abraham Rua Ludwik Macal 1081/201d, Jd da Penha, Vitoria -ES, Brazil

This paper presents an extensive simulation study to evaluate the behaviour of two semiparametric estimators of the fractional integrated parameter of the ARFIMA model in non-cointegrated processes. The study also investigates the relationship between spurious regression and cointegrated processes and the sample times series size effect. Different bandwidths are considered to estimate the fractionally integrated parameter, and its asymptotic distributions are used to test the null hypothesis of non-cointegrated processes.



Index of Contributors

Name	Page	Name	Page
Adva Monica	31	Corcoran Jonathan	50
Akatova Elena	123	Correa da Rosa Joel	117
Akram Muhammad	56	Cotter John	15
Albertson Kevin	87	Crato Nuno	108
Allen P. Geoffrey	112	Curry Bruce	26
Alon-Brimer Yael	97	da Silva Christo Eliane	47
Alvarez Susana	100	Daniel Ana Cristina M	66
Ameijenda Noelle	46	Daub Mervin	126
Amirkhalkhali Sal	76	Davies John	58
Amstad Marlene	85	De Mello M	67
Antipov Alexander	57	de Menezes Lilian M	27
Antonini Claudio	109	de Paula Reginaldo Rosa Cotto	115
Armstrong J. Scott	10, 91	Deo Rohit	107
Assarsson Bengt	109	Deschamps Elaine	124
Atanackov Natasha	63	Dillane Dominic	73
Aylen Jonathan	119	Doherty James	98
Aznar Antonio	40	Dominguez N	84
Baidya Tara Keshar Nanda	131	dos Santos Dalci Maria	59
Balkin Sandy	119	Duan Alei	126
Barnes Michelle	97	Dunis Christian	14
Barot Bharat	97	Eaves Andrew	81
Batchelor Roy	12	Eberl Klaus	121
Bauer Larry	131	Espasa Antoni	111
Bewley Ronald	87	Evgeniou Theos	18, 24
Billah Baki	109	Exley Jon	11
Blunt Gordon	120	Fay Damien	114
Bock David	43	Fernandes Cristiano	134
Bonnici Mike	71	Fernandez Isabel	69
Bowman Charles	31	Fildes Robert	10, 16, 91
Boylan J E	9, 18	FitzGerald John	127
Bozeman Barry	54	Forsyth Jay	43
Brandner Peter	88	Franco Glaura C	41
Brentall Gareth	136	Franses Philip Hans	38, 113
Bressan Aureliano Angel	70, 134	Fritzer Friedrich	63
Brewer Alan	52	Fuller Stephen S	21
Bruno Giancarlo	126	Galvao Alexandre	132
Busetti Fabio	110	Gao Dayong	22
Caloba Luiz P	26	Garcia-Ferrer Antonio	85, 102
Camba-Mendez Gonzalo	88	Gencay Ramo	39
Campbell Bryan	89	Gerlach Richard	100
Camus Roberto	102	Ghosh Sucharita	92
Cancelo Jose Ramon	95	Giles Ronald	113
Caro Alejandro Rodriguez	40	Golyandina Nina	104
Chaharbaghi Kazem	79	Gormley Peter	94
Chen Cathy	40	Gorr Wilpen	50
Clar Guenter	54	Green Kesten C	10, 31
Clauson Annette L	79	Greszta Michal	127
Claveria Oscar	103	Grove Peter	51
Clements Michael P	36	Gu Qingyang	137
Coil Gary	123	Gualtierotti Antonio	125

Dago



Name

Gudmundsson Gudmundur Guha Debashis Gunawardana K D Hall Owen Hamoudia Mohsen Harries Clare Harvey Nigel Hauser Michael A Heilemann Ullrich Heiler Mark Hendry David Hibon Michele Holjevac Ivanka Avelini Hughes Anthony W Hunt William Hyndman Rob Iovino Gabriella Islam Towhidul Ismail Suzilah Ittig Peter T Jalobeanu Ciresica Jansen Dennis W Johnson Paul Jowaheer Vandna Karakatsani Nektaria Karakostas G C Kavussanos Manolis Keogh Gerard Kim Won-Joon Koehler Anne Koopman Siem Jan Koskinen Lasse Kotan Zelal Kumar V Kunst Robert **Kurcewicz Michal** Kurre James A Ladiray Dominiqui Lahiri Kajal Lamounier Wagner Moura Lawrence Michael Lawton Richard Leal Teresa Leonard Michael J Levenbach Hans Lopes Artur Silva Lourdes Viridiana Lyons Michael Madigan David Maher Brian Mann Darrell

81,

ruge	Marrie	ruge
110	Marcellino Massimiliano	37
14	Marrocu Emanuela	36
23, 25	Martino Joseph P	55
24	Mason Clive	94
16	Mate Carlos	45, 106
28, 80	Matthews Kent	127
28	McCarthy Teresa	72
116	McCracken Mike	128
86	McSharry Patrick	77
107	Meade Nigel	57
6, 111	Medeiros Lucio	48
56	Medeiros Marcelo	22, 90
70	Milioni Armando Zeferino	34
105	Miller Don	19, 122
114	Moon Mark	7, 10
92	Morzuch Bernard J	45
101	Mueller Ulrich	86
59	Naik Gopal	32
73	Nelson Michael	32
121	Nelson Ray	77
41	Nunes Luis	96
39	O'Connor Marcus	28, 29, 32
75	O'Connor Ronan	15
106	Oliveira Fabiano	137
47	Oller Lars-Erik	85, 95
18	Olson Dennis	98
101	Onkay-Atay Dilek	30
93	Onsi Mo	60
112	Ord Keith	10, 68
56	Owens Raymond	129
133	Palma Wilfredo	108
12	Parcells Pete	66
89	Parreno Jose	115
7	Pearson Roy L	125
121	Perez Javier	125
112	Pitkanen Seppo	61
21	Polius Tracy	34
122	Pollock Andrew	30
102, 116	Quenneville Benoit	122
67, 95	Raeside Robert	103, 105
28, 29, 32	Raftery Adrian	63
105	Raunig Burkhard	99
116	Ray Bonnie K	93, 107
58	Reilly David	75
81, 94, 136	Reisen Valderio Anselmo	137
110, 112	Remus William	33
44	Rickman Dan S	20
71	Robertson Alastair	17
5	Robinson Peter M	108
74	Rodrigues Antonio J	64
83	Rodrigues Paulo M M	65

Dago

Namo



Name	Page
Doggo Anto	(0
Rozga Ante	09
Ruiz Estriel Sastaiadu Kamal	14
	99 70
Salini Abuer Salimi Abuer	/8
Schmidbauer Haraid	133
Schunk Don Sensier Merianne	20, 90
Sensier Wahldhile	37
Shanctone Ludia	30
Siliverateve Perice	0Z
Siliverstovs Buriss	128
Siubuud Bildii	08
Sinaliwood Adron	42
Smeral Egon	00
	10
SU MIKE K P	128
Solig Halyali Soliga Doipaldo Costro	00
Souza Reinaluo Castro	48
Stekler Herman	0Z
Stelder Dirk	9 I 11 7
Stellwagon Fric	0
Stelliwagen Linc	8 40
Stevenson Ividx	49
Streicher Gemänu	4Z
Studi LIIIS Summars Datar M	34, 30 110
Sundararajan Anantha S	110
Sunuararajan Ananuna S	02
Swall Williams W	
Toracyirta Timo	47,70
Terrisi Repedette	4, 22
Valls Poroira Podro	70
Van Pollogom Sobastion	40
Voga luan Luis	13
Voiga Alvaro	110 125
Vonkatosan Daikumar	64
Vevler Albert	64
Vidiella i Anguera Antoni	28
Vogelvang Ben	52
Wagner Martin	130
Wallis Kenneth F	130
Watts Robert I	62
Weihns Claus	86
Whelan Shane	15
Wilkie David	13
Winklopfer Heidi	72
Wright George	, ∠ 30
Yaroshinsky Alex	112
Zant Wouter	53
Zia Asim	83
Zimmermann Hans Georg	7
	,



Ask your librarian to subscribe to the

International Journal of Forecasting

Published on behalf of the International Institute of Forecasters by North-Holland, Amsterdam

EDITOR-IN-CHIEF:

Jan G. De Gooijer, Faculty of Economics and Econometrics, University of Amsterdam, 1018WB Amsterdam, the Netherlands, Email: jandeg@fee.uva.nl

EDITORS:

Michael P. Clements	Michael Lawrence	Bonnie K. Ray
Department of Economics	School of Information Systems	IBM T.J. Watson Reeearch Center
University of Warwick	University of New South Wales	P.O. Box 218
Coventry CV4 7AL	Sydney 2052	Yorktown Heights, NY 10598
UK	Australia	USA
Email: m.p.clements@warwick.ac.uk	Email: m.lawrence@unsw.edu.au	Email: bonnier@us.ibm.com

AIMS	SCOPE
The International Journal of Forecasting (IJF) is	Papers published in the IJF encompasses the
the official publication of the International Institute of	following areas:
Forecasters (IIF) and shares its aims and scope. The	- Evaluation of forecasting methods and approaches
Journal publishes high quality refereed papers	- Applications in business, government and the
covering all aspects of forecasting. Its objectives	military
are to bridge the gap between theory and practice.	- Implementation research
The intention is to make forecasting useful for	- Judgmental/psychological aspects of forecasting
decision and policy makers who need forecasts.	 Impact of uncertainty on decision making
	- Seasonal adjustments;
The IJF places strong emphasis on empirical	- Marketing forecasting
studies, evaluation activities, implementation	- Time series forecasting
research, and ways of improving the practice of	- Organizational aspects of forecasting
forecasting. It publishes papers, notes, reviews of	- Financial forecasting
recent research, book reviews, and software	- Time series analysis
reviews. For empirical studies, the Journal gives	- Economic analysis
preference to papers that compare "multiple	- Production and inventory forecasting
nypotneses" (two or more reasonable hypotheses).	- lechnological forecasting
	- Legal and political aspects

CALL FOR PAPERS for a Special Issue on: "Forecasting in Energy Markets"

Forecasting energy consumption and prices for the short-run and long-run are critical. It is important for investment decisions by firms for exploration and the development of new and existing resources, construction of generating plants and transmission networks, fuel choices and conservation efforts by consuming firms and households, and predicting emissions of greenhouse gases. Accurate load forecasting and electricity pricing bids in increasingly deregulated electricity markets play an important role in the allocation of resources and profitability of firms. The goal of the editors of this special issue is to bring together examples of forecasting in energy markets and contexts using different methodologies in a single volume.

Special Issue Editors:

Fred Joutz (bmark@gwu.edu), Department of Economics, The George Washington University, Washington, DC 20052, USA

Reinaldo Castro Souza (reinaldo@ele.puc-rio.br), C.E. Pedreira, DEE, PUC-Rio, Rua Marques de Sao Vicente, 225, Gavea 22453-900, Rio de Janeiro, RJ, Brazil





International Institute of Forecasters

An International Institute aimed at promoting the discipline of Forecasting

Objectives

The International Institute of Forecasters (IIF) is a non-profit organization founded in 1981 with support from INSEAD, the Manchester Business School, IMEDE, Laval University, and the Wharton School. Its objectives are to stimulate the generation, distribution, and use of knowledge on forecasting. The *International Journal of Forecasting* is the official journal of the Institute.

RESEARCH

Develop and unify forecasting as a multidisciplinary field of research drawing on management, behavioral, social, engineering, and other sciences.

PRACTICE

Contribute to the professional development of analysts, managers, and policy makers with responsibilities for making and using forecasts in business and government.

THEORY AND PRACTICE

Bridge the gap between theory and practice, with practice helping to set the research agenda and research providing useful results.

INTERNATIONAL SCOPE

Bring decision makers, forecasters, and researchers from all nations together to improve the quality and usefulness of forecasting.

Annual Conference

The IIF has held outstanding International Symposia on Forecasting in cities around the world beginning with Quebec City in 1981 and most recently in Lisbon, Washington DC, Edinburgh, Barbados, Istanbul, Toronto, Stockholm and Pittsburgh. Included in programs are plenary and featured speakers including international forecasting experts, about 250 research presentations in areas such as new product forecasting, multivariate methods, international trade forecasting, judgmental methods, financial forecasting, demographic forecasting, and rule-based methods, plus book and software exhibitors. Those who register for the Symposium at the regular rates (including student registration) automatically become members of the IIF for the following twelve months.

Membership

Membership is for individuals only. It is not available for organizations. Dues are US\$80 per year for regular membership, US\$40 for student members. Included are four issues of the IJF and the IIF Newsletter. To join please complete the application form over the page.



International Institute of Forecasters, Membership Application

Please accept me as a member of the IIF for the year commencing July 1, 2002. Enclosed is my payment of US\$80.00 (regular membership) or US\$40 (student membership). Student members please include verification of your status. A statement on Department letterhead from your advisor or Department Head will suffice. Student membership is for a maximum of four consecutive years.

Kindly use a bank draft, international money order, postal check, or check drawn on a US bank. Please make check payable to IIF. We also accept payments by VISA and MASTERCARD.

Please print or type:				
First name	La	st name		_ Title
Affiliation				
Address				
City		State/Province		
Postal Code		Country _		
Telephone	Fax	En	nail	
Academic or Practitioner	? (Circle one) Particula	ar forecasting intere	ests:	
If paying by credit card p	please complete the fol	lowing information:		
Please circle one: VI	SA MASTERCARD			
Account number			_ Expiration date	
Signature				
Billing address (if differer	it from above)			
Do you wish your contac Internet user? Yes or No	t information and intere (Circle one)	ests to be added to	a list of members acc	cessible to any
Do you wish your contac (Circle one)	t information be made a	available to membe	rs for research purpo	ses? Yes or No
	Please send this co Internationa c/o P. Geoffrey Allen, I 220 Stockbridge Univers Amherst, Mass Fax: 413,545,5853	ompleted form with I Institute of Foreca Department of Reso Hall, 80 Campus C ity of Massachusett achusetts 01003-20 Email: allen@rese	payment to: sters urce Economics center Way s 040 USA con umass.edu	



Notes



Notes



Notes