ISF 2005

The 25th International Symposium on Forecasting

San Antonio, Texas

June 12 – 15, 2005

Table of Contents

Welcome from the ISF 2005 Chairs

Greetings from the ISF 2005 Co-Chairs!

On behalf of the International Institute of Forecasters, welcome to Texas and San Antonio! We are delighted you are joining us to celebrate 25 years of work in the Forecasting area.

The work of the organizing committee has been exemplary, the San Antonio group- Joel Saegert, Juan Gonzalez, and Tom Madison. In College Station, Marietta Tretter provided support for the workshops. In addition she and Dean Wichern helped with the evaluation process. The San Angelo IT group created an excellent home page by responding to every request. Track chairs and session organizers outdid themselves. Geoffrey Allen has always been incredible helpful providing enthusiastic support.

We sincerely hope you enjoy your stay in San Antonio and invite you on a boat trip to visit the Southwestern School of Arts and Crafts and see a bit of France and Mexico. Visits to the "Mercado" and "La Villita" near the River walk offer a taste of the city's Mexican culture and Tuesday night will be all about the great state of Texas. To make sure you have fun we will greet you with a friendly reception and send you off to Spain on Wednesday in the same manner.

The ISF 2005 Organizing Committee hopes you have a pleasurable stay in San Antonio and that a great learning experience is had by all.

Benito Flores   **Tom Yokum**
Co-Chairs of the International Symposium on Forecasting 2005

Welcome from the IIF President

It is a great pleasure for me to welcome you all to the Silver Anniversary Symposium on Forecasting in San Antonio, Texas!

The International Institute of Forecasters is an active association (go to our new web address: www.forecasters.org). Since we met in Sydney last year many things have happened. The most important achievement is the launching of the inaugural issue of **Foresight - the International Journal of Applied Forecasting**. The International Journal of Forecasting is a great success, but it has little to offer a practitioner who doesn't have a Ph. D. FORESIGHT reaches out to all forecasters. Take a look at this first issue. I'm sure you'll find something worth reading. You may yourself have something you'd like to communicate to practitioners. Then, don't hesitate to contact Len Tashman (LenTashman@compuserve.com). However, the final decision whether to start regular publication of this journal will be taken by the IIF Board at this symposium. So, please turn up at the IIF General Meeting here in San Antonio on Tuesday, June 14, 5:30-6, and you'll hear more!

There would be many more things to report (see my letter in the Oracle), but let me just mention the IIF Workshop. The first was held in Madrid in December 2003. It now has a follower: a new workshop on demographic forecasting to be held in Salamanca, Spain, July 28-29, 2005. One on energy forecasting and another on judgmental forecasting are to follow. If you feel you would like to organize a workshop of your own, please contact Benito Flores (for US) BFlores@cgsb.tamu.edu, or Antonio García-Ferrer (rest of the world) antonio.Garcia@uam.es.

Yet, nothing beats our annual get-together where you can meet old friends and make new and profitable contacts. Tom Yokum and Benito Flores, together with their Organizing Committee here in San Antonio, have once again shown that the ISFs just get better and better every year. Thanks to you all! We, the participants, will enthusiastically contribute with all we have to offer. Finally, if you feel you'd like to host an ISF, please contact Marcus O'Connor, M.Oconnor@econ.usyd.edu.au.

Lars-Erik Öller
President of IIF

ISF 2005 Sponsors

The ISF 2005 Organizing and Program Committees would like to thank the following institutions for their help and support:

International Institute of Forecasting

Angelo State University

Mays Business School, Texas A&M University

University of Texas San Antonio

SBC Communications

Elsevier

SAS Institute, Inc.

Timberlake Consultants

Organizing Committee

Co-Chair: Dr. Benito E. Flores
Tenneco Professor
Department of Information and Operations Management
Texas A&M University

Co-Chair: Professor Tom Yokum
Professor of Management Science and Virgil J. Powell Professor of American Economic Principles
Angelo State University

Program Committee

Joel Saegert
University of Texas, San Antonio
jsaegert@utsa.edu

Tom Madison
St. Mary's University
tmadison@stmarytx.edu

Juan J. Gonzalez
University of Texas, San Antonio
jgonzalez@utsa.edu

Marietta J. Tretter
Texas A&M University
m-tretter@tamu.edu

Invited Session Organizers

We are very grateful to all the session organizers. Their names are listed below.

- Monica Adya, Marquette University, USA
- Geoffrey Allen, University of Massachusetts, USA
- Scott Armstrong, University of Pennsylvania, USA
- Charlie Chase, SAS, USA
- Fred Collopy, Case western Reserve University, USA
- Sven Crone, Lancaster University, UK
- Alfred Cuzan, University of West Florida
- Elaine Deschamps, Caseload Forecast Council, State of Washington, USA
- Robert Fildes, Lancaster University, UK
- Giampaolo Gabbi, University of Siena, Italy
- Michael Gilliland, SAS Inc., USA
- Wilpen L Gorr, Carnegie Mellon University, USA
- Kesten C Green, Monash University, Australia
- Victor Guerrero, Instituto Tecnologico Autonomo de Mexico, Mexico
- V Kumar, University of Connecticut, USA
- Michael Lawrence, University of New South Wales, Australia
- Richard B Lawton, University of the West of England, Britain
- Hans Levenbach, Delphus, Inc., USA
- Joao Tiago Mexia, New University of Lisbon, Portugal
- Mathew Parackal, University of Otago, New Zealand
- Nadia Sanders, Wright State University, USA
- Brian Sloboda, US Department of Transportation, USA
- Eric Stellwagen, Forecast Pro,USA
- Ralph Snyder, Monash University, Australia
- Pam Texter, Mitre Corporation, USA
- Rajkumar Venkatesan, University of Connecticut, USA
- Marc Wildi, University of Technical Sciences, Switzerland
- Justin Wolfers, University of Pennsylvania, USA
- Vincent Yao, University of Arkansas, USA
- Peg Young, US Department of Transportation, USA

General Information

San Antonio

What expert could have forecast, in 1718, when Father Antonio Olivares established Mission San Antonio de Valero that in less than 300 years San Antonio would become the ninth largest city in the United States. It is now a busy 21st century urban center but it is also the meeting place of many cultures and traditions - Native American, Old Mexico, the Wild West, and the Deep South.

Hyatt Regency San Antonio

On the banks of San Antonio's renowned River walk, across from the Alamo, the hotel features a 16-story garden atrium built over an extension of the San Antonio River, which flows through the lobby.

123 Losoya
San Antonio, Texas
78205 USA

Tel: +1 210 222 1234
Fax: +1 210 227 4925

Directions

From San Antonio International Airport (12 miles):
Take 281 S. which will turn into I-37 S. near the downtown area. Follow I-37 S. and exit Houston Street. Turn right on Houston. Proceed 5 blocks to Broadway. Turn left on Broadway and continue down 3 blocks. Hotel is on the right. (Broadway changes name to Losoya Street)

The Hyatt Regency San Antonio offers the following amenities:

· Wireless Internet
· Computer Data Port
· Heated, outdoor swimming and whirlpool
· New, 2,800 sq. ft. complimentary hotel health club offers free weights, exercise cycles, stair climbers, treadmills and Nautilus® fitness equipment
· 8 miles, 18-hole The Quarry Golf Course (individual or group)
· 10 miles, 18-hole Silverhorn Golf Course (individual or group)
· 6 miles, 18-hole Pecan Valley Golf Course (individuals or group)

Badges

Delegates are requested to wear their personal badges at all times while attending symposium events.

Coffee Breaks

There will be a coffee break in the morning and one in the afternoon

Continental Breakfast

There will be a continental breakfast in the conference area from 7-8 a.m.

Exhibits

Exhibits will be on the atrium of the Regency West

Tours

For tours please check with the Concierge or Dawn Jackson, City Hospitality (Guadalupe).

Tipping

It is not included. Percentage depends on the quality of service and can go from 10 – 20 %.

Church Services

There exist many churches of all denominations in San Antonio. For the nearest one to the hotel ask the staff of the hotel at the lobby.

Police

Contact hotel personnel

Insurance

Please arrange your own travel and health care insurance. The organizers cannot be held responsible for any accident, theft or damage to property or for any modification in the program due to unforeseen circumstances.

Social/Partners Program

Sunday June 12

6 - 8 p.m.   **Welcome Reception. Regency West.**
                        6-7 Open bar (sponsored by SAS); 7-8 Cash Bar.

Monday June 13

6 – 7:30 p.m.   **Depart from hotel to Southwest Arts and Crafts Center, a historic San Antonio landmark, via a river boat. Arts and crafts stores will be open. Cash bar. Music. Return to the hotel via the river boats. Explore the Riverwalk for dinner.**

Tuesday June 14

6 – 10 p.m.   **Depart from hotel lobby via a bus ride to the conference dinner. Food will be (some vegetarian food available) a Texas Barbeque at the Don Strange Ranch located in the hill country north of San Antonio at Welfare, Texas.**

Wednesday June 15

12 – 1 p.m.   **The conference concludes with a 'Goodbye San Antonio, Bienvenidos a España' (ISF 2006) farewell reception (Sponsored by SBC) at the Lone Star Palace (Across from the hotel).**

                        (All activities in the social program, except cash bar, are included in the registration fee). Dress code is business casual.

Exhibitors List

Timberlake Consultants

SAS

Forecast-Pro

Delphus Inc.

John Galt Solutions

Special Meetings

Directors Meeting

        Saturday June 11   **10 am - 5 pm**   **Pecan**

Directors Dinner

        Saturday June 11   **6:30 pm - 9 pm**   **Casa Rio**

Directors Meeting

        Sunday June 12   **10 am – 3 pm**   **Pecan**

IJF Associate Editors Meeting

        Sunday June 12   **4 pm - 5 pm**   **Pecan**

IJF Associate Editors Dinner

        Sunday June 12   **7:30 pm – 10 pm**   **ITALIA**

IIF Members Meeting

   **Tuesday June 14**   **5:30 pm – 6 pm**   **Regency West**

Conference Venue Map

Hyatt Regency San Antonio
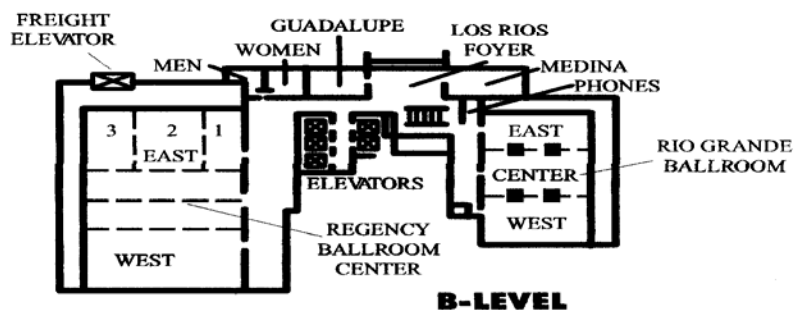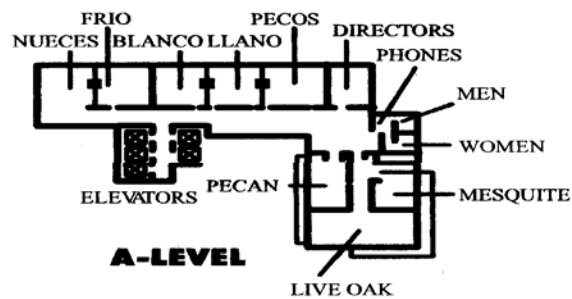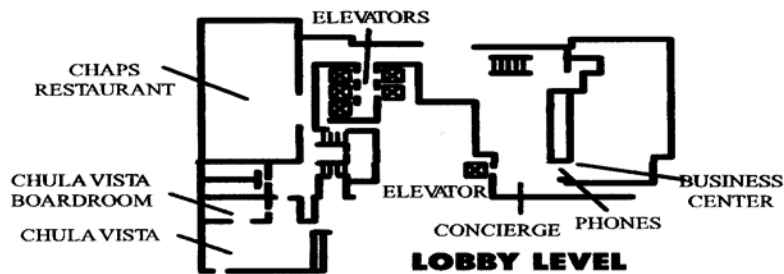
Speakers

Keynote Speakers

Robert Fildes
J. Scott Armstrong

Progress in Forecasting: 1981 – 2005 and Beyond   Regency West

Monday 8 – 9 am

Daniel Kahneman

A Perspective on the Psychology of Judgment   Regency West

Monday 1 – 2 pm

Ray C. Fair

Forecasting Using Structural Models   Regency West

Tuesday 8 – 9 am

Executive Speaker

J. Kenneth Raley

Forecasting at a Point of Oblique Evolution   Regency West

Wednesday 8 – 9 am

Feature Speakers

Exponential Smoothing – The State of the Art   Live Oak

Everette Gardner

Some recent developments in Time Series Forecasting   Live Oak

Ruey Tsay

Energy Forecasting   Live Oak

Derek Bunn

Transportation Forecasting: The Past 25 years.   Live Oak

Peg Young, Caesar Singh, Jack Wells

Improving Forecasting Through Textbooks: A 25 year review   Live Oak

James Cox, David Loomis

Twenty Five Years of progress, problems, and conflicting evidence in Econometric Forecasting.
What about the next 25 years?   Live Oak

Geoff Allen, Ray Fair, Bernard Morzuch, P. Swamy

Modelling and Forecasting the Diffusion of Innovation – A 25-year review
                                                            Live Oak
Nigel Meade, Twohidul Islam.

Feature Panels

Twenty five years of combining forecasts

Nadia Sanders, Marcus O'Connor, Paul Goodwin, Monica Adya
                                                            Live Oak

Judgmental Forecasting

Michael Lawrence, Marcus O'Connor, Paul Goodwin, Nadia Sanders
                                                            Live Oak

Practitioner Forum

The IIF is committed to the diffusion of forecasting to practitioners. One of the concrete actions to that effect, as you noticed in you material you were given, is the first issue of Foresight a new practitioner journal of the IIF.

In addition, in the ISF2005, many sessions are developed from the practitioner viewpoint.

Add to that that the following sessions that are either a tutorial or deal with issues directly related to the practitioner. We recommend that you avail yourself of the opportunity of attending as many of the sessions as possible.

Forecasting Software: State of the Art	(L. Tashman) Panel	MJ2	58
Organizational Politics on Forecasting: Issues, Strategies and Solutions (E. Deschamps) Panel		MJ3	76
Robust Statistical Applications in Contemporary Econometric Software		MH4	89
Forecasting Software in the UK and US		TE3	140
Health Care Issues I and II (H. Levenbach)		TE4/TE5	155/174
Considerations for effectively forecasting a product hierarchy (E. Stellwagen) Tutorial		TF5	176
Some Fundamental Issues in Business Forecasting (M. Gilliland) Tutorial		TK1	114
Presenting Credible Regression-based Forecasts: Some Tips and Tricks (Roy Pearson)		WG1	199

TimeTable

Monday June 13th 2005

8:00am - 9:00 am

K1   **Plenary: Robert Fildes and J. Scott Armstrong**   (Regency West) 21
         Progress in Forecasting: 1981 to 2005 and Beyond

9:05am – 10:25 am

MA1   **Featured -Everette S. Gardner, Jr**.   (Live Oak)   23
         Exponential Smoothing – The State of the Art
MB1   Contributed: Scenarios   (Directors)   24
MC1   Contributed: Advances in Econometrics   (Pecan)   26
MD1   Contributed: Bayesian Time Series Procedures   (Pecos)   28
ME1   Contributed: Underlying factors in Time series   (Llano)   30
MF1   Contributed: Neural Network s Applications I – Load Forecasting (Blanco)   32
MG1   Contributed: Business Cycles I   (Nueces)   34
MH1   Contributed: Telecom Diffusion I   (Frio)   35
MI1   Contributed: Forecasting Accuracy Measures   (Mesquite)   37
MJ1   Invited: Supply Chain Practices   (Chula Vista Boardroom) 39

10:40am -12:00pm

MA2   Featured: Twenty Five Years of Judgmental Forecasting   (Live Oak)   41
MB2   Invited: Forecasting in Asset Allocation   (Directors)   42
MC2   Invited: Signal Extraction   (Pecan)   44
MD2   Contributed: Leading Indicators   (Pecos)   46
ME2   Contributed: Trading Issues   (Llano)   48
MF2   Invited: Neural Network Theory I – Recurrent Method   (Blanco)   50
MG2   Invited: Exponential Smoothing Issues and Application   (Nueces)   52
MH2   Invited: Modeling and forecasting the diffusion of innovation: (Frio)   54
         The Evolution
MI2   Contributed: Forecasting Model Selection   (Mesquite)   56
MJ2   Invited: Forecasting Software – State of Art   (Chula Vista Boardroom) 58

12:00pm- 1:00pm Lunch

1:00pm – 2:00pm
K2   **Plenary Session: Daniel Kahneman**   (Regency West) 59
         A perspective on the psychology of Judgment

2:35pm - 3:55pm

MA3   Presentation: Time Series Forecasting   (Live Oak)   60
MB3   Invited: Forecasting in Asset Allocation II   (Directors)   61
MC3   Contributed: Probability Forecasts   (Pecan)   62
MD3   Contributed: Forecasting in Agriculture   (Pecos)   64
ME3   Invited: Conflict Forecasting I   (Llano)   66
MF3   Contributed: Neural Network Application II   (Blanco)   68

MG3	Contributed: Forecasting Methods	(Nueces)	70
MH3	Contributed: Forecasting Prices	(Frio)	72
MI3	Contributed: Time series analysis II	(Mesquite)	74
MJ3	Invited: Organizational Politics in Forecasting: Issues, strategies and solutions	(Chula Vista Boardroom)	76

4:10pm – 5:30pm

MA4	Feature: Modeling and Forecasting the Diffusion of Innovation – A 25-Year Review	(Live Oak)	77
MB4	Invited: The use of Judgment in Forecasting	(Directors)	78
MC4	Contributed: Density Forecasts	(Pecans)	80
MD4	Contributed: Financial Information	(Pecos)	82
ME4	Invited: Conflict Forecasting II	(Llano)	84
MF4	Invited: Neural Network Theory II – Time Series Pattern	(Blanco)	85
MG4	Invited: Analysis and Forecasting of the Mexican Economy	(Nueces)	87
MH4	Practitioners: Robust Statistical Approach in Contemporary Econometric Software	(Frio)	89
MI4	Invited: Crime Forecasting	(Mesquite)	90
MJ4	Invited: Supply Chain II	(Chula Vista Boardroom)	92

Tuesday June 14th 2005

8:00am – 9:00am

K3	**Plenary Session: Ray C. Fair** Forecasting using Structural Models	(Regency West)	94

9:05am -10:25am

TA1	Feature: Econometric Forecasting	(Live Oak)	95
TB1	Invited: Exponential Smoothing II	(Directors)	96
TC1	Contributed: Econometric Applications	(Pecan)	98
TD1	Contributed: Forecasting International Inflation	(Pecos)	100
TE1	Invited: Forecasting issues in the Supply Chain	(Llano)	102
TF1	Contributed: Neural Network Application III- Finance	(Blanco)	104
TG1	Invited: Conflict Forecasting III	(Nueces)	106
TH1	Contributed: Marketing-Bass Diffusion	(Frio)	108
TI1	Contributed: Time series analysis Topics	(Mesquite)	110
TJ1	Invited: The Use of Scales in Judgmental Forecasting	(Chula Vista Boardroom)	112
TK1	Invited: A Practitioner View of Some Fundamental Issues in Business Forecasting	(Chula Vista)	114

10:40am -12:00pm

TA2	Invited Panel: Presidential Election Forecasting I	(Live Oak)	115
TB2	Contributed: Seasonality I	(Directors)	116
TC2	Invited: Use of Improper Forecasting Models	(Pecan)	118
TD2	Contributed: Forecasting international inflation and exchange rates	(Pecos)	119
TE2	Invited: Forecast Support Systems	(Llano)	121
TF2	Contributed: Neural Networks Competition I	(Blanco)	123
TG2	Contributed: Short-term forecasts	(Nueces)	125
TH2	Contributed: Marketing – Issues	(Frio)	127

TI2	Contributed: Discontinuities in Time series	(Mesquite)	129
TJ2	Contributed: Climate and Environment	(Chula Vista Boardroom)	130
TK2	Invited: Time Series Analysis - Prediction Bounds	(Chula Vista)	132

12:00pm -1:00pm Lunch

1:00pm -2:20pm

TA3	Invited: Prediction Markets-Forecasting Elections	(Live Oak)	134
TB3	Contributed: Energy Forecasting I	(Directors)	135
TC3	Contributed: Analysis of Time series	(Pecan)	137
TD3	Invited: Panel on Conflict Forecasting	(Pecos)	139
TE3	Contributed: Forecasting Software in the UK and US	(Llano)	140
TF3	Contributed: Neural Networks Competition II	(Blanco)	141
TG3	Contributed: Judgmental and Scenario Forecasting	(Nueces)	143
TH3	Contributed: Marketing-Technology Forecasting	(Frio)	145
TI3	Contributed: Portfolio Management	(Mesquite)	147
TJ3	Invited: Aviation Forecasting I	(Chula Vista Boardroom)	148
TK3	Invited: Extensions of Exponential Smoothing Models	(Chula Vista)	149

2:35pm – 3:55pm

TA4	Featured: Transportation Forecasting	(Live Oak)	150
TB4	Invited: Rule-based Forecasting I	(Directors)	151
TC4	Contributed: Time series analysis III	(Pecan)	152
TD4	Contributed: Dynamic Portfolio Management I	(Pecos)	154
TE4	Invited: Healthcare Forecasting I	(Llano)	155
TF4	Contributed: Non-linear Time series models	(Blanco)	157
TG4	Contributed: Empirical Application	(Nueces)	158
TH4	Invited: Forecasting Marketing Metrics Bass Model III	(Frio)	159
TI4	Invited: Presidential Elections Forecasting-A Survey of Methods, Part I.	(Mesquite)	161
TJ4	Contributed: Forecasting in Agriculture II	(Chula Vista Boardroom)	163
TK4	Contributed: Business Cycles II	(Chula Vista)	165

4:10pm – 5:30pm

TA5	Feature: Improving Forecast Through Textbook	(Live Oak)	167
TB5	Contributed: Technology Diffusion Forecasting III	(Directors)	168
TC5	Contributed: International Economic Issues	(Pecan)	170
TD5	Contributed: Combining Factors and Models	(Pecos)	172
TE5	Contributed: Health Care Forecasting II	(Llano)	174
TF5	Invited: Forecasting a Product Hierarchy	(Blanco)	176
TG5	Open: ASK THE EDITORS	(Nueces)	177
TH5	Contributed: Marketing Application	(Frio)	178
TI5	Invited: Prediction markets and Public Policy	(Mesquite)	180
TJ5	Invited: Aviation Forecasting II	(Chula Vista Boardroom)	182
TK5	Invited: Dynamic Portfolio Management	(Chula Vista)	184

Wednesday June 15th 2005

8:00am – 9:00am

K4	**Plenary: J Kenneth Raley**	(Regency West)	186
	Executive Presentation		

9:05am - 10:25am

WA1	**Feature Panel Discussion: 25 Years of Progress in Combining Forecasts** - 25 Years of Energy Forecasting	(Live Oak)	187
WB1	Contributed: Seasonality II	(Directors)	189
WC1	Contributed: State Space Models	(Pecos)	190
WD1	Invited: Transportation Forecasting	(Pecan)	193
WE1	Contributed: Demography I	(Llano)	195
WF1	Contributed: Forecasting methods and Decomposition	(Blanco)	197
WG1	Invited: Presenting Forecasts	(Nueces)	199
WH1	Contributed: Sports Forecasting	(Frio)	200
WI1	Contributed: Weather Forecasting	(Mesquite)	202
WJ1	Poster Session	(Chula Vista Boardroom)	204

10:40am - 12:00pm

WA2	**Feature Session: Derek W. Bunn** 25 Years of Energy Forecasting	(Live Oak)	208
WB2	Invited: Rule based forecasting II	(Directors)	209
WC2	Invited: Presidential Elections forecasting: A survey of methods II	(Pecan)	210
WD2	Contributed: Transportation Forecasting	(Pecos)	212
WE2	Contributed: Demography II	(Llano)	214
WF2	Contributed: Volatility	(Blanco)	216
WG2	Contributed: Forecasting methods and Decomposition	(Nueces)	217
WH2	Contributed: Potpurri	(Frio)	220
WI2	Contributed: Behavior of Prices	(Mesquite)	221

Monday, June 13th

K1

Plenary Session: Progress in Forecasting: 1981 to 2005 and Beyond
Monday, June 13th 8:00 am to 9:00 am   Room: Regency West

Chair: Keith Ord
      Georgetown University, USA

Robert Fildes
      Professor of Operational Research and Operations Management
      Lancaster University Management School

J. Scott Armstrong
      Professor of Marketing
      Wharton School
      University of Pennsylvania

After working together since the Institute was founded, each speaker still has distinct views on how best to achieve further progress in research and in applications. Our approach is to examine evidence on the last 25 years of research on forecasting. What have been the major contributions? The opinions of forecasting experts will be contrasted with our own in an effort to establish the areas of greatest potential for the next 25 years. More importantly, we suggest ways to accelerate progress in research and in the implementation of useful findings. Three areas show particular promise for implementing forecasting knowledge: the web, freeware and commercial software.

Robert Fildes

Robert Fildes (PhD California), is Head of Department, Member of IT Committee, and Joint Director of the Centre for Forecasting of the University of Lancaster. Associate Editorship of the International Journal of Forecasting. President (from 1999), International Institute of Forecasters, Past-President from 2004. His research interests span from studying the comparative performance of various methods of forecasting. Forecasting method selection and the evaluation of forecasting methods. In addition, he is involved in the development of Forecasting systems to support production, inventory, and supply chains.

J. Scott Armstrong

J. Scott Armstrong (Ph.D., MIT, 1968) is Professor of Marketing at the Wharton School, University of Pennsylvania. He is a founder of the International Institute of Forecasters, the Journal of Forecasting, the International Journal of Forecasting, and the International Symposium on Forecasting. He is the creator of forecastingprinciples.com, author of Long-Range Forecasting, and editor of Principles of Forecasting: a Handbook for Researchers and Practitioners. In 1996, he was selected as one of the first o the "Honorary Fellows" by the International Institute of Forecasters. He was named the SAM/JAI Press Distinguished Marketing Scholar of 2000. His recent interests have been in determining how to forecast the outcomes of conflicts and in applying the Polly vote to political elections.

Email: r.fildes@lancaster.ac.uk; armstrong@wharton.upenn.edu

MA1

Feature Presentation: Exponential Smoothing – The State of the Art

Monday, June 13th 9:05 – 10:25 a.m.   Room: Live Oak

Chair: Benito E. Flores
> Texas A&M University

Everette S. Gardner, Jr.
> Bauer College of Business
> University of Houston

This talk is based on an updated version of my 1985 review paper on exponential smoothing. When that paper appeared, many believed that exponential smoothing should be disregarded because it was either a special case of ARIMA modeling or an ad hoc procedure with no statistical rationale. Since 1985, the special case argument has been turned on its head. Today we know that exponential smoothing methods are optimal for a very general class of state-space models that is in fact broader than the ARIMA class. From the practitioner's viewpoint, the most important advance is the development of a robust method for smoothing damped multiplicative trends. We also have a new adaptive method for simple smoothing, the first such method to demonstrate credible improved forecast accuracy over fixed-parameter smoothing. Longstanding confusion in the literature about whether and how to renormalize seasonal indices in the Holt-Winters methods has finally been resolved. There has been significant work in forecasting for inventory control, including the development of new prediction distributions for total lead-time demand and several improved versions of Croston's method for forecasting intermittent demand series. Regrettably, there has been little progress in the identification and selection of exponential smoothing methods. The research in this area is best described as inconclusive, and it is still difficult to beat the application of a damped trend to every time series.

Everette S. Gardner, Jr. is Professor of Decision and Information Sciences in the Bauer College of Business, University of Houston. He received the Ph.D. in Business Administration from the University of North Carolina at Chapel Hill. Dr. Gardner served twenty years in the U.S. Navy and retired with the rank of Commander. He is a Vietnam veteran, served several tours of duty at sea, and held senior management positions in operations research, inventory management, and information systems. He has authored/co-authored four books, including Quantitative Approaches to Management (8th edition) from McGraw-Hill. His most recent paper is "Dimensional Analysis of Airline Quality," which appeared in Interfaces (July-August, 2004). As a consultant in forecasting and operations management, Dr. Gardner has served numerous companies like Compaq, Continental Airlines, Delta Airlines, Exxon, the NASA Johnson Space Center, and Toshiba.

Email: BFlores@mays.tamu.edu

MB1

Contributed Session: Scenarios

Monday, June 13th 9:05 am to 10:25 am   Room: Directors

Chair: Huang Haiyan
> Fair Isaac Corporation, Irvine, CA, USA

Appling Scenario and Multi-criteria Methods to Simulate and Assess Technology Policies

Victor A Banuls, Jose L. Salmeron
> Pablo de Olavide University, Seville, Spain

Scenario generation methods have often been used by policy makers as an instrument to manage the uncertain technological environment and supporting the shaping of long-term technology policies. Although scenario generation methods are conceptually similar to the shaping of long-term technology policies, literature suggests that there is a methodological gap between them.

In an effort to bridge this gap, the authors propose a scenario-based model to simulate and assess technology policies. This work introduces the principles and methodological basics of the proposed model. The proposed model is based on a mix of the Delphi Method, Analytic Hierarchy Process, and Cross Impact Matrix Method.

This paper also analyses an application of the proposed model to a Technology Foresight process in the Information Technology field. This analysis aims to serve as a reference for the application of the author's proposal, for researchers and practitioners.

A Study on the Product Development Scenario-Planning System Based on the Communication Semantic Chain Model

Yoji Kawamura
> Kinki University, 3-4-1 Kowakae, Higashiosaka-shi, Japan

This research builds the communication semantic chain model as the information modeling of the both-directions product communication between providers and consumers, and proposes the plan of the Product Development Scenario-Planning System (PDSPS) that simulates the product development scenario. Then, the outline experimental results of a developed prototype-system of PDSPS are shown.

PDSPS analyzes the product advertisement and consumer public information on the Internet, and simulates the product development scenario, based on the communication semantic chain model (product technology model, consumer behavior model and product development strategy model).

The outline specifications of a developed prototype-system of PDSPS are as follows:
1)Provider: 2 companies (each 3 products).eller
2)Consumer: 16 groups.
3)Product technology model: 1088 technology elements.
4)Consumer behavior model: 1088 cognitive elements, 544 quotation elements.
5)Product development strategy model: core technology driven strategy, or consumer adaptive strategy.
6)Simulation: 8 communication cycles.

A developed prototype-system of PDSPS can plan (generate) the provider and consumer scenarios by graph, chart and texts, in response to premise parameter. Based on a developed prototype-system of PDSPS, we can analyze the key-factor that creates the impact to consumer behavior.

Use of Time Series Bootstraps for Scenario Generation

Thomas R. Willemain

Rensselear Polytechnic Institute, Troy, NY, USA

Omer Demirel

Fatih University, Istanbul, Turkey

Huang Haiyan

Fair Isaac Corporation, Irvine, CA, USA

The design of many systems -- physical, financial, or decision-aiding -- would be aided by an unlimited and inexpensive supply of realistic scenarios describing the range of possible future inputs to those systems. If there is a recorded history of input values, the bootstrap provides a mechanism to generate the scenarios.

For univariate scenarios, we review the original bootstrap, its modification for time series data in the moving blocks bootstrap, its tuning for purposes of scenario generation, and its success in passing a Turing test of verisimilitude.

For multivariate scenarios, we review the original nearest neighbor bootstrap, its modification for financial data, and its application to generating future values of the US Treasury yield curve.

Email: willet@rpi.edu; odemirel@fatih.edu.tr; haiyanhuang@fairisaac.com; kawamura@bus.kindai.ac.jp;

MC1

Contributed Session: Advances in Econometrics

Monday, June 13th 9:05 – 10:25 a.m.   Room: Pecan

Chair: Sergio Koreisha
        University of Oregon

Out-of-Sample Forecasts as an Analytical Tool for Data Containing a Possible Structural Break

Scott D. Gilbert
        Southern Illinois University, Carbondale, Illinois

An important objective of science is to find global theories, those that explain/predict what happens in a wide variety of circumstances. Along the way, scientists usually encounter local theories which are either discarded or embedded in a more general theory. Statistical hypothesis tests provide two tools for this scientific method: (a) Tests for theory significance, regardless of local/global distinction, and (b) Tests for global-ness versus local-ness. The present work takes pieces of information from each method and builds some new tests of theory significance, with power focused on global theories. The tests answer the question: Is the theory valid and global? Rather than a subordinate question: Is it valid? Is it global? The statistics are asymptotically equivalent to quadratic forms in statistics obtained from standard methods (a) and (b), and under simplifying assumptions these forms coincide with out-of-sample and nested-sample model validation statistics. We examine test performance in simulation, and illustrate with an economic example.

Bayesian forecast combination for VAR models

Sune Karlsson
        Orebro University, Orebro, Sweden

Michael K. Andersson
        Sveriges Riksbank, Stockholm, Sweden

This paper proposes a Bayesian procedure for combining forecasts from multivariate forecasting models, e.g. VAR models. Standard applications of Bayesian model averaging suffer from a basic difficulty in this context, when additional variables are included and modeled the connection between the overall measure of fit for the model and the expected forecasting performance for the variables of interest is lost. We circumvent this problem by focusing on the predictive performance for the variables of interest and base the forecast combination on the predictive likelihood.

Specifically we consider forecast combination and, indirectly, model selection for VAR models when there is uncertainty about which variables to include in the model in addition to the forecast variables. For this purpose we consider all possible combinations of variables and lag lengths and the models that arise from these.

The procedure is evaluated in a small simulation study and found to perform competitively in applications to real world data.

Empirical Best Linear Unbiased Prediction in Misspecified and Improved Panel Data Models with an Application to Gasoline Demand

Swamy Paravastu, Wisham Yaghi, I-lok Chang
American University, Washington, USA

Jatinder S Mehta
Temple University, Philadelphia, USA

In this article, our main emphases are on using our solutions to the problems of omitted variables, measurement errors, and unknown functional forms, to improve the specifications of misspecified models, and on estimating the mean square error of an empirical best linear unbiased predictor of an individual drawing of the dependent variable of an improved model. We illustrate our methods with a comparison of forecasting performance for misspecified and improved models using data on the U.S. gasoline market. The results show that significant improvements in forecasting accuracy can be obtained by improving the specifications of misspecified models.

Using Least Squares to Generate Forecasts in Regression Models with Auto correlated Disturbances

Sergio G. Koreisha and Yue Fang
University of Oregon

The topic of serial correlation in regression models has attracted a great deal of research in the last fifty years. Most of these studies have assumed that the structure of the error covariance matrix Ω was known or could be consistently estimated from the data. In this article we develop a new procedure for generating forecasts for regression models with serial correlation based on ordinary least squares and on a misspecified, albeit adequate, representation of the form of the autocorrelations. A large simulation study is used to compare the finite sample predictive efficiencies of this new estimator vis-à-vis estimators based on ordinary least squares and generalized least squares with estimated, but known Ω , as well as with misspecified Ω. We also use real economic data to contrast the forecast performance of the proposed new method with other approaches.

**Email: Sune.Karlsson@esi.oru.se; Michael.Andersson@riksbank.se; gilberts@siu.edu;
paravastu_s@bls.gov, wisamyaghi@yahoo.com, ilchang@american.edu, mehta1007@comcast.net**

MD1

Contributed Session: Bayesian Time Series Procedures

Monday, June 13th 9:05 – 10:25 a.m.   Room: Pecos

Chair: Daniel T. Walz
      Trinity University

Comparison of non-nested asymmetric heteroscedastic models

Cathy W. S. Chen
      Graduate Institute of Statistics & Actuarial Science, Feng Chia University, Taichung, Taiwan

Richard Gerlach
      School of Mathematical and Physical Sciences, University of Newcastle, Newcastle, Australia

K. P. Mike
      Department of Information and Systems Management, the Hong Kong University of Science and Technology, Hong Kong, China

The GJR-GARCH is a popular choice among asymmetric heteroscedastic models. However, recent work employs double threshold models to capture volatility and mean asymmetry. We propose a Bayesian model comparison procedure to test between the GJR-GARCH and double threshold GARCH (DTGARCH) specifications, adopting novel Reversible jump simulation methods. A simulation experiment illustrates good performance over different priors and sample sizes. In a study of eight markets we find strong evidence that the DTGARCH, with US market news as a threshold variable, performs better than the GJR-GARCH and traditional DTGARCH models. This result was consistent across seven of the markets, excluding Canada.

A Bayesian Predictive Approach to Time Series Model Selection

Juan C. Martinez-Ovando
      Banco de Mexico, MEXICO

Eduardo Gutierrez-Peña
      IIMAS, UNAM, MEXICO

In recent years, there has been a wide interest in developing Bayesian procedures for parametric model selection, and the area of time series analysis is not the exception. In this paper, we describe a Bayesian decision theoretic approach to parametric time series model selection from a predictive standpoint; the resulting optimal model is that which maximizes the expected utility with respect to the posterior distribution of a \'flexible\' Bayesian model. We define this 'flexible' model as the Bayesian mixture of two semi-parametric models describing the systematic and the stochastic components of the time series separately. We discuss the implementation of this criterion and present some empirical results.

Using Financial Market Variables to Predict Macroeconomic Activity: A Bayesian Model Averaging Approach

Daniel T. Walz, Dante Suarez, Roger Spencer
    Trinity University, San Antonio, USA

The study of economic activity as it relates to equity markets has been addressed by Fama (1981) and Barro (1990), who conclusively established that stock market returns are leading indicators of future economic growth. More recently, studies such as Campbell, et al. (2001), confirming earlier results of Schwert (1989), show that stock return volatility (as a measure of systematic risk) is significantly related to real GDP counter cyclically, and may even drive out the effect of lagged stock market returns. Market returns reflect expectations about future cash flows and discount rates (suggesting a positive relation with future investment and real production), while market volatility reflects uncertainty about future cash flows and discount rates (suggesting a negative relation with future investment and real production).

The debt market forecast potential for real product also enjoys a rich literature. Harvey's (1991, 1993) work on forecasts of economic growth derived from the informational content of the term structure of interest rates was followed by, among others, Estrella and Hardovelis (1991), Estrella and Mishkin (1998), and Ang, Piazzesi, and Wei (2003). Most intuitively, we can expect higher interest rates to inhibit economic activity, and a positively sloped term structure to represent an upcoming raise in interest rates. One could think, however, of interest rates as endogenously determined by the central bank (as it attempts to curve the business cycle), in which case the relationship with economic activity would be positive. Spencer, et al. (2004) find that the combination of these two effects can give rise to a situation where the interest rate is inversely related to economic activity with a longer horizon, but inversely related in the short term.

We propose applying Bayesian Model Averaging Approach (BMA) to determine the relative forecast accuracy of bond and equity market variables. Specifically, we use BMA, as originally developed by Leamer (1978) and recently extended by many studies, to calculate the posterior probability that each of our four financial variables is the best predictor of U.S. GDP and Industrial Production.

**Email: chenws@fcu.edu.tw; Richard.Gerlach@newcastle.edu.au; immkpso@ust.hk; dwalz@trinity.edu;
        esuarez@trinity.edu; rspencer@trinity.edu; jcmartinez@banxico.org.mxl;
        eduardo@sigma.iimas.unam.mx**

ME1

Contributed Session: Underlying factors in Time series

Monday, June 13th 9:05 am – 10:25 am   Room: Llano

Chair: Dandan Liu,
Texas A&M University, College Station, TX, USA

Modeling and Forecasting household representative rates in England – an Application of a Conditional VECM System

Alei A. Duan
Nationwide Building Society, Swindon, UK

Dave D. King
Anglia Polytechnic University, Chelmsforn, UK

This paper aims to reveal underlying economic effects, which may help explain and forecast changes to household representative rates and consequent numbers of households in England. It applies a time series macro-econometric modeling approach, namely a conditional VECM system. In this approach, household representative rates are modeled as a function of key macroeconomic Drivers; key economic effects are quantified with elasticity estimations; future numbers of households are forecast via changes in household representative rates. To separate predominant age and gender effects from the economic effects, age-specific, age/gender-specific household representative rates are modeled.

The modeling results confirm that changes in economic factors, particularly real income, housing costs and unemployment rates significantly affect household representative rates; demographic factors, particularly age and gender play an important part in determining the strength of economic effects on household representative rates. It shows that projected future numbers of households, particularly those headed by young adults, are more sensitive to changes in the assumption of future macroeconomic conditions than other age groups.

The paper provides an economics-based framework for assessing economic impacts on household representative rates. However, the limitations of this approach, i.e. insufficient control of demographic effects and weak out-of-sample forecast performance should be recognized.

Macroeconomic Forecasting Using Structural Factor Analysis

Dandan Liu, Dennis W. Jansen

Texas A&M University, College Station, TX, USA

The use of several underlying factors to summarize the information from a relatively large set of explanatory variables is the new frontier of the forecasting literature. However, factors estimated in the previous literature usually cannot be interpreted structurally, and the estimated factors or forecasting models are not chosen on the basis of some standard theories. In this paper, we propose several variations of a general structural factor forecasting model, and use these to forecast some key macroeconomic variables. We argue that the choice of factors can be made more structurally meaningful by choosing these factors from subsets of variables according to widely-accepted theories, and depending on the variable to be forecasted. To analyze the advantages of the structural factor forecasting model, we compare its forecasting performance with baseline models including the univariate AR model and the standard VAR model, as well as some non-structural factor forecasting models. The results indicate that our structural factor forecasting model performs significantly better in many cases, and especially for real activity variables at short-horizons.

Email: **alei.duan@nationwide.co.uk; d.g.king@apu.ac.uk; dandan-liu@neo.tamu.edu; d-jansen@tamu.edu; ao2027@columbia.edu;**

MF1

Contributed Session: Neural Networks Applications I-Load Forecasting

Monday, June 13th 9:05 – 10:25 a.m.   Room: Blanco

Chair: Sven Crone
Lancaster University Management School, Lancaster, UK

Online training and testing load forecasting using a multi context recurrent neural network

Tarik T.R. Rashid, Tahar Kechadi

Computer Science, University College Dublin, Ireland

Forecasting is done by online training and testing using a multi context recurrent network. The network consists of the input, hidden, context(s), and output layers. Forward connections exist from the context(s) and the input to hidden layer, and from the context(s) and hidden to the output layer. Backward connections exist from the hidden to the context layers.

Offline training: The network was trained with a few years' data. The network weights are saved and used as initial weights to train the network with one particular season's data. The new weights are computed and used as initial weights to train a particular month from that same season.

Online training: To forecast the nth day's load in the month, the network is initialized with the weights of the month obtained from the offline training. The network is then trained with similar patterns of that day for that month. Then the nth day's pattern is presented to the network and load is forecasted.

The forecast error is averaged for a number of sequences of the days using moving average window. It is then added to the current forecasted load to improve future forecasting. The network is trained with real time recurrent learning

Short-term forecasting using Artificial Neural Networks

Vivek V.M. Mahajan

Technical Education Department, J&K, INDIA

Vinod V.I. Sharma

University of Jammu, J&K, India

Artificial Neural Networks have been recently suggested for short term load forecasting applications by a large number of researchers. Short term load forecasting no a day is a very commonly addressed problem in utilization commodities. The reason for this is that, recent scientific innovations have brought in new approaches to solve this problem. The developments in information technology have broadened possibilities for this and other methods working in a real time environment.

The ability to predict or forecast load pre-hand within a reasonable accuracy of actual demand provides target for supply optimization well in time. Gas load forecasting using Artificial Neural networks borrows the idea from electric load forecasting in which neural networks have been used very extensively for short term load forecast, one

hour up to a maximum of twenty four hours. It is essential to manage integrated gas networks efficiently to minimize gas trading and transportation cost. It is very essential to have the gas load forecasting in the state of J&K, where it has been observed that, gas load mainly depends upon the electric power scenario. The power scenario of the state is poor thus necessitating the people to shift to the alternate sources of energy for their day to day utilization.

As market competition intensifies, precise demand forecasting information becomes more valuable. The main advantage of using neural networks lies in their abilities to learn the mentioned dependencies directly from the historical data without necessity of selecting appropriate models. Neural Network can learn to approximate any function and behave like associative memories just by using example data that is representatives of the desired task. They are model free estimators, which are capable of solving complex problems based on the presentation of a large number of training data. Neural Networks estimate a function without mathematical description of how the outputs functionally depend on the inputs. As energy tradeoff become more flexible, the forecasting of its demand will need to adapt, to handle the new behavior patterns. It is anticipated that the forecasting will include commercial modeling along with the latest concepts in the information technology as Fuzzy systems, Genetic logarithms, in the near future.

A Bayesian Kernel Framework for Univariate Short-term Electricity Load Forecasting

Lilian M. de Menezes
Cass Business School, City University, London, United Kingdom

Nikolay Nikolaev
Goldsmiths College, University of London, London, United Kingdom

In the last decade many applications of neural networks to load forecasting have been reported and reviewed. Claims were made that large neural networks explore the data and are at least as efficient as conventional approaches. Yet, most of this advocated success has been observed within a multivariate framework. Comparisons of univariate time series models of electricity demand show that this optimism may be premature, since neural networks have also been outperformed by far simpler models.
In this paper, the Relevance Vector Machine (RVM) with Gaussian kernels is applied to univariate time series forecasting of electricity demand. According to this Bayesian framework, automatic model selection is carried out and weights that balance statistical bias with variance are optimized without the need to perform cross-validation. This framework seems ideal for the task of generating probabilistic multi-steps-ahead forecasts for the load and thus we compare its performance on data that have previously favored simpler models.

Email: s.crone@lancaster.ac.uk

MG1

Contributed Session: Business Cycles I

Monday, June 13th 9:05 – 10:25 a.m.   Room: Nueces

Co-Chairs: Beatriz B. Farina, Jose Luis Rojo
Universidad De Valladolid, SPAIN

Development of a CGE Model as a Forecasting Tool for the Thai Economy

Kriengsak Chareonwongsak
Santisuk-Bangkok, Thailand

In the past, CGE (Computable General Equilibrium) models have been used as tools to assess the impact of policies that always gave only the pure impacts of shocks. As CGE models are reliable in their provision of policy implications, but not so accurate in forecasts, so they are rarely used in forecasting due to their structure and data limitations. Because utilizing more information in forecasting would improve the forecast, we have thus developed our CGE model to use forecasting information from many institutions, more than structural information and other information traditionally used in CGE models. Following the approach of the MONASH model, which is the CGE model of the Australian economy, we have carried out the simulation steps of historical simulation, decomposition simulation, and forecasting simulation. The base model in development is IFD-GEM, the CGE model of the Institute of Future Studies for Development. This approach makes it possible for forecasts from many institutions to be consistent under one framework. Results can be fed back to those institutions so that they can revise their forecasting results to be consistent with economy-wide aspects of forecasting.

Dynamic patterns of the monthly statistical distributions in the Spanish Economic Climate Cycle

Beatriz B. Farina, Jose Luis Rojo
Universidad de Valladolid, Spain

In a previous work presented in the 20th ISF, the authors introduced a new concept for the business cycle, the 'Economic Climate Cycle', a hidden and a latent sign behind a very extensive package of socio-economic and economic indicators, arising from the co-movements among their cyclical patterns.
In this context, it is understood that an economy is in an acceleration phase when the environment that collects these indicators points out a generalized improvement of the rhythm of growth, and it is in a deceleration or slowing down phase when the environment of the economic activity indicates it. Therefore, turning points are defined like those in which the environment of the economy changes.
In this paper we propose a model for describing the guidelines of the monthly behaviour of those economic indicators, or more specifically, for explaining the statistical patterns that exist behind the series which contain the cyclical information of the Spanish Climate Cycle. This model uses beta distributions whose parameters are estimated for each cross-section. The assessment of the behavior and the evolution of these estimators allow us to identify the sample characteristics of the monthly distributions and provide the guidelines of the cyclical behavior in the acceleration and deceleration phases.

Email: bfarina@eco.uva.es; rojo_s@eco.uva.es

MH1

Contributed Session: Telecom Diffusion I

Monday, June 13th 9:05 – 10:25 a.m.   Room: Frio

Chair: Towhidul Islam
University of Guelph, Guelph, Canada

Predicting Diffusion of Innovations by Self-Organizing Maps and Machine Learning

Seppo T. Pitkanen, Heikki Kalviainen, Jarmo Ilonen
Lappeenranta University of Tech, Lappeenranta, Finland

The study deals with diffusion of telecom products. The products have been available in some countries, and on the basis of the diffusion process observed, forecasts are made for the other countries. The prediction is based on finding similar countries by the aid of self-organizing maps (SOM), using various economical and social key figures. A novel method, \differential evaluation\ was developed for solving the highly non-linear optimization problem concerning finding weights for the country parameters that dominate the diffusion process.

Forecasting uncertainties and risks in high capacity broadband rollouts

Kjell Stordahl
Telenor Nordic, Oslo, Norway

Nils K. Elnegaard
Telenor R&D, Oslo, Norway

The paper shows the economical impact of forecast uncertainties in telecommunication projects. Optimal strategies for high capacity broadband rollouts are developed using Net Present Value (NPV) calculations based on broadband adoption rate forecasts, ARPU (average revenue per user) forecasts, telecommunication equipment cost predictions and predictions of customer operations and maintenance costs. The NPV calculations are examined for different rollout strategies in order to find the optimal strategy.

The forecasts and the predictions are modeled using diffusion models, extended learning curve models and similar models. Beta distributions are used to model forecasts uncertainties for each forecasting variable. The simulation package Crystal Ball is applied to generate simultaneous simulations of the forecasting variables. For each rollout strategy 10 000 simulations have been carried out.

An advanced techno-economic tool called the "Tonic tool" has been developed through the European research programs RACE, ACTS and IST. The tool was used to assess NPV for each of the 10 000 simulations. The analysis shows that the adoption rate forecasts generated the highest risks followed by the ARPU forecasts. The evaluation of the broadband rollout strategies took into account both the NPV and the NPV risks generated from the forecasts uncertainties.

Forecast of new technology in saturated markets

Borgar Olsen, Arild Jacobsen, Markku LŠteenoja
BTO, Telenor R&D, Fornrbu, Norway

This paper analyses the importance of taking into account the existing market situation, when new and promising technology is brought to the market. This fact is illustrated by performing techno-economic analysis for the newly standardized WiMAX-2004 technology used as fixed broadband in Europe. The extended learning curve models developed in the European project TITAN together with judgmental knowledge are used to predict the cost evolution of the new network components.

WiMAX provides broadband capacities to households quite similar to ADSL and HDSL and must therefore be seen as complementary or competing to existing services. In urban and suburban areas, WiMAX may be used to cover parts of the residual market and as a technology for a competitor, which wanted to enter the broadband market. In most countries there is a significant ADSL residual market in rural areas and some of these customers will be very expensive to cover with traditional ADSL solutions. The incumbent operator will need an alternative solution and WiMAX is a promising technology in those areas.

Overall broadband forecasts are developed and substitution models are used to forecasts WiMax marked share in the different areas. The forecasts are important input to techno-economic analysis for WiMax roll out.

The Effects of Innovation Characteristics, Country Characteristics and Context on International Diffusion of Multi-generation Cellular Mobile Phone Adoption

Towhidul Islam
.   University of Guelph, Guelph, Canada

Nigel Meade
Imperial College London, London, UK

Mobile cellular telephony is an example of an extremely successful new telecommunications service that has already changed how people live and work and created a significant increase in consumer welfare. Since its introduction in Europe and Japan, the technology has evolved through three generations. A number of recent papers in Marketing, Management Science, Economics and Sociology have identified several determinants of international technology diffusion. The determinants (or covariates) that have been studied using a single generation of technology can be broadly classified into three categories i.e. innovation characteristics (e.g. price, relative advantage), country characteristics (e.g. wealth, heterogeneity, access to information, demographics) and context (e.g. culture, risk factors, geographical region).

The objective of this paper is to analyze two generations of this interactive technology using data from 80 countries from four economic and six geographical regions within a multi-generation diffusion modeling framework. We shall test a series of hypothesis about 50 covariate effects with an emphasis on their contribution to improving forecasting accuracy.

Email: islam@uoguelph.ca

MI1

Contributed Session: Forecasting Accuracy Measures

Monday, June 13th 9:05 – 10:25 a.m.   Room: Mesquite

Chair: Robert W. Samohyl
         UFSC, Brazil

Investigating Performance of Various Forecasting Measures for Short, Medium and Long Term Forecasts in Financial Time Series

Zainudin Z Arsad, Choo Hui Nee
         Universiti Sains Malaysia, Penang, Malaysia

In many financial times series; a model being developed is diagnosed for its sufficiency by carrying out residual analysis and investigating the capability of the model in producing reliable forecasts. Various forecasting performance measures have been developed and are used for the investigation. In many situations, researchers normally use more than one measure to evaluate the reliability of the forecasts.

This paper investigates the performance of various forecasting measures on short, medium and long term forecasting. In particular, the analysis is intended to find a robust measure whereby performance will not be influenced by the length of forecasting period. The data used are the monthly rate of inflation and the daily Kuala Lumpur Composite Index. Two different techniques, ARMA and GARCH are used to model the series. The analysis uses various forecasting measures and includes Mean Square Error (MSE), Root Mean Square Error (RMSE), Mean Absolute Deviation (MAD), Root Mean Square Percentage Error (RMSPE), Mean Percentage Error (MPE), Mean Absolute Percentage Error (MAPE), Adjusted MAPE (AMAPE), Theil's U, U1, U2, and Log Mean Square Error Ratio (LRM).

The results indicate that it can be confusing and dangerous to use several measures in evaluating the models because different measures may select a different optimal model. This contradiction will definitely lead to user into difficulty in selecting the best model in terms of within-sample fit and ability to forecast future values. Most of the measures show low consistency when the length of the forecast period is varied. Overall, the results found that U1 is the only measure that shows a reasonably high consistency.

Aberration Control in Time Trend Forecasting

Elliot H. Levy
         US Department of Commerce, Washington DC, USA

This presentation is an overview on the subject of setting upper and lower bounds for forecast error to assessing results of a prediction technique. A parsimony concept is applied against useless forecast input, e.g. linear dependent logjam. Use of quality control limits is the main emphasis that applies a loss function between actual and forecast. Also, a method of 2-way forecast error adjustment I presented in an attempt to control forecasts that go awry. Costs of tracking various trend-methods of forecasts are presented too.

Another look at measures of forecast accuracy

Anne B Koehler
Miami University, Oxford, Ohio, USA

Rob Hyndman
Monash University, Clayton, Australia

Measures of accuracy for forecasts of univariate time series are discussed and compared. The measures recommended by previous authors on this topic and those used in the M-competition and the M3-competition are all found to be inadequate. Many of these frequently used or recommended measures of forecast accuracy are degenerate in commonly occurring situations. A measure that has been given little attention is the Relative Mean Absolute Error, which is the ratio of mean absolute error for forecasts from a given method to the mean absolute error from a specified base model. We propose that the Relative Mean Absolute Error become the standard measure for comparing forecast accuracy across multiple time series.

A Combined Control Chart for monitoring Forecasting Errors on Electrical Energy Demand in Santa Catarina (South of Brazil)

Eder D. Corvalao
Ciasc, Brazil

Robert W. Samohyl, Gueibi P. Souza, Andrea C. Konrath
UFSC, Brazil

Inaccurate forecasts in the electrical energy sector are the cause of several strategical problems, as the imprecise determination of the correct magnitudes in electrical systems. For example, the social-economic development of a region depends upon precise forecasts of energy use, and beyond this, in the Brazilian case, there are severe penalties foreseen in federal legislation (Decree 5,163 of 30/07/2004) for imprecise forecasts. In the case of contracted energy above the necessary limits, energy use will be submitted to the appropriate legislation and penalties paid, while in the case of under estimation contracted energy will have to come from the exclusive and costly short term market of spot auctions.

The main proposal of this study is to guarantee the maintenance of accuracy in forecasts through the application of a method of monitoring forecast error. The use of the combined control chart from the literature in Statistical Process Control, the Shewhart-CUSUM chart, and two auxiliary tables, one for n-step ahead errors, and another for cumulative sums of errors are proposed and their applicability demonstrated. Errors become a learning instrument for identifying difficult periods of forecasting and indicating the relevant moment for the revision of models.

Email: samohyl@deps.ufsc.br

MJ1

Invited Session: Supply Chain Practices
Monday, June 13th 9:05 – 10:25 a.m.   Room: Chula Vista Boardroom

Chair: John E. Boylan
      Buckinghamshire Chilterns University College, UK

Supply Chain Demand Planning: A Case Study of Consensus Forecasting

Rogelio Oliva
      Mays Business School, Texas A&M University College Station, USA

Noel Watson
      Harvard Business School, Boston, USA

Forecasting biases and proposed mechanisms to avoid them are well documented in the literature. When looking at corporate forecasting, however, it is rare to find processes that account for the social, political, and economical pressures responsible for these biases. In this study, we document the implementation of a consensus forecasting process (incorporating input from product planning, sales, finance and operations) adopted by a consumer electronics manufacturer. In describing the information gathering and sharing protocols, the meetings, and the feedback incorporated into this process, we explicitly identify how functional and individual biases are addressed. The resulting process increased the firm's forecast accuracy from 25% to 90% in fifteen months.

The case study reveals forecasting as a social and political process, beyond the application of statistical models, and illustrates how coordination efforts affect the behavioral decision making of individuals. We identify a dual dependency between the supply chain coordinating system (CS) and individual biases (while the CS needs to account for individual biases, the CS is also in part responsible for the biases that a function or individual might have) and suggest new areas of research and dimensions for consideration in the design of coordinating systems.

Demand forecasting adjustments for service level achievement.

Aris A. Syntetos
University of Salford, SALFORD, UK

John E. Boylan
Buckinghamshire Chilterns University College, UK

In practical parametric approaches to inventory management it is inevitable that future demand is forecasted in some way. In the past we have been concerned with the issue of intermittent demand forecasting in an inventory management context. In particular, the main focus of our research has been the production of unbiased estimates, the minimization of the sampling error of the mean and the development of 'operationalised' definitions of intermittent demand patterns focusing on the performance of alternative estimators. However, various research projects have demonstrated that: (a) forecasting performance does not relate directly to the empirical utility of the estimators, and (b) the substitution of the true moments of the demand distribution with estimates leads to an inevitable 'loss of performance'.

Even though both issues have been explicitly recognized in the academic literature little work has been conducted on necessary adjustments that address the issue of interaction between forecasting and stock control. Moreover, published work in this area assumes a normal distribution which is clearly inappropriate for intermittent demands. In this paper some relevant modifications are proposed and results are presented, based on an extended real-data simulation experiment, to examine the performance of those modifications.

Email: john.boylan@bcuc.ac.uk;

MA2

Feature Presentation: Twenty Five Years of Judgmental Forecasting
Monday, June 13th 10:40 am – 12:00 pm   Room: Live Oak

Chair: Michael Lawrence
    University of New South Wales

Judgmental Forecasting of time series with no domain knowledge

Michael Lawrence
    University of New South Wales

Judgmental Forecasting of time series with domain knowledge

Marcus O'Connor
    University of Sydney

Supporting the judgmental forecaster

Paul Goodwin
    University of Bath

Forecasting Sales

Nada Sanders
    Wright State University

Twenty five years ago the use of judgment in forecasting was viewed with much suspicion. In fact judgment was generally seen as the old outdated technique being held to by the equivalent of dinosaurs and due for replacement by a computer based forecasting technique. In the intervening years judgmental approaches to forecasting have proved remarkably resilient and have spawned a rich field of research called Judgmental Forecasting through which we have come to recognize the value and shortcomings of judgment, where it is useful and where it is counter productive. This panel features four speakers, some of whom have been at the forefront of the field since its beginning. All are noted researchers in the field. The panel participants and their topics are given below.

Email: michael.lawrence@unsw.edu.au

MB2

Invited Session: Forecasting in Asset Allocation I
Monday, June 13th 10:40 am – 12:00 am   Room: Directors

Chair: Giampaolo Gabbi
    University of Siena

Asset Price Forecast In The Case Of A General Ito Diffusion.

A. Cipollini
    Universit`a degli Studi di Milano-Bicocca

Crucial assumption in the Black and Sholes formula, commonly used in the context of Asset Price Forecast, is that the stock price follows a suitably normalized exponential Brownian motion. Main aim of the article is to extend the Black and Sholes machinery in order to do pricing of derivatives in the case in which the stock price process is a general Ito-Diffusion. In particular it is possible to define a more general formula that entirely substitutes the Black and Sholes one. Moreover the price process turns out to be again the probabilistic solution of the Black-Sholes-Merton P.D.E., with respect to the Ito-Diffusion selected. Together with the case of an exponential Brownian motion that gives the well known Black and Sholes results it is possible to characterize a large class of cases. As example here it is used the case of an Ornstein and Uhlenbeck process that seems to describe well situations in which the stock price is expected to be 'out of money' except for the effect of randomness.

The Performance Evaluation Of Hedge Funds: A Comparison Of Different Approaches

Gianluca Mattarocci, Alessandro Carretta
    University of Rome Tor Vergata   Rome   Italy

The standard approach to fund's evaluation assumes that the return distribution is normal and uses the variance as a measure of funds' risk. Some characteristics of hedge funds, as the remuneration mechanism of the portfolio manger, make this assumption not acceptable and the traditional approach of Risk Adjusted Performance (RAP) must be revised before applying it to the hedge funds. Some authors define different RAP measures that try to overcome the problem related to the lack of normality: new RAPs are characterized by a more detailed analysis of return distribution that doesn't consider only the first two moments of the distribution. Higher computational complexity could be reasonable only if selections founded on new RAPs allow to identify better investment opportunities than those selected with standard RAPs. This work analyses different approaches proposed to calculate RAP for hedge funds and evaluates advantages and limits of each measure proposed. To demonstrate the usefulness of new approaches, an application of these measures on the european hedge funds' market is proposed. The empirical analysis studies differences in funds' classification based on different measures and demonstrates that the standard RAP approach is unable to identify the hedge fund's best performer.

Portfolio Optimization under Changing Risk

Riccardo Bramante

    Institute of Statistics, Università Cattolica del Sacro Cuore, MILAN

Giampaolo Gabbi

    Financial Management Department, University of Siena, Banking and Finance Area, SDA Bocconi – Milan

Risk estimation is crucial in investment decisions. A variety of risk measures have been suggested to take into consideration that risk changes through time [Flavin-Wickens (1998); Sheedy-Trevor-Wood (1996)]. The choice of different risk measures can considerably change asset allocation decisions in the way assets are ranked on the basis of their risk-return profile.

In this paper we adopt a time varying asset allocation model based on a modified Sharpe Index measure in which risk is treated as downside volatility. On the basis of this model we show how to construct optimal portfolios that adapt quickly to changes in the distribution of returns.

Empirical evidence is provided using a set of European and American Market Indices. In particular, model outputs will tend to produce superior asset allocation outcomes if compared to the ones of a standard mean-variance approach.

Email: gabbi@unisi.it; giampaolo.gabbi@sdabocconi.it

MC2

Invited Session: Signal Extraction

Monday, June 13th 10:40 am – 12:00 am   Room: Pecan

Chair: Marc Wildi
        University of Technical Sciences, Switzerland

Signal extraction: early detection of turning-points

Marc Wildi
        University of technical sciences, Biel, Switzerland

In this paper we briefly review the problem of detecting turning-points of a time series towards the current time point. Historically, turning-points of the time series are identified with those of a smooth trend component. Unfortunately, this component which is based on a symmetric filter cannot be obtained directly towards the current time point and must be estimated. Intuitively, the best asymmetric level filter could then be used for assessing the existence of turning-points. We show that the rate of false alarms (number of wrongly inferred turning-points) generated by this procedure would often be excessively large in practice and therefore we propose a new solution based on approximating the trend signal subject to a particular frequency-weighting function. Besides a formal motivation for this technique we also provide comparisons with other methods based on business survey data. In summary, our results show that the level approximation and the early detection of turning points are incongruent criteria which should be solved by specific filter design techniques.

Signal extraction: level approximation for bounded time series

Bernd Schips
        Institute for Technology, Zurich, Switzerland

Estimation of signals at the current boundary of time series is an important task in many practical applications. In order to apply the symmetric filter at current time, model-based approaches typically rely on forecasts generated from a time series model in order to extend (stretch) the time series into the future. In this paper we analyze performances of concurrent filters based on TRAMO and X-12-ARIMA for important bounded time series - business survey data and diffusion indices of the FED - and compare the results to a new efficient estimation method which does not explicitly (though implicitly) rely on forecasts. It is shown that both model-based procedures are subject to heavy model misspecification related to false unit root identification at frequency zero and at seasonal frequencies. Our empirical results show that the traditional model-based approach is strongly inefficient (increase of error variance by 30-40% in the mean).

Oral Presentation on Diffusion Indices: A Potentially Fruitful Application of the Direct Filter Approach in Seasonal Adjustment, Trend Extraction and Prediction

Thomas Fomby
Southern Methodist University, Dallas, TX, USA

The history of and methodologies for constructing diffusion indices for business surveys are briefly reviewed. Diffusion indices are, by construction, bounded between 0 and 100. Currently no consensus exists concerning seasonal adjustment, trend extraction, and prediction of diffusion indices. However, Wildi and Schips (2004) recently showed that, for 36 representative bounded time series, the Direct Filter Approach outperformed Model Based Approaches (Tramo/Seats and Census X-12-ARIMA) in signal extraction and prediction. With regards to bounded time series, Wildi and Schips point out that the Model Based Approaches are mis-specified and use an unsuitable optimization criterion. Given the relatively long history of the Philadelphia Fed diffusion indices and their importance in business cycle research, it is suggested that they too can serve as excellent trial series for examining the relative performances of the Direct Filter and Model Based Approaches in the seasonal adjustment, trend extraction, and prediction of bounded time series.

Email: wia@zhwin.ch; Bernd.schips@kof.ethz.ch; tfomby@smu.edu

MD2

Contributed Session: Leading Indicators

Monday, June 13th 10:40 am to 12:00 pm   Room: Pecos

Chair: Christian Gaggermeier
        Nuremberg, Germany

Forecasting the General Government Deficit: the Role of Leading Indicators

Teresa Leal
        University of Huelva, Huelva, Spain

Diego Pedregal
        University of Castilla-La Mancha, Ciudad Real, Spain

Javier Perez
        Centra Sevilla, Spain

In this paper we evaluate the usefulness of a set of fiscal indicators as early-warning-signal tools for the Spanish annual General Government Net Lending developments. The indicators are mainly based on monthly and quarterly public accounts' figures. We illustrate how the dynamics of the indicators show a remarkable performance when anticipating general government accounts' movements, both in qualitative and in quantitative terms."E

A Dynamic Bi-factor Model: U.S. coincident and leading indicators

Konstantin A. Kholodilin
        St. Petersburg, Russia

Wenxiong Vincent Yao
        Institute for Economic Advancement, University of Arkansas - Little Rock, USA

In this paper a dynamic bi-factor model with Markov-switching is developed. Both common factors have their own cyclical dynamics and their lead-lag relationships are reflected in the transition probabilities matrix. We apply the model to four coincident and four selected leading indicators for the U.S. economy. The model-derived recession probabilities reveal close correspondence of composite coincident indicator (CCI) and strong predictive power of composite leading indicator (CLI) relative to NBER business cycle chronology. The bi-factor model also reveals that CLI leads CCI at recessions and expansions by 7 months, on average. This permits forecasting in a timely and precise way the turning points of the business cycle.

Searching Leading Indicators for Employment in Germany: Some Simple Regression Models

Christian Gaggermeier
Nuremberg, Germany

In Germany, monthly employment data, which is calculated from different data sources by the Federal Statistical Office, is not published before 70 days after the end of the reported month. To bridge this gap, I use the information provided by leading business-cycle indicators and employment-approximating variables, estimating indicator models, which are to predict the number of employed over a horizon of three months and Đ above all Đ to determine turning points in employment cycles.

Out of more than 40 tested variables, six proved useful: the assessment of the current business situation and the business expectations according to the Munich IFO institute's business survey, incoming orders in manufacturing, the numbers of registered unemployed and contributors to the unemployment insurance as well as the German-stock-market index of the 30 biggest companies (DAX).

I present three alternative regression models, which are tested regarding their fit, their stationarity and their stability and whose forecasts are compared. Having observed that a model with only three variables already performs surprisingly well, all models have been specified very parsimoniously. Especially, I refrained from including lagged employment because in that case, forecasts would be too strongly based on the past, turning points being very unlikely to be detected.

Email: christian.gaggermeier@iab.de

ME2

Contributed Session: Trading Issues

Monday, June 13th 10:40 am – 12:00 pm   Room: Llano

Chair: Roy Batchelor,
        Cass Business School, London, UK

A New Fail Safe Method for Exchange Level Risk Management

Aneel A. K. Kanwer
        BMA Capital Management Limited, Karachi, Pakistan

Ansari A. A. Ali
        AKD Securities (Pvt.) Ltd, Karachi, Pakistan

Value at Risk is generally accepted as a standard of measuring risk. However, not many financial markets use this concept to regulate and manage risks. We propose a system for Stock Exchanges in Pakistan based on objective estimates of risk obtained through J. P. Morgan RiskMetrics™ which has become industry standard for measuring risk. However, we find out that this measure is not comprehensive. Therefore we propose a composite model of market and liquidity risk for Karachi Stock Exchange (KSE), Pakistan. Our concern in selecting the model has been results of model performance, ease of computation, and industry practice. The model encapsulates risks associated with any stock listed on the exchange. Thus KSE could base its margins on the estimates from the model. The model performed well for the last eight years in capturing the risk and protecting the system.

Trading activity and liquidity supply in a pure limit order book market: An empirical analysis using a multivariate count data model

Andreas J. Heinen
        University Carlos III, Madrid, Spain

Joachim Grammig
        Eberhard Karls University of Tuebingen, Tuebingen , Germany

Erick Rengifo
        Center of Operations Research and Econometrics, Louvain-la-Neuve, Belgium

In this paper we perform an empirical analysis of the trading process in a pure limit order book market, the Xetra system which operates at various European exchanges. Parameter estimation and hypotheses testing is conducted using a new econometric methodology designed for the analysis of multivariate count processes. The Multivariate Autoregressive Conditional Double Poisson model deals with issues of discreteness, over dispersion and both auto- and cross-correlation, arising with multivariate counts. We model counts with a double Poisson and assume that conditionally on past observations the means follow a Vector Auto regression. We resort to copulas to introduce contemporaneous correlation. We advocate the use of our model as a feasible alternative to multivariate duration models and we apply this model to determine how liquidity supply and demand as well as price volatility affects future trading activity and market resiliency, and discuss the results in the light of predictions implied by theoretical models of financial market microstructure.

When good forecasts go bad: a recursive bootstrap test of moving average trading rules

Roy Batchelor, Nikolas Nitsas
Cass Business School, London, UK

Technical trading rules aim to give investors timely forecasts of the direction of change of prices in financial markets. It is now well documented that the apparent ability of very simple technical trading rules to generate superior risk-adjusted profits in the US stock market has broken down in the last two decades. The question we seek to answer in this paper is whether an investor could have accounted in real-time for this breakdown and stopped utilizing these rules. We analyze the daily closing levels of the S&P500 in the years 1972-2004. We show that a 'naïve' investor choosing among a set of 152 double Moving Average crossover rules can always finds superior in-sample performance throughout this period. We then use a current best-practice bootstrap procedure to determine whether the in-sample out performance of certain rules is robust to data mining biases, given the full set of rules from which these particular rules were selected. Recursive application of this procedure captures in real-time the break-down of their performance after the mid 1980s. Of course, this bootstrap technology was not available in 1982. But our technology illustrates how the performance of the more complex technical trading rules now in vogue can be monitored and evaluated by a 'sophisticated' investor.

Email: r.a.batchelor@city.ac.uk

MF2

Invited Session: Neural Networks Theory I – Recurrent Methods

Monday, June 13th 10:40 am – 12:00 pm   Room: Blanco

Chair: Lilian Menezes
Cass Business School, London, UK

From Time Series to Market Modeling

Hans-Georg Zimmermann
Siemens AG, Corporate Technology, Munich, Germany

Neural networks represent a class of functions for the efficient identification and forecasting of dynamical systems. The elegance of the calculus is a consequence of a correspondence between equations, architectures and algorithms. However, the question often arises if neural networks are a sufficient framework for the modeling of complex nonlinear dynamical systems, which can only be understood by analyzing the interrelationship of different subdynamics. A simple scale up of the recurrent neural networks developed during the last years is misleading. Our experiments indicate, that scaling up the networks by increasing the dimension of the internal state results in overfitting due to the high number of free parameters.

In this talk we present architectures which are feasible for high dimensional recurrent neural networks. In addition, we focus on a consistency problem of traditional statistical modeling: Typically one assumes, that the environment of the system remains unchanged when the dynamics is iterated into the future direction. We show, that this is a questionable statistical assumption and solve the problem with a dynamical consistent recurrent neural network. Thereafter, we deal with large error correction networks and integrate dynamical consistency into this framework. Finally we merge the different characteristics of the two models in a unified neural network architecture, which we call DCNN for dynamical consistent neural network.

Time Series Forecasting by Ensemble of Recurrent Neural Networks: some New Results

Mohammad Assaad, Romuald Bone, Hubert Cardot
Universite Francois-Rabelais de Tours - Laboratoire Informatique, Tours, France

Boosting is a general method for improving the accuracy of any given (possibly weak) learning algorithm. The small gain a weak learner can bring with respect to random guessing is boosted by the sequential construction of several such learners, progressively focused on difficult examples of the original training set.
The application of boosting to regression problems has received little investigation. We propose a new training algorithm for recurrent neural networks (RNNs), dedicated to the sequential data processing. This algorithm is based on the boosting algorithm but, unlike the original algorithm, by taking into account all the available examples. We choose the RNNs because it possesses an implicit internal memory and are well adapted for time series forecasting. We study the behavior of this new algorithm. We apply it to the prediction problem of two time series of reference: a natural one (Sunspots) and a synthetic chaotic one (Mackey -Glass). We evaluated the average and the standard deviation of the algorithm with three loss functions and different values of the parameter. We compared our results with the results obtained from several other methods.

The experiments we performed show that our boosting method provides improved results with low standard deviation.

Modeling Time Scales in Dynamical Systems

Hans-Georg Zimmermann
Siemens AG, Corporate Technology, Munich, Germany

Recurrent neural networks are basically able to map every open dynamical system. Moreover in contrast to most statistical methods they not only learn from data, but also integrate prior knowledge and first principles into the modeling in form of architectural concepts. In this context working with high dimensional recurrent networks raises the question of how desired network functions can be supported by certain structures in the transition matrix.

In particular, we focus on two network functions: conservation and superposition of information. Both are coded in the transition matrix and important to model different time scales. As we point out, sparseness of the transition matrix alone is not a sufficient solution. Only with an inflation of the internal dimension of the recurrent neural network we can implement an optimal balance between different memory and computation effects. We work out that sparseness of the transition matrix is actually a necessary condition for high-dimensional neural networks. Furthermore we analyze the information flow in sparse networks and present an architectural solution which speeds up the distribution of information.

Email: l.demenezes@city.ac.uk; Hans_Georg.Zimmermann@siemens.com

MG2

Invited Session: Exponential Smoothing - Issues and applications

Monday, June 13th 10:40 am – 12:00 pm   Room: Nueces

Chair: Konstantinos Nikolopoulos
        Lancaster University Management School - Lancaster, UK

An application of multivariate exponential smoothing to small product hierarchies

Ulrich U. Kuesters, Oliver O. Vogt
        Catholic University of Eichstaett, Ingolstadt, Germany

Stock keeping units (SKU's) in product hierarchies usually share common features like packaging, content, and flavor. Typical examples can be found in breweries which employ a limited number of bottles and kegs and a limited number of brews for a small number of brands. Time series of such SKU's often exhibit common features like trend and season. Unfortunately univariate exponential smoothing methods like Holt-Winters ignore this.

In this presentation we will sketch the application of a multivariate exponential smoothing model based on the multivariate state-space formulation of the Bayesian dynamic linear model of West and Harrison (1997). To model common factors, a parsimonious state vector is used, which allows the additive representation of common trends, seasonal indices and regressors by a much small number of components compared to separate smoothing models. Furthermore in contrast to West and Harrison's approach, we do not set the discount parameter in a Bayesian fashion but estimate them as common in the frequency interpretation of statistics. To allow stable estimation the square-root-decomposition of the linear Kalman filter developed by Morf and Kailath (1975) is used. The presentation concludes with a small example of 3 sales series.

Forecasting with group seasonal indices

Pim Ouwehand, Karel van Donselaar, Ton de Kok
        Department of Technology Management, Eindhoven University of Technology   Eindhoven, The Netherlands

In this study, we consider an approach to improve individual item forecasts by simultaneously forecasting a group of items that exhibit a similar demand pattern. The idea is that if we can construct product families, consisting of items with the same underlying seasonal pattern, we may find the seasonal indices using demand data of all products in the family. By using aggregate data or by taking a weighted average of the time series, we benefit from pooling effects.

We study this group seasonal indices (GSI) approach as an adaptation of the Holt-Winters procedure where seasonality estimates are obtained using all time series instead of using the individual time series separately. Empirical results for three Dutch wholesalers have shown significant improvement potential of the product-aggregation method over classical methods. Furthermore, it appeared to be a robust method. This paper provides a statistical basis for this approach by describing an underlying model for this method as an adaptation of Holt-Winters, and by investigating the impact of several parameters on the performance of the method.

The Theta Model: Decomposition Approach or just SES with drift?

Konstantinos Nikolopoulos
> Lancaster University Management School - Lancaster, UK

Vassilis Assimakopoulos
> Ministry of Economics and Finance - Athens, Greece

Hyndman and Billah (H&B) in an attempt to decode the Theta model asserted that the obtained forecasts are equivalent to Simple Exponential Smoothing with drift (SES-d). H&B in their "recalculated theta method" focused on a very special case of the model: equally weighted extrapolations of L(0) and L(2); a case used in the Monthly-M3 series – providing 70% of the forecasts counted for the overall M3 performance. Formula-wise, Theta model extrapolations in this specific case may look like SES-d, but a) the drift is predefined equal to half of the regression slope, and b) the smoothing parameter is optimized on L(2) and not the original series as in any SES-with-drift approach! Furthermore, H&B version of the model is not backed by their results in the Yearly-M3 series - that do significantly differ from the published ones! A difference unfairly blamed into SES initialization, as will be proved in this study. The final assertion is that a maximum likelihood optimization version of SES-d can produce better forecasts. Not surprisingly, this is based on a subset where Theta presented its worst performance. Contrasting that, evaluation of SES-d (optimized or not) in the Other-M3 series, gives Theta a clear victory with over than 0.35% in terms of SMAPE!

Email: k.nikolopoulos@lancaster.ac.uk; vassim@mnec.gr

MH2 (Dedicated to Dr. Frank Bass who pioneered the research in Diffusion)

Invited Session: Modeling and forecasting the diffusion of innovation: The Evolution

Monday, June 13th 10:40 am to 12:00 pm   Room: Frio

Chair: V. Kumar
     University of Connecticut

The Effects of Innovation Characteristics, Country Characteristics and Context on International Diffusion of Multi-generation Cellular Mobile Phone Adoption

Towhidul Islam
.   University of Guelph, Guelph, Canada

Nigel Meade
           Imperial College London, London, UK

Mobile cellular telephony is an example of an extremely successful new telecommunications service that has already changed how people live and work and created a significant increase in consumer welfare. Since its introduction in Europe and Japan, the technology has evolved through three generations. A number of recent papers in Marketing, Management Science, Economics and Sociology have identified several determinants of international technology diffusion. The determinants (or covariates) that have been studied using a single generation of technology can be broadly classified into three categories i.e. innovation characteristics (e.g. price, relative advantage), country characteristics (e.g. wealth, heterogeneity, access to information, demographics) and context (e.g. culture, risk factors, geographical region).

The objective of this paper is to analyze two generations of this interactive technology using data from 80 countries from four economic and six geographical regions within a multi-generation diffusion modeling framework. We shall test a series of hypothesis about 50 covariate effects with an emphasis on their contribution to improving forecasting accuracy.

Diffusion of Personal Computers and Digital Divide - Estimating Demographic Segment Level Diffusion Parameters

Vinay Kanetkar
University of Guelph, Guelph, Canada

Over the last 30 years researchers have been studying diffusion of personal computers for home use. Using aggregate data estimated model suggest that diffusion process is not different from many other durable products. There is, however, growing awareness among researchers that personal computers as well as internet may create social divide or digital "have" and "have-nots" in the society. Evidence from empirical work indicates that household head's education race and income contribute to digital divide.

We investigate notion of digital divide using household durable ownership data for the US and Canada. We formulate extended Bass model to incorporate socio-economic as well as demographic variables specific diffusion parameters. Using information about 100000 households in each country, we estimate socio-demographic segment level parameters of Bass model. Our estimate indicate that household with higher socio-economic status households have very high penetration rates than lower socio-economic status household. Our models also indicate that overall diffusion parameters were very similar in the US and Canada. There were also differences for variable such as income, household size and race.

Our work indicates that using three or more cross-sections it is possible to estimate parameters for Bass model at the segment level and understand segment specific innovation and diffusion parameters. Such insight would be useful to position to the first time buyers as opposed to replacement buyers.

Modeling and Forecasting the Diffusion of Innovation – The Evolution

V. Kumar, Rajkumar Venkatesan
University of Connecticut, USA

Trichy Krishnan
National University of Singapore

Since the time Bass model was introduced in 1969, many advances have occurred to the basic Bass model. It has been over 35 years now and we would like to reflect some of the significant extensions that have taken place in these years. For example, Bass model has been modified to accommodate certain type of influences estimated with different procedures extended to a generalized bass model adapted for global diffusion adapted for brand-level diffusion, used for intergenerational diffusion, and used for various applications

In this session, we trace the evolution of the Bass model by referencing various research studies that address the above issues. The significant developments and enhancements to the Bass model will demonstrate the power of the Bass modeling framework. No wonder it has withstood the test of time, rigor and relevance.

Email: n.meade@imperial.ac.uk; islam@uoguelph.ca

MI2

Contributed Session: Forecasting Model Selection

Monday, June 13th 10:40 am – 12:00 pm   Room: Mesquite

Chair: Kajal Lahiri
University at Albany – SUNY

Exploring Practical Aspects of Akram Test Statistic

Irfan Ahmed

PhD (Statistics) Student, the University of Lahore, Lahore, Pakistan

Model selection is highly important in any statistical analysis. Often the main aim of model selection is to choose a model for future prediction. A model is considered suitable or appropriate if it yields optimum forecasts. In real life, mostly the data are polluted by color noise processes and the models applied to such data are in violation of the assumption of whiteness of residuals. Thus, it becomes mandatory to identify the noise processes prior to any venture.

The main goal of this paper is to highlight the practical aspects of Akram Test Statistic (ATS) by analyzing numerous real life data sets. ATS is a simple straight forward non-parametric test statistic which helps not only in the construction of appropriate models but also generates optimum results by filtering the color of noise. Furthermore, it is not affected by the dimensions of errors, specially the initial ones generated by the model during the learning and updating of parameters process. Besides making its comparison with the classical criteria like Akaike's Information Criterion (AIC), Schwarz Bayesian Information Criterion (SBIC) etc., the commonly used forecast accuracy identifiers are also examined to evaluate the forecasts.

Simple Methods are best? A New Look at an Old Question

Keith Ord, Dawn C. Porter

Georgetown University, Washington, DC, USA

The claim that simple methods are better (or best) has been made consistently over the years and considerable evidence has been presented in support of that viewpoint. However, some of the evidence points in the other direction. We examine the question in two parts. First, we use theoretical arguments to examine how closely the rankings by different criteria are likely to agree. Second we re-examine and extend empirical data on performance and complexity in order to provide a quantitative assessment of the benefits of using more complex methods. We conclude with a discussion of the issues that affect performance and the choice of method.

Characteristic-based forecasting for Time Series Data

Xiaozhe Wang, Kate Smith

Faculty of Information Technology, Monash University, Melbourne, Australia

Rob J. Hyndman

Department of Econometrics and Business Statistics, Monash University, Melbourne, Australia

We propose a new approach for selecting a forecasting method for univariate time series based on measurable data characteristics. Our approach combines elements of data-mining, meta-learning, clustering and statistical measurement.

Various global characteristics of a time series are measured, including trend, seasonality, periodicity, serial correlation, skewness, kurtosis, chaos, nonlinearity and self-similarity. In some cases, existing measures of these characteristics are well-established. In other cases, we propose new measures. Each time series is then categorized according to the global characteristic measures using a clustering method. The time series characteristics are used as meta-features to determine the appropriate forecasting method and the relationships and knowledge are developed as rules through learning. The rules offer forecasters recommendations in selecting an appropriate forecasting method.

Four forecasting methods are used: Exponential Smoothing, ARIMA, Random Walk and Neural Networks. We measure the forecasting performance of the four methods on 315 time series from a wide range of application domains. An extensive comparative evaluation is provided with statistical analysis, ranking and summary. Using two rule-generation methods (mapping methods and combining techniques), we derive rules for selecting the most suitable forecasting method based on the characteristic measures.

Fixed-event forecast evaluation under asymmetric loss

Kajal Lahiri

University at Albany – SUNY, Albany, USA

Gultekin Isiklar

New York State Assembly, Albany, USA

We study unbiasedness and forecast efficiency tests under asymmetric loss functions. We estimate the loss function parameters that justify forecast biases using asymmetric loss functions. Using real GDP growth forecasts of 18 developed countries, we question the reasonability of the magnitude and behavior of the implied asymmetric loss function parameters over forecast horizons and find that implied loss function parameters change abnormally over horizons, which suggests that the observed bias is not because of the use of asymmetric loss functions. Then we extend the standard fixed-event forecast efficiency tests so that they can be applied if forecasters have asymmetric loss functions. We show that standard forecast efficiency tests will be valid under asymmetric loss functions if uncertainty changes over two horizons are included in the regressions. Using these extended forecast efficiency tests we find strong evidence against forecast efficiency and find no significant evidence for the usage of asymmetric loss functions in majority of the GDP growth forecasts.

Email: klahiri@albany.edu

MJ2

Invited Session: Forecasting Software – State of the Art

Monday, June13th 10:40 am – 12:00 pm   Room: Chula Vista Boardroom

Chair: Len Tashman
          Institute for Forecast Education

Different viewpoints of the present state of the art in forecasting software will be presented and discussed. In addition, a quick look at some future directions of the forecasting software will be offered. The future directions of the development of forecast software will be briefly examined.

Panelists:

Ana Timberlake
          Timberlake Consultants Ltd.

Tom Willemain
          Smart Software

Charlie Chase
          SAS

Eric Stellwagen
          Forecast Pro

Email: estellwagen@forecastpro.com; willet@rpi.edu; Charlie.Chase@sas.com; info@timberlake.co.uk

K2

Plenary Session: A perspective on the psychology of Judgment

Monday, June 13th 1:00 pm to 2:00 pm   Room: Regency West

Chair: L.J. Shrum, Professor of Marketing,
The University of Texas at San Antonio

Daniel Kahneman
Nobel Prize Laureate
Eugene Higgins Professor of Psychology and Professor of Public Affairs
Woodrow Wilson School
Princeton University
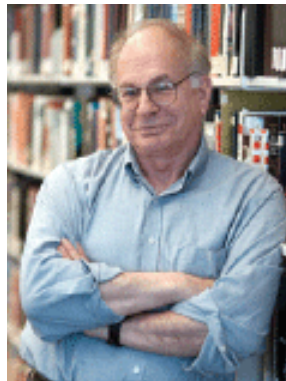
Daniel Kahneman

Daniel Kahneman (PhD California) is a fellow of the Center for Rationality of Hebrew University in Jerusalem. He has received all the most prestigious awards in the psychology field. Among others, in 2003, he and longtime collaborator the late Dr. Amos Tversky won the Grawemeyer Award for Psychology.
Dr. Kahneman is a key theorist of behavioral finance and prospect theory, which challenges mainstream economists' assumptions that people are rational and motivated by self interest, and that they make rational financial decisions.
In 2002, Dr. Kahneman received the Nobel Prize in economic sciences even though he is a research psychologist and not an economist.

He is a worldwide know professor and researcher in Psychology. He has received all the most prestigious awards in the psychology field. Among others, in 2003, he and longtime collaborator the late Dr. Amos Tversky won the Grawemeyer Award for Psychology.

Dr. Kahneman is a key theorist of behavioral finance and prospect theory, which challenges mainstream economists' assumptions that people are rational and motivated by self interest, and that they make rational financial decisions. Instead prospect theory suggests that more psychological motives, including emotions and biases, determine people's economical behavior and that when making decisions people frequently take short-cuts, utilize cognitive heuristics, and make flowed but human choices.

In 2002, Dr. Kahneman received the Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel.

Email: kahneman@princeton.edu

MA3

Feature Session: Time Series Forecasting

Monday, June 13th 2:35 pm to 3:55 pm   Room: Live Oak

Chair: Dean W. Wichern,
         Texas A&M University

Some Recent Developments in Time Series Forecasting

Ruey Tsay

H.G.B. Alexander Professor of Econometrics and Statistics, University of Chicago Graduate School of Business

Henry Jin-Lung Lin

Institute of Economics, Academia Sinica, Taiwan

Time series methods are important tools in forecasting. The well-known Box-Jenkins approach has been widely used in practice for several decades. There are many alternative methods. Indeed, many new developments were proposed over the years. In this paper, we briefly review some of the developments. Our focus is on time-domain, parametric procedures including linear and nonlinear models, univariate and multivariate models, Bayesian and non-Bayesian methods, and point and interval forecasts. The case of many predictors is also discussed, including use of factor models, partial least squares, and principal component analysis. The review is not exhaustive and, to a great degree, reflects our experience and preferences. Real examples are used throughout to demonstrate and compare different forecasting methods.

Dr. Ruey Tsay received his B.S. in Mathematics from National Tsing Hua University, Taiwan and Ph.D. in Statistics from University of Wisconsin, Madison. Currently, Dr. Tsay is H.G.B. Alexander Professor of Econometrics & Statistics, Graduate School of Business, and University of Chicago. He was an Elected Member (Academician) of Academia Sinica, Taiwan in 2002, Elected Fellow of American Statistical Association in 1992, Elected Fellow of Institute of Mathematical Statistics in 1992, William S. Fishman Research Scholar of Graduate School of Business, University of Chicago from 1989 to 1990
Dr. Tsay has been Editor of Business and Economic Book Series since 2001, Associate Editor of Journal of Financial Econometrics since 2001, Studies in Nonlinear Dynamics and Econometrics since 1995, and Asia-Pacific Financial Markets since 1993. Dr. Tsay's research interests include: Econometric modeling, Extreme value theory, Financial econometrics, High-frequency data analysis, Linear and nonlinear dynamic models, Markov chain Monte Carlo methods, Risk management.

Email: d-wichern@tamu.edu

MB3

Invited Session: Forecasting in Asset Allocation II
Monday, June 13th 2:35 pm to 3:55 pm   Room: Directors

Chair: Giampaolo Gabbi
        Financial Management Department, University of Siena, Bank, SDA Bocconi-Milan

Forecasting Stock Returns through a composite APT-ARIMA and EQUITY model

Davide Bergamini
        SDA Bocconi School of Management, Milan, Italy

Stefano Bonini
        Universita Commerciale.-Bocconi, Instituto di Amministrazione, Finanza e Controllo Milan, Italy

Vincenzo Capizzi, Fabrizio Erbetta
        Universita degli Studi del Piemonte Orientale, Dipartimento di Studi per Impresa ed il Territorio, Italy

Forecasting of stock returns is one of the major objectives of financial analysts. Data series of stock returns are characterised by fundamental factors of macroeconomic nature as well as persistency effects. In this paper we propose a model aimed at predicting stock market returns drawing from econometric techniques for analysing time series. The economic model is first based on a standard APT approach with multiple macroeconomic factors as regressors. Next, we add another factor in order to take into account the statistically significant interactions existing among the above-mentioned macroeconomic variables. Third, we integrate the model with a further vector of regressors stemming from an ARIMA process, which allows identifying stock returns stationarity moving over time. Finally, we complete the model by including the impact of other drivers of stock returns that deal with perspective valuation of future cash flows, as stated by the Equity Approach literature. In particular, we measure the expected change in intrinsic firm values making reference to IBES Stock Market Consensus Forecast. The resulting model will initially show good predictive capacity when applied to a five-years period of weekly Italian stock market returns.

Forecasting Correlation Breakdowns in Financial Benchmarks

Giampaolo Gabbi
        Financial Management Department, University of Siena, Banking and Finance Area, SDA Bocconi-Milan

There is a debate over whether correlation differs considerably in quiet and unstable markets. If correlation breakdowns occur, there is a significant effect both for diversification and optimization, and for risk management of portfolio losses. We estimate daily returns on stock and bond markets considering countries and sectors with the world as the leading market. We focus the phenomenon on three dimensions: business cycle; inflation rate; volatility state. The paper is aimed at answering to the following questions:
 1) when correlation breakdowns come about more frequently?
 2) is there a significant difference between geographical and sector diversification?
3) which is the policy that portfolio managers should implement to minimize the effects of these breakdowns?
To give an answer, we apply regime switching models to numerous sub-periods daily data. We verify that important extreme losses can be tested due to the existence of unstable correlation in financial markets.

Email: gabbi@unisi.it

MC3

Contributed Session: Probability Forecasts
Monday, June 13th 2:35 pm to 3:55 pm   Room: Pecan

Chair: James W. Richardson
Agricultural and Food Policy Center, Texas A&M University

Probabilistic forecasts of peak electricity demand using simulated weather

Patrick E. McSharry
University of Oxford, Oxford, UK

Forecasts of electricity demand are crucial for efficient operation and decision-making within the privatized energy markets. Electricity demand fluctuates with daily, weekly and yearly seasonalities and varies with special calendar events such as bank holidays and vacation periods. In addition there is a strong weather dependent component due to the use of both heating and cooling equipment.

We explore the affect of the weather on demand through the temperature, wind speed and luminosity. A novel technique is proposed for simulating daily weather over a yearly time scale. This technique preserves the distribution, autocorrelation and cross-correlations of these weather variables. These weather simulations are then used to provide probabilistic forecasts of both the magnitude and timing of the peak electricity demand for a lead time of one year. The technique is demonstrated using data from a province in the Netherlands.

Probability forecasts of the rare business events and the evaluation methodologies.

George Wang
Assistant Professor of Finance, Business Department, College of Staten Island, City University of New York, USA

Kajal Lahiri
Professor of Economics, Economics Department, State University of New York at Albany, USA

We use a distribution-oriented prequential (predictive sequential) Bayesian approach to evaluate multi-period probability forecasts for the declines in real GDP available through the Survey of Professional Forecasters since 1968. Tests for calibration, resolution and forecast validity suggest that these subjective assessments have value in predicting future declines in real GDP.

Coefficient of Variation Stationarity in Probabilistic Forecasting

Paul A. Feldman, James W. Richardson, Keith D Schumann, Steven Klose
Agricultural and Food Policy Center, Texas A&M University, College Station, TX, USA

Simulation is a widely used tool for modeling risk and making probabilistic forecasts. It allows the analyst to model the uncertainty in complex systems by identifying sources of risk and estimating distributions for forecasted values.

One of the key issues in simulation modeling is appropriately maintaining the relationship between the forecasted mean values and the associated forecast variations based on the historical relationships. Generally the historical variance of a stochastic variable is used as the variance estimate for the projections in a simulation model. This seems to be a logical assumption; however, if the forecasted values of the stochastic variable are non-constant, as is often the case, the coefficient of variation changes in an undesirable way.

A common assumption used to avoid this problem is coefficient of variation stationarity. Again, this seems to be a logical assumption; however, there has been no empirical evidence given to support this idea. This paper presents empirical evidence to explore the validity of coefficient of variation stationarity.

Email: patrick@mcsharry.net; jwrichardson@tamu.edu

MD3

Contributed Session: Forecasting in Agriculture

Monday, June 13th 2:35 pm – 3:55 pm   Room: Pecos

Chair: **Pradip Kumar Sahu**
Department of Agricultural Statistics, Bidhan Chandra Krishi Viswavidyalya, Mohanpur, West Bengal, India

Forecasting in Agriculture

Pradip Kumar Sahu
Uttar Banga Krishi Viswavidyalaya, India.

Good and accurate food and agriculture statistics could provide immeasurable support to the global battle to break the vicious circle of poverty and food insecurity. Adequate forecasting technique in agriculture would provide an important contribution in minimizing the adverse effects of disasters of food security, particularly in the countries where agriculture sector is contributing substantially to the national gross domestic product (GDP) and is mostly dependent on vagaries of weather. In a country like India, agriculture contribute 22.6 per cent to the national out put (triennium 2001-02 to 2003-04) and near about 70% of its population is either directly or indirectly dependent on agriculture for their daily livelihood and hence forecasting in agriculture plays pivotal role on the economy of the country. Forecasting plays important role in estimating food and nutritional requirement of any country on short term or long term basis. It can forecast the amount of area needed to put under various crops under a given set of technologies or with under changing technological scenarios. It can forecast weather vis a vis pest and disease attack on short or medium term basis. Forecasting technique can effectively be used to foresee the changes in soil-water environment, system productivity etc due to continuous use of same management practices in same cropping system followed year after year, as cropping systems are mostly region specific. Forecasting techniques can effectively be used in projecting market demand and prices for so called agricultural cash crops like jute, tea, coffee etc., particularly under the present regime of free world trade. Different long term or short-term forecasting methods are used. Among these methods, statistical methods in the form of parametric, semi-parametric or nonparametric approaches like regression, probability, trend analysis, Box-Jenkins techniques, Spline, Kernel, LOESS, etc., are used in isolation or in combination. Use of remote sensing information is also coming in a great way to give impetus to the art of forecasting in agriculture. Among other methods, expert judgment method, participatory rural appraisal technique etc. are also helpful in forecasting agricultural entities. But not all the techniques are suitable for every situation because of their own limitations; one has to select the best technique suited for the specific purpose.

Time Series Analysis & Forecasting of Jute Crop and Jute goods production.

Kalyan Kumar Goswami
Central Research Institute for Jute & Allied Fibres, Kolkata, India

The information on statistics of crop production is essential for planning and developing strategies for the production of any agricultural commodities. Jute and mesta (Kenaf) fibre together is called "raw jute" in commerce. Jute is the most important bast fibre in India and next to only cotton among the natural fibres. It is the most important cash crop in eastern India grown in the states of West Bengal, Assam, Bihar, Orissa, and eastern part of U.P., Meghalaya and Tripura etc. There are only few other countries in South and South East Asia, Africa and South America, namely Bangladesh, Nepal, Thailand, Indonesia, Myanmar, China, Taiwan, Brazil etc. that grow jute.
The Time Series Forecasting Methods forecasts future values of Time Series variables by extrapolating trends and pattern in the past value of the series or by extrapolating the effect of other variables on the series.
The data on area under crop, production and productivity of jute and mesta crop and jute goods production were taken as time series data as these were measured in time scales. The best forecasting method for each series were

---

chosen on the basis of both graphical and statistical features. The forecasting tools of SAS/ETS soft ware have been used along with a wide variety of forecasting methods including several kinds of exponential smoothing models, and ARIMA (Box Ð Jenkins) model.

View the plots of the data, predicated verses actual values, prediction error and forecasts with confidence limit as well as autocorrelations and result of while noise and stationery test. The transformed series were also used in the model selection process, the set of forecasting models considered the goodness Ð of Ð fit measures used to select best model.

Forecasting jute production in two major contributing countries in the world

Debsankar Gupta

Head of the Department, Agricultural Statististics, Uttar Banga Krishi Viswavidyalaya, India

Pradip Kumar Sahu

Sr. Lecturer, Department of Agricultural Statistics, Bidhan Chandra Krishi Viswavidyalya, Mohanpur, West Bengal, India

Besides cotton, jute is one of the major fiber crops, known as 'Golden fiber' in many parts of the world. Two Asian countries viz. India and Bangladesh contribute almost 85% to the world jute basket. In these countries jute is treated as one of the predominant cash crops and as such has got tremendous impact on economic growth of these agriculture based countries. The present paper focuses on time series forecasting of production of jute in these countries along with that of whole world. Attempts have been made to forecast and compare the method of forecasting using parametric models like polynomial, logarithmic, inverse, exponential etc with those of Box – Jenkins techniques, such as autoregressive, autoregressive moving average, autoregressive integrated moving average techniques (AR, ARMA, ARIMA) of forecasting using data for the period 1961-2001. The study also examined the nature of growth and forecasted a decline in jute yield.

Email: pksahubckv@rediffmail.com

ME3

Invited Session: Conflict Forecasting I

Monday, June 13th 2:35 pm – 3:55 pm   Room: Llano

Chair: Donald E. Brown
University of Virginia, Charlottesville

Terrorist Attack Prediction using Discrete Choice Models

Donald E. Brown and Michael Smith
Department of Systems and Information Engineering, University of Virginia, Charlottesville, USA

Terrorists employ a range of attack modes to include suicide bombings, improved explosive devices (IED), mortar and rocket firings, and portable air defense missiles. The range of attack modes and the rareness of these events make effective defensive measures difficult with the result that defensive actions typically impose greater restrictions on the larger population. Predicting the locations and times of terrorist events can enable more directed defensive efforts. While a number of predictive technologies might be used for this problem, very few are capable of dealing explicitly with the inherent decision making used by the terrorists in their attack planning. This paper describes an approach to terrorist incident prediction that uses discrete spatial choice models to predict the behavior of the terrorist.
This work builds on our previous work using point process models and spatial choice analysis to forecast criminal behavior and suicide bombings. We give examples of the use of this approach and an evaluation of its performance. These evaluations show the discrete spatial choice models are more effective at predicting future attack locations than the more commonly used methods that employ kernel density estimates.

Strategic Early Warning for Organized and Serious Crime

David Carment, Bruno Nordeste, Stewart Prest
Carleton University

Dr. Gregory O'Hayon
Criminal Intelligence Service Canada (CISC)

The criminal threat environment is ever-changing. As a consequence, law enforcement agencies have had to develop forecasting capabilities based on intelligence gathering and analysis that will improve targeting and resource allocation. Criminal Intelligence Service Canada (CISC), in partnership with Carleton University, has spearheaded an effort to develop a strategic early warning methodology and intelligence network in order to forecast threats. The methodology draws on existing capabilities developed by the Country Indicators for Foreign Policy at Carleton University. Both the methodology and the outputs derived from it have been adapted to meet the specific needs of law enforcement personnel and decision makers. We first examine the rationale and purpose for developing a strategic early warning capability. Second, we outline the methodology for identifying potential risks and their relationship to criminal activity. Third, we describe current research using the existing framework. Finally, we specify directions for future work and implications for both policy and strategy development. Early results from this project have been positive, as evidenced by the community's feedback to our warning product (SENTINEL). Early warning methodologies from other fields (including public health, military and national security) have proven useful to law enforcement's mission.

Oracle of Battle, Part 3

Jonathan E. Czarnecki
Naval War College, Monterey Program

Part one of this project outlined the research problem: explanation and prediction of joint combat operations. It proposed a theory that contained testable hypotheses, and suggested methods by which the hypotheses could be examined. Part two initiated the testing of the theory. The testing revealed weaknesses in the theory and method (systematic judgment.) It also suggested means by which the theory and accompanying hypotheses could be improved.

Part three will demonstrate the efficacy of the improvements, and explore the reliability and validity of the measures that bring form to the theory. The reliability of the variable matrix is .75, very acceptable considering the small number of the population. The prima facie and content validity as assessed by the judges is consistent and strong. Thus, the basic empirical elements of the theory seem sound.

The expansion of the variability and the inclusion of an operational leadership variable, recommended by the last round of judges, improve the explanatory power of the theory, but only marginally and at the cost of statistical significance. Finally, the judges in this round strongly recommend that the theory's limit is to the descriptive and explanatory, and should not be expanded to the predictive.

Forecasting the Unforecastable: The Impact of 9/11 on Las Vegas Gaming Revenues

Stephen W. Custer
Las Vegas

Don M. Miller
Virginia Commonwealth University

When a major disruption occurs, a time series can no longer be predicted reliably from the historical data. The issue most important to the forecaster's client, the decision maker, becomes identifying which of several alternative scenarios will characterize the future. For example, the events of 9/11 caused a major loss of gaming revenue in Las Vegas. Would revenues return to the previous trend line, return to the previous trend but at a lower level, remain flat indefinitely, or continue to deteriorate? Decisions to build/expand casinos, lay off employees, cancel contracts, and temporarily close hotel wings depended on which scenario would prevail. The challenge to the forecaster is to provide reliable answers rapidly as new data become available.

In this paper, we develop a method for forecasting time series after significant disruptions. We develop simple models of the response to a disruption that blend easily with the pre-disruption time series model. Using Bayesian methods to adjust business judgments as new data arrive, we are able to identify the nature of the response and to develop a reliable forecast as rapidly as possible. We illustrate the method using gaming revenue for Clark County (Las Vegas) before and immediately after 9/11.

Email: NevadaSteveNUI@aol.com; brown@virginia.edu

MF3

Contributed Session: Neural Networks Applications II

Monday, June 13th 2:35 pm – 3:55 pm   Room: Blanco

Chair: Sven F. Crone
Lancaster University management School, Lancaster, UK

Performance Evaluation with Neural Networks: for a Monte Carlo Simulation Application on Workstation Clusters

Sirma Yavuz
Yildiz Technical University, Istanbul, Turkey

In this paper, we present a feedforward backpropagating neural network model as a performance evaluation tool. Since it is generally very difficult to predict and validate the contributions of interrelated factors to the performance of an application on different platforms; neural networks provide a very good alternative to conventional techniques.

The neural network model we propose here is aimed to be simple and general. It takes a number of application and hardware parameters as its inputs to forecast the execution time of the application on different workstation clusters. To demonstrate the success of this model we have selected an application that calculates the European option prices using Monte Carlo simulation techniques.

The measurements are taken on different models and numbers of SunSparc workstations to compose the training and test data. We have used the Levenberg-Marquardt algorithm, which is one of the most often used non-linear curve fitting methods, to train the network. We have held back the %30 percent of the measurements to test the network. The average 'mean squared' errors have been calculated as less than %5 for different datasets, verifying the potential of ANNs in performance evaluation area.

Performance Prediction in A Distributed Environment Using Neural Networks

Efsun S. Sarioglu, Coskun Bayrak
University of Arkansas at Little Rock, Little Rock, USA

With the emergence of new network technologies such as Grid, the need for a more intelligent and adaptive scheduling mechanism became clearer. Rather than basing scheduling decisions on the current status of the network, it's more effective to take into account the near future performance of the network. In this study, we are providing such an enhancement to the scheduling mechanism by forecasting the status of the resources: i.e. memory, CPU, network, IO, etc. This information can then be used by the scheduler as a measure of future status of a particular resource within a short period of time. The predicted performance of resources can also be used for detecting future bottlenecks and failures in the network.

For predicting the performance of various resources in the network, the status of resources are logged and when scheduler needs to know the status of some particular resource, the neural network, that is trained to predict the resource's performance, uses this historical trace data as its input.

We also aim to identify most efficient feature extraction methods working in collaboration with neural networks in predicting performance of resources. The best combination will, in turn, provide valuable information about the state of the network.

Prediction of Raveling on Dutch motorways Using ANN

Maryam Miradi

Delft University of Technology, Delft, the Netherlands

Porous asphalt has plenty of advantages relating to noise lowering and drainage but its major drawback is being sensitive to the asphalt detriment called raveling. Therefore it is important to predict when porous asphalt top layer will achieve a critical level of raveling so as to allocate funds for necessary maintenance. The goal of this research is developing the best quality models for this prediction. The author believes ANN techniques generate the most proper models. That's why Artificial Neural Network (ANN) technique is employed to develop intelligent models for predicting and analysis of raveling. The data is used for the first part of research is obtained from SHRP NL database. Two models are developed to analyze the relation between material/construction properties and raveling behavior which are important factors for predicting lifespan of the porous asphalt. The data provided for another two models is adopted from a database which was a result of an intensive research on the quality of porous asphalt. As the models are developed, color contours illustrate the interaction between any two parameters. These Models contains very important results for road engineers. ANN is proved to be a powerful technique resulted in high quality maintenance for Dutch motorways.

Email: essarioglu@ualr.edu; cxbayrak@ualr.edu

MG3

Contributed Session: Forecasting Methods

Monday, June 13th 2:35 pm – 3:55 pm   Room: Nueces

Chair: Elizabeth A Maharaj
          Monash University, Melbourne, Australia

On Forecasting Counts

Brajendra Sutradhar
          Memorial University, St. John's, Canada

In this paper, we propose an observation driven non-stationary correlation model to fit a time series of counts with possible overdispersion. Analogous to the Gaussian time series techniques, we develop forecasting functions to forecast future counts. The proposed forecasting approach is simpler than the existing approaches and it is shown through a simulation study that the approach performs quite well in forecasting a future count. The forecasting methodology is illustrated by analyzing a U.S. time series of polio counts.

How to update forecasting models in time series prediction problems.

Jose Guajardo, Richard H Weber
          Department of Industrial Engineering, University of Chile, Santiago, Chile

Traditional methodologies for time series prediction take the series to be predicted and split it into training and test set. The first one serves to develop forecasting models which are evaluated on the second set. Different techniques such as ARIMA, neural networks, regression and support vector machines (SVM) have been successfully used to develop forecasting models.

A problem that has not yet received proper attention is how to update such forecasting models when new data arrives, i.e. when a new value of the considered time series occurs.

We designed a way to update forecasting models that can be applied using forecasting techniques which allow the treatment of each object of the series by itself, such as regression and SVM. The basic idea of the proposed updating strategy is to add the most recent observations into the training set every time that a predefined number of observations takes place, so patterns in new data are taken into account in model construction.

We applied this strategy using SVM as forecasting technique outperforming the static version on various time series.

Future work has to be done in order to understand how Optimal updating strategies can be developed for dynamic time series prediction.

Statistical Models for Targeted Marketing of IT Services

Bonnie K. Ray
IBM Watson Research Center, Yorktown Hieghts, NY, USA

We present an approach used at IBM to build propensity-to-buy models for IT services engagements. These models are used to assist in the identification of companies or organizations that might be preferentially inclined to outsource a component of their IT operations to an outside provider. We discuss the variables used in the model, the modeling approach, and various issues that had to be addressed, such as handling of missing values, outlier identification, model validation, and uncertainty in categorical predictor values. We also briefly discuss how the model results have been deployed and used at IBM and their impact thus far.

Wavelets Multiscale Forecasting

Elizabeth A Maharaj
Monash University, Melbourne, Australia

Donald B Perceival
University of Washington, Seattle, USA

In this paper, a procedure is developed to obtain forecasts for stationary time series by means of wavelets multiresolution analysis. A theoretical framework is presented for the Haar wavelet transform of a Gaussian first order autoregressive (AR (1)) process with zero mean, using both the discrete wavelet transform (DWT) and the modified discrete wavelet transform (MODWT). This approach using the DWT with cycle spinning does better than when using the MODWT. Furthermore, it results in a mean square prediction error that is no more than 12.5% worse than the 'time domain' best linear predictor.

A simulation study which compliments these results shows that this approach using the DWT with cycle spinning appears to be quite competitive with the best 'time domain' linear predictor for smaller parameter values associated with AR(1) processes. A simulation study is also conducted for long memory processes using series generated from Gaussian fractionally differenced (I(d)) processes and it shows that this approach is also competitive with the best fractionally differenced predictor for small values of the difference parameter d. The advantage of using this approach over the traditional approach for forecasting I (d) series is that complex model fitting would be avoided.

Email: ann.maharaj@buseco.monash.edu.au

MH3

Contributed Session: Forecasting Prices

Monday, June 13th 2:35 pm – 3:55 pm   Room: Frio

Chair: Maxwell J. Stevenson
         The University of Sydney

Forecasting U.S. Shelled Pecan Prices

Mohammed Ibrahim
        University of Georgia, Athens

Wojciech J. Florkowski
        University of Georgia, Griffin

Pecans are produced mostly in southern United States. Because the pecan demand is relatively stable, therefore, prices are primarily determined by supply. Although prices paid to growers have been studied, there is little research on prices received by shellers. In this study the total volume of pecans held in cold storage is considered the portion of supply that affects prices. Consequently, forecasting pecan prices requires information on pecan cold storage inventories. We develop a pecan price model using both seasonally unadjusted and adjusted quarterly data (1991:2-2002:1) and follow Hylleberg et al. (1990) to test for unit roots at both zero and seasonal frequencies. Preliminary results reveal that both series have unit roots at the zero frequency. The seasonally unadjusted data, however, show that total pecan inventories and shelled pecan prices have common unit roots at both the non-seasonal and seasonal frequencies. Results suggest that there is no long run equilibrium between pecan prices and inventories when unadjusted data are used. The appropriately adjusted data are used in forecasting pecan prices.

Increasing Liquidity In The Temperature-Based Weather Derivative Market In Australia By Improved Pricing

Jiri Svec, Maxwell J. Stevenson
        Discipline of Finance, School of Business, the University of Sydney, Sydney, Australia

Weather can adversely impact on the earnings and cash flows of businesses. While temperature-based weather derivatives are traded on the liquid CME market, the level of liquidity in Australia is low with trading only available on an over-the-counter basis. Liquidity in the Australian weather market is likely to be enhanced by reducing the uncertainty in the pricing of these derivatives.

As temperature-based weather derivative contracts are mainly written in degree days (HDDs and CDDs) that are measures of the deviation of the daily average temperature from a predetermined threshold, price estimation can be improved by improving the forecast of daily average temperature. Using an Australian dataset, a forecast evaluation based on the MSPE compares an existing time-series model based on a Fourier function with a newly proposed SEASETAR model and a benchmark seasonal autoregressive model. The HDD and CDD metrics are derived from forecasts of the daily average temperature, as well as being directly forecast. In addition, an estimate along with upper and lower prediction interval bounds, are calculated by simulation. To ensure that the models are fitted and forecasted using series that depict a more fundamental signal, we use a wavelet analysis to decompose and reconstruct the series at different levels of resolution.

Forecasting electricity spot prices using multivariate long memory processes

Abdou K Diongue, Bertrand Vignal
    EDF, Clamart, France

Dominique Guegan
    ENS-Cachan, Cachan, France

Among energy markets, electricity spot markets are very challenging in term of price modeling and price forecasting. Indeed, as many common financial time series (the nominal exchange rates, the real interest rates,...), electricity spot prices, at least for European markets, exhibit long memory and pseudo seasonalities. In addition, in an interconnected area such as Europe, the spot markets from the different countries are linked. Of course for applications such as trading, risk measurement or pricing such complex behaviors have to be handled. In this paper, we investigate the possibility of using a multivariate long memory process to model electricity spot prices. We therefore introduce a multivariate k-factor GARMA process, capable of capturing both the long memory and pseudo seasonalities for each of the considered electricity spot price series, and the lagged cross-correlations between them. We test this model considering the French and the German spot prices [markets of interest for EDF (Electricity France, one of the major electric utility companies in Europe)] by analyzing its forecasting performance.

Estimating Forward Price Curves For The Australian Electricity Market

Maxwell J. Stevenson, Luiz F. Moneira do Amaral
    School of Business, the University of Sydney, Australia

Estimating forward price curves in the electricity market is of fundamental importance for evaluating derivatives within risk management systems. Electricity prices are collected on a half-hourly basis and are subject to extreme volatility and large price spikes due to unanticipated electricity supply problems and adverse weather effects.

We estimate forward price curves over a three year forecast horizon recognizing the high level of correlation between temperature and load and, to a lesser extent, between load and price. The price, load and temperature series are decomposed to lower (more fundamental) levels of resolution using wavelet functions, and reconstructed on the half-hour to reflect information sets of one hour and more. After controlling for diurnal, day-of-the-week and seasonal effects, models for temperature, load and price are fitted and forecasted for different levels of resolution. A probability distribution is fitted to the differences between the actual price values and those from the in-sample fit of the reconstructed series that produces the best fundamental forecast. To estimate forward prices that incorporate an estimate of the convenience yield, the median and an upper bound is found by simulating from this distribution at each point over the forecast horizon.

Email: m.stevenson@econ.usyd.edu.au

ISF 2005

MI3

Contributed Session: Time series analysis II

Monday, June 13th 2:35 pm – 3:55 pm   Room: Mesquite

Chair: Antonio Garcia-Ferrer,
      Universidad Autonoma de Madrid

Prediction of short-term time series as adaptive extrapolation of finite spectrum functions problem with data selection phase space model criteria

Oleg S. Antropov

    Undergraduate student, Radio-physics faculty at Dniepropetrovsk National University, Ukraine

Aleksander M. Akhmetshin

    Professor, Radio-physics faculty at Dniepropetrovsk National University - Ukraine

Theoretical fundamentals and information aspects of method of extrapolation of short-term time series, based on idea of prolongation of analytical functions out of limits of initial temporal measurements area are stated in this work. The nature of predicted data is considered by using special criteria for the length of taken datasets, based on recurrence plots method, which gives an opportunity to estimate the predictability of observed time series via the determinism of the system. Determinism rate of probably non-stationary time series is analyzed with consideration of chaos-chaos transactions via recurrence plots methods technique. Results of the experimental functional test of a method on examples of real financial as well as industrial series are also given. The description of algorithm and data segment length selection criteria is provided as well. On the basis of theoretical substantiation and practical validity of obtained results information system is being constructed.

Aggregation of space-time processes: indirect or direct approaches for forecasting economic aggregates?

Giovanni Savio

Eurostat, Statistical Office of the European Communities, Luxembourg

Maria Simona Andreano

Universita degli Studi di Roma, La Sapienza, Italy

Economic variables are typically observed over time and across different but likely correlated areas. When interested in forecasting the aggregate across the various areas, a question that naturally arises is whether gains in efficiency can be obtained using a direct approach (forecasts are directly obtained from the spatially aggregated series) or an indirect approach (forecasts are derived from the spatial series for the various areas, in case imposing the constraints derived from spatial correlation in the system).

Such issue has been recently considered in Giacomini and Granger (Aggregation of space-time processes, Journal of Econometrics, 2004), where it is shown that space-time AR(1,1) models are relatively more efficient than traditional ARMAs and VARs in terms of forecasts.

We theoretically extend these findings through asymptotic results and small sample simulations by: a) considering more realistic and general non-stationary space-time ARIMA(p,d,q) models; b) extending the dimension of the simulated systems in order to reduce the biases induced by the edge effects; c) relaxing the assumption of a positive spatial correlation in the system; d) considering changes in the correlation structure caused by spatial aggregation.

Two concrete applications with regional real GDP US data and industrial production indices for Euro-zone economies are presented.

The effects of disaggregation on nonstationary I (1) time series.

Antonio Garcia-Ferrer, Pilar Poncela

Departamento de Analisis Economico. Universidad Autonoma de Madrid, Madrid, Spain

This paper focusses on the effects of disaggregation on forecast accuracy for nonstationary time series using unobserved components models. Both, unrelated and common trends are considered for I(1) processes. Although the basic theoretical results are known for stationary vector ARMA time series, the possibility of cointegration, or equivalently the presence of common trends, brings a new dimension to this problem. The usage of unobserved components models allows the possibility of explicitly modeling these trends. We study the presence of common trends among several components using a multivariate dynamic factor model, and analyze if the common information can help in forecasting the aggregate. Alternatively, if the dissimilarities among the components are quite strong, a disaggregated approach will be prefered. The results are applied to quarterly GDP data of several European countries within the euro area. After obtaining forecasts at the country level, we pool them to obtain the forecast of the aggregate. Then, we compare these results with those obtained directly from modelling and forecasting the aggregate GDP of the individual countries.

Email: antonio.garcia@uam.es

MJ3

Invited Session: Organizational Politics in Forecasting: issues, strategies and solutions

Monday, June 13th 2:35 pm – 3:55 pm   Room: Chula Vista Boardroom

Chair: Elaine Deschamps
         Caseload Forecast Council, State of Washington

Panelists:

Charles Chase
    Market Strategy Manager, Applied Econometrics and Forecasting, Analytics Strategy Team, Worldwide Marketing, SAS

Elaine Deschamps
    Senior Forecaster, Caseload Forecast Council, State of Washington

Michael Gilliland
    Marketing Strategist - Demand Forecasting, Marketmax / A Division of SAS

John Mello, Mark Moon
        Department of Logistics, University of Tennessee

This panel addresses the issue of organizational politics in the forecasting process. What are some of the common political pressures forecasters face? How do we identify and handle biases in the forecast process and product? A technically sound forecast goes nowhere if it is not accepted by those in power, and often the forecast gets manipulated to satisfy political ends or meet targets and goals. In this panel we bring together practitioners from both the private and public sector to discuss the common problems in handling politics in the forecast process.

Specific issues to be addressed by the panel include:
    How can we identify and eliminate political bias in the forecast?
    How can we improve usability and acceptance of the forecast by those in power?
    How can we convince others that manipulation of the forecast leads to inefficiencies and inaccuracies?
    Where should the forecasting function reside?
    How can we improve collaboration and communication among players with conflicting interests?

Practitioners meet academics, as political scientist, philosopher, econometrician, and supply chain professional join together to tackle this issue and develop strategies for allowing forecast accuracy to prevail over politics.

Email: Elaine.Deschamps@cfc.wa.gov; Charlie.Chase@sas.com; Mike.Gilliland@Sas.com; jmello@utk.edu

---

MA4

Feature Session: Modeling and Forecasting the Diffusion of Innovation – A 25-Year Review

Monday, June 13th 4:10 pm – 5:30 pm   Room: Live Oak

Chair: V. Kumar
University of Connecticut

Nigel Meade

Professor of Quantitative Finance, Tanaka Business School, Imperial College London

Towhidul Islam

Department of Marketing and Consumer Studies, University of Guelph, Canada

As the age of consumer electronics develops, the time from the introduction of an innovative product, through early adoption, to market saturation takes less and less time. For example, compare the time taken for black and white television to reach 50% of its potential market with the time taken by MP3 players to reach a similar position. These developments, among others, have contributed to continuing and increasing interest in modeling the adoption of innovations.

Building on the pioneering work of Rogers, Fisher & Pry, Bass and many others; work in diffusion modeling has developed in several distinct directions.

    Empirical comparisons of models by fit and forecasting accuracy
    Modeling adoption in a multinational context
    International comparisons of the propensity to innovate
    Modeling the adoption of successive generations of technology
    Micro-modeling the diffusion process – for example, modeling the effect of heterogeneity among adopters

The objective of this paper is to review the research in these different directions, with an emphasis on their contribution to improving on forecasting accuracy, or adding insight to the problem of forecasting.

Email: n.meade@imperial.ac.uk; islam@uoguelph.ca

MB4

Invited Session: The use of Judgment in Forecasting

Monday, June 13th 4:10 pm – 5:30 pm   Room: Directors

Chair: Mike Brennan
       Massey University

Examining the predictive ability of two loyalty segmentation approaches

Nick Dannenberg and Byron Sharp
       Marketing Science Centre, University of South Australia

This paper examines the predictive performance of two approaches for measuring loyalty. These predictive tools provide individual level estimates of people's future switching behavior which can be used by firms to segment their customer bases into groups according to the likelihood of defection.

In this paper we assess the ability of the Conversion Model which is a widely used proprietary approach. The Conversion Model's developers and owners claim that it has performed extremely well in more than 1000 studies.

The second approach that is tested is based on the Verbal Probability Scale, a well-documented, public domain technique for predicting future buying behavior that is based on subjective probabilities. Probabilistic measures of future behavior have performed well in providing aggregate level predictions of future behavior and have been used for more than 30 years. However, they are not typically used to provide individual level predictions and have been exposed to very limited testing in this area.

We find that both approaches predicted a greater proportion of 'defectors' than would be expected from chance alone. Given the poor performance of many previous attempts to predict future buying behavior this result is very promising. Especially considering the difficulty of the task in that the approaches had to predict a future non-repetitive buying behavior. On the data available the probabilistic approach was substantially more impressive, in terms of predictive ability, than the Conversion Model. Additionally it has the considerable advantages of being non-proprietary and it provides an aggregate level prediction of the overall, or segment level, defection rate, which the Conversion Model does not.

A comparative investigation of three methods for forecasting election results under the Single Transfer Voting System

Parackal Mathew, Harris Phil
> Department of Marketing, University of Otago

Chris Rudd
> Department of Political Studies, University of Otago

Empirical testing has shown probability scales as a superior direct forecasting approach for purchasing behavior. In this paper we extend the application to evaluation research, examining the impact of a Government financial assistance payment on the future uptake of paid work by assistance recipients. Such an application is extremely useful as social and Government interventions have experimental design constraints that rule out the use of control groups and test markets.

We use longitudinal data that covers 835 respondents, each interviewed three times over the course of four years. At each interview the Juster Scale was used to create a benchmark for respondents' likelihood of taking up paid work in the next year. We then examined the impact of a reduction in the Government financial assistance and life changes on this work estimate. The research identified scenarios that would have the biggest impact upon behaviors relevant to payments, making it possible to gauge the importance of the payment to the family without having to change it.

As a longitudinal study, we were able to assess the accuracy of the Juster Scale benchmarks in predicting aggregate and individual future behaviors. This is unusual for research on the Juster Scale, as most is not conducted over time with the same respondents. We suggest that the Juster Scale can be used to assess the relative merits of possible initiatives without the need for test markets.

Obtaining Accurate Purchase Predictions for Innovative Products

Mike Brennan
> Department of Marketing. Massey University, New Zealand

Many new products fail, raising the question of whether methods for predicting demand need improvement. While quite accurate estimates of demand can be obtained using instruments such as the Juster purchase probability scale, the results are inconsistent. One reason may lie with the choice of respondents used to provide the estimates of demand. These estimates are often obtained from a representative sample of the general public. However, it has been suggested that more accurate predictions will be obtained if the estimates are obtained from the 'opinion leaders' in a product category, as these are the people likely to be the early adopters, and influencers of later adopters. This study examines the purchase probabilities elicited from respondents who obtained either low, medium or high scores on three sets of scales: Opinion Seeker, Opinion Leader, and Innovator. The Juster ratings were similar for all three groups on the Opinion Seeker scale, but were very different on both the Opinion Leader and Innovator Scales. This suggests that these last two scales would be useful for testing the whether 'innovators' and 'opinion leaders' provide more accurate predictions of purchase probabilities for really new products or product innovations than a sample of the general public.

Email: Mbrennan@massey.ac.nz

MC4

Contributed Session: Density Forecasts

Monday, June 13th 4:10 pm – 5:30pm   Room: Pecan

Chair: Patrick McSharry
         University of Oxford

Evaluation and Comparison of Density Forecast Models

Yong Bao
         University of Texas, San Antonio, USA

Tae-Hwy Lee
         University of California, Riverside, USA

Burak Salto
         Marmara University, Istanbul, Turkey

Following Diebold et al (1998, 1999) it has been a common practice to evaluate a density forecast model based on the probability integral transforms (PIT) of the process with respect to the model's density forecasts. The inverse-normal transform of the PIT follows a standard normal process if the density forecast model is correctly specified. In this paper, we aim to evaluate a density forecast model by examining the departure from this property and compare competing density forecast models by using this departure as a loss function. The loss is constructed as a likelihood ratio and thus is the Kullback-Leibler Information Criterion (KLIC) for the distance between the density of the PIT and the standard normal density. We also show that comparing the KLIC values of the PIT is equivalent to comparing the predictive likelihoods of the models. We use the S&P500 and NASDAQ daily return series to conduct an empirical exercise of density forecast evaluation and comparison, where the benchmark is with GARCH(1,1) volatility and Gaussian conditional density.

Density forecasting using simultaneously estimated CAViaR models

Patrick E. McSharry, James W. Taylor
University of Oxford, Oxford, UK

An adequate description of the conditional distribution of financial market returns is important for risk management, as well as option pricing and portfolio management. Conditional autoregressive value at risk (CAViaR) models provide a new approach to univariate modeling of the quantiles of the conditional distribution. Empirical results show strong potential for the models. In the CAViaR approach, different quantiles are modeled independently, which is appealing because the different quantiles may have different dynamic structures. For example, the left and right tails of the conditional distribution may be driven by different forces over time. However, when estimating models for closely clustered quantiles, it seems more sensible to estimate the models together in order to synthesize and corroborate the information in the different quintile models. This helps reduce the possibility of quintile crossing, and is particularly useful when there is a lack of data, which is essentially the case when estimating extreme tail quantiles. In this paper, we extend the CAViaR framework to density forecasting by enabling the simultaneous estimation of the CAViaR models for all quantiles. We explore how the models vary for the different quantiles and comment on how the different parts of the distribution follow different dynamic processes.

Evaluation of nonlinear models using density forecasts

Patrick E. McSharry
University of Oxford, Oxford, UK

Nonlinear models have been proposed for describing the dynamics underlying economic time series such as post-war US GNP. Regime switching models such as the self-exciting threshold autoregressive (SETAR) model can be formulated to provide distinct autoregressive models of the economy when undergoing expansionary and contractionary phases of the business cycle. While this flexibility is both attractive and intuitive, these models often fail to outperform their linear counterparts when assessed in terms of their out of sample mean squared forecast error. Evaluation of point forecasts using traditional linear statistics such as the mean squared error can even reject the actual nonlinear model that may have generated the data. We explore the estimation and evaluation of nonlinear models with regard to the effects of observational uncertainty and model error.
We show that the benefits of nonlinear models can only be truly ascertained when evaluating the full forecast density. This is demonstrated using models and time series of US GNP.

Email: patrick@mcsharry.net

MD4

Contributed Session: Financial Information

Monday, June 13th 4:10 pm – 5:30 pm   Room: Pecos

Chair: Jay D. Forsyth
    Central Washington University - Ellensburg, Washington, USA

Modeling Future Cash Flows Using Static and Dynamic Fixed-Effects Regression and Bootstrapping - Empirical Evidence of Small and Medium Sized Enterprises from the German Manufacturing Sector

Nikolaus Wrede, Carsten Homburg
    University of Cologne, Cologne, Germany

We model future operating cash flows using static and dynamic fixed-effects regression (FER). We show that the OLS estimator is not appropriate in a dynamic setting, that alternative estimation methods perform better, and that our newly developed static model delivers similar good results. Our sample includes a set of more than 300 SME from the German manufacturing sector and eight periods.

In the basic model, the future operating cash flow depends on the current (lagged) operating cash flow and accruals, similar to Al-Attar (2004). Since this regression contains a lagged, dependent variable, the model is dynamic. The commonly used OLS estimator is biased in this dynamic setting. Therefore, we use the transformed likelihood-approach and the Generalized Method of Moments (GMM) to estimate the model and improve estimation results by re-sampling the dataset.

We modify the basic model by splitting the lagged cash flow into its major components: revenues and costs. This substitution leads to a static model, where all variables are exogenous. This new static model is estimated by OLS, GLS and GMM and results are improved by re-sampling.

We show that our estimation methods in a dynamic FER perform better than OLS of earlier studies and that our alternative static FER delivers comparable good results.

Forecasting Net Interest Margins by Bank Asset Size Using a Longitudinal Mode

Albert E DePrince, Pamela D. Morris
Middle Tennessee State University, USA

The Interstate Banking and Branch Efficiency Act (1994) permitted interstate branching by July 1997 and accelerated a consolidation underway since 1982. Banks of mammoth size appeared, while the number of small banks imploded. Given the industry's structural change, it is possible that the profitability from financial intermediation also shifted. Net interest margin (net interest income to average assets) or NIM is used as the relevant profit measure for intermediation. To focus on effect of asset size on profitability, all banks are assigned to one of five asset classes for each year of the 1993-2003 sample period; ranges for each class change from year to year to reflect inflation, and average NIM is calculated for each asset class for each year.

This study first evaluates differences in NIM by asset class over the sample period. Next, a longitudinal model is developed using panel data, modeling NIM by asset class by year. Effects of various interest rates and various economic variables are assessed. Preliminary results suggest that interest rates effects differ by asset class, but economic effects are roughly the same for all asset classes. The final model will be used to produce one-period ahead forecasts of NIM by asset class.

The Use of Forecasting in Financial Statements

Jay D. Forsyth
Central Washington University - Ellensburg, Washington, USA

The purpose of this paper is to enumerate forecasting requirements in the body of Generally Accepted Accounting Principles (GAAP). The origins of the current body of GAAP started toward the end of the Great Depression. Subsequent to that era, significant structural changes in the rule making process have occurred along with an explosion of new accounting pronouncements in recent years. Some emphasis will also be directed toward current Securities Exchange Commission (SEC) rules on the disclosure of forward looking information in Management's Discussion and Analysis (MD&A).

Email: forsythj@cwu.edu

ME4

Invited Session: Conflict Forecasting II

Monday, June 13th 4:10 pm – 5:30 pm   Room: Llano

Chair: Allen Moulton
       MIT Sloan School of Management

Forecasting Domestic Conflict

Prasad S. Bhattacharya
       Florida International University, University Park; USA

Dimitrios D. Thomakos
       University of Peloponnese, School of Management and Economics, Tripolis-Greece

We take domestic conflicts across the world, measured and classified in terms of number of deaths and forecast their occurrence likelihood in future using the following models: (1) Poisson Autoregressive model, (2) Markov Switching model, (3) Artificial Neural Networks model and (4) Smooth Transition Autoregressive model. First two models take care of underlying conditionalities, if any, present in the original data. As the data generating process is unknown a priori, therefore, we use the neural network framework to investigate if the conflict process itself is state-independent. Additionally, as the sample ranges from 1950 to 2003, we choose the smooth transition model to explore the potential nonlinear pattern. We have also evaluated the first two and the last model in presence of economic, institutional and political control variables as being identified in the literature. Various model forecasts are then combined and compared with the individual model forecasts to generate improvements in forecasting performance. However, final results provide ambiguous improvement in out-of-sample predictions and call for a more general approach to correctly classify the data pattern.

CASCON and MIT Research on Conflict

Allen Moulton
       MIT Sloan School of Management and Center for International Studies

The focus of this discussion will be on methods for better understanding the process by which disputes either do or do not escalate to threats of violence or to outright hostilities. One research approach currently underway is to use systems dynamics to operationalize theories linking post-conflict conditions of one conflict to the precursors of subsequent conflict. This work attempts to quantify measure where possible, identify data sources, and test theories against reality. In another vein of research, CASCON (Computerized System for Analyzing Conflict) supports decision analysis by historical analogy using a conceptual map of 571 factors influencing the dynamics of the conflict process. Factors were developed by generalizing case-specific events and circumstances identified as significant by case experts. Using the factor map, expert case knowledge is captured in an extensible database and software enables the analyst to explore patterns of similarities and dissimilarities between a current case and historical cases. In contrast to other approaches that use either simplified theories or collections of unconnected facts, CASCON offers a method for applying a multivariate abstract framework to assist in organizing research on a conflict situation, whether incipient or ongoing, in identifying comparable historical situations, and in analyzing potential future courses.

Email: amoulton@MIT.EDU

MF4

Invited Session: Neural Networks Theory II - Time Series Patterns

Monday, June 13th 4:10 pm – 5:30 pm   Room: Blanco

Chair: Bruce Curry
Cardiff Business School, Cardiff, UK

Artificial Neural Networks for Modeling Nonlinear Time Series with Segment Trends

Paola P. Sanchez, Juan D.J.D Velasquez
Universidad Nacional de Colombia, Medellin, Colombia

It has been long accepted that many economic time series exhibit a nonlinear behavior, whose complexity makes impossible to formulate an econometric model based only on economic laws; usually the problem is aggravated by the presence of structural breaks, for which it not exists a mathematical formulation in the nonlinear case. A new methodology for modeling of nonlinear time series with segment trends is proposed; it is based on the explicit representation of the different structural components (trend-long term cycles, seasonality, and irregularities) of the time series, while the neural network is used to modeling nonlinear relationships no captured by them. The proposed methodology was applied to several study cases and the results were compared with classical approaches, finding that, our model can be represent in a better way the dynamics of each studied time series. These preliminary results encourage future research of the applicability of our methodology and suggest the extension of the model to other cases.

Nonlinear Time Series with Breaks in the Seasonal Pattern - A modeling approach using Neural Networks

Paola P. Sanchez, Juan David, J.D. Velasquez
Universidad Nacional de Colombia, Medellin, Colombia

As a continuation of the research of Sanchez and Velasquez (Artificial Neural Networks for Modeling Nonlinear Time Series with Segment Trends, ISF-2005), this study is concerned to the modeling of nonlinear time series with breaks in its seasonal pattern, which representation is not considered for standard modeling procedures in the linear case. This paper proposes a hybrid model for the representation of nonlinear time series with permanent breaks in the amplitude of seasonal pattern, which combines the advantages of the structural models in the individual representation of the time series components and multilayer perceptrons for modeling nonlinear relationships, allow us the representation the permanent disturbances in the amplitude of the seasonal pattern. The goodness of the proposed model is illustrated with the application to simulated and real data sets, allow us for a more complete representations. These preliminary results encourage future research of the applicability of our methodology and suggest the extension of the model to other cases.

A New Perspective on Forecasting Seasonal Time Series with Artificial Neural Networks

Sven F. Crone
Lancaster University, Lancaster, United Kingdom

Research in artificial neural networks (NN) has recently refocused on their ability to forecast seasonal time series patterns without prior deseasonalisation. While research over the past decade presented contradicting results on the benefit of deseasonalising seasonal time series, recent evaluations on artificial and empirical time series by Zhang et al. and Hill et al. suggest that NN provide only suboptimal results if the time series are not deseasonalised first. While this seems implausible considering the NN ability of universal approximation, it also contrasts experimental results within our research group. Considering the relevance of predicting seasonal and other autoregressive patterns directly from unpreprocessed time series for automatic forecasting procedures, we seek to explore this widening gap in research practices, focussing on purely seasonal time series patterns as opposed to various forms of trend-seasonal patterns used in other evaluations.

We evaluate different preprocessing schemes, NN architectures and external explanatory variables to encode seasonality. Experimental predictions are computed for three artificial seasonal time series used in a recent evaluation by Zhang and Qi. Our experiments suggest that NN are capable of predicting seasonal patterns, indication the need for an extended analysis.

Email: s.crone@lancaster.ac.uk

MG4

Invited Session: Analysis and Forecasting of the Mexican Economy

Monday, June 13th 4:10 pm – 5:30 pm   Room: Nueces

Chair: Victor M. Guerrero
Instituto Tecnologico Autonomo de Mexico (ITAM)

Analysis and Forecasting of the Mexican Economy: The forecasting accuracy of Eudoxio Macroeconometric Model of the Mexican Economy-A Historical Overview

Eduardo Loria
School of Economics, UNAM, Mexico City Mexico

Eudoxio, since 1995 has normally forecasted the main macroeconomic indicators of the Mexican Economy which have been published in national and international journals.

We test its accuracy in forecasting key variables such as GDP, Consumption and Investment, Inflation, Current Account and Fiscal Balance for the period 1995-2004.

We detected two main (different) forecasting periods: a) simple (1995-2000 and 2004-2005), in which its forecasting accuracy is impressive; b) and difficult (2001-2003), where turbulence and volatility affected the predictive ability of the model. Economic and econometric explanations are discussed in order to explain the model's performance.

Potential GDP in Mexico

Ernesto Acevedo
School of Economics, Universidad Nacional Autnoma de Mexico, Mexico City Mexico

This paper explores three different methodologies to estimate the potential GDP of the Mexican economy. A Hodrick-Prescott (HP) filter is used along an extended time series data to overcome the common bias that it is seen at the sample's endpoints. Its results are compared with those of a structural VAR with long-run restrictions (as proposed by Blanchard and Quah, 1989) as well with the estimate of the potential level derived from a production function approach. The production function approach is complemented with an estimate of the non-accelerating inflation rate of unemployment (NAIRU) that is obtained with a Kalman filter. It is shown that the HP filter generates output gaps that are less volatile than those derived from the production function approach.

Restricted VAR Forecast That Take Into Account An Expected Structural Change

Nicolàs Gomez
> Departamento de Fisica y Matemàticas, Universidad Iberoamericana (UIA), Mexico

Victor Guerrero
> Departamento de Estadistica, Instituto Tecnologico Autonomo de Mexico (ITAM), Mexico

The forecasting problem that arises when a structural change is expected to occur on an economic system during the forecast horizon is considered. Both the deterministic and the stochastic structure of a Vector Auto-Regressive model are assumed to be affected by the structural change. The available information about the structural change is provided by a set of linear restrictions imposed on the future values of the variables involved. The restricted forecasts of the multiple time series process with structural change, as well as its mean squared error are here derived.

An empirical illustration makes use of Mexican macroeconomic data on six variables. Restricted forecast take into account the economic targets for year 2004 announced by the Mexican Government and an economic reform assumed for year 2005.

Email: guerrero@itam.mx

MH4

Practitioner Session: Robust Statistical Applications in Contemporary Econometric Software

Monday, June 13th 4:10 pm – 5:30 pm   Room: Frio

Chair: Benito Flores
        Texas A&M University

Robert A. Yaffee
        Ph.D., New York University, USA

The purpose of this paper is to compare robust analytic capabilities of popular contemporary econometric software. In the analysis of real data, outliers and/or heteroskedasticity commonly plague econometric and time series models. Outliers can increase standard errors, decrease power, bias significance tests downward, and predispose models toward type II errors, whereas heteroskedasticity can preclude generalization by warping confidence limits.

The comparative econometric analysis begins with a brief consideration of automatic and manual outlier and heteroskedasticity detection approaches in Stata, SAS, PcGive, LIMDEP, Autobox (FreeFore), and S-Plus. It continues with a discussion of principal robust algorithms for outlier resistant cross-sectional regression. Among these techniques are winsorizing, trimming, least median squares, median regression, least trimmed squares, iteratively reweighted least squares, M estimate regression, and MM estimate regression along with methods of nonparametric regression and bootstrapping in the various packages.

Robust options in time series analysis extend to time series regression, ARIMA, and RegARIMA. In time series regression analysis, the application of robust covariance matrices to correct for heteroskedasticity and autocorrelation are explained. In ARIMA and RegARIMA models, methods used for level-shift and/or robust outlier identification in these statistical packages are also covered. Comments about possible future robust applications conclude the presentation.

Email: yaffee@nyu.edu

MI4

Invited Session: Crime Forecasting

Monday, June 13th 4:10 pm – 5:30 pm   Room: Mesquite

Chair: Wilpen L. Gorr
        Carnegie Mellon University

Short-Term Crime Forecasting: Results from Large-Scale Forecasting Experiments

Wilpen L. Gorr, Jacqueline Cohen
        Carnegie Mellon University, Pittsburgh, USA

Andreas M. Olligschlaeger
        TruNorth Data Systems, Pittsburgh, USA

Police around the world have turned to data analysis and modern management methods to improve efficiency of crime prevention and enforcement. Key to further developments in modern policing is crime forecasting for tactical deployment and evaluation of short-term resources. We have developed one of the largest test beds for evaluation of crime forecasting methods with 6 million crime incident records over 12 years from two medium-sized cities. We processed these data into monthly crime series data for 24 crimes and four geographies: precincts, car beats, census tracts, and grid cells. At this point we have definitive results from rolling horizon forecast experiments. The most accurate counterfactual forecast method, for use in evaluating past performance, is exponential smoothing with data deseasonalization via multiplicative classical decomposition applied to pooled city-wide data. The most accurate forecast method for use in tactical deployment is a leading indicator model using "soft" crimes as leading indicators of "hard" crimes, with 12 time lags in a neural network model. We will present these results including several innovative features of our models and evaluation framework.

Hierarchical Profiling of Crime Time Series Data as a Precursor to Neural Network Modeling

Hasan Al-Madfai, Jonathan Corcoran, Christian Ivaha, Andrew Ware
        University of Glamorgan, Pontypridd, UK

Crime levels are usually influenced by a complex interplay of spatial and temporal factors. Spatial factors include the social demographics of an area, while temporal factors include the weather and suspected periodic and a periodic events such as national holidays and large sporting events.

The paper will present a methodology that can be used to help construct and calibrate a model that incorporates such factors and their interplay in such a way that latent patterns of past crime can be discovered to facilitate future crime level prediction. The methodology employs Hierarchical Profiling to establish the impact of salient events and conditions on crime levels. The profiling information can then be used to augment the raw data used to construct the actual crime level prediction model which, in the case of the paper, will be a traditional neural network model. The performance of this model is compared to ARIMA, and to neural networks and ARIMA models constructed using the raw non-profiled data.

The additional work required in carrying out the hierarchical profiling facilitates not only the construction of more accurate predictive models but aids in the understanding of the data and the subsequent predictions produced.

Effectiveness and Use of Spatial Forecasting Techniques in Tactical Crime Analysis

Sean M. Bair, John Van-Auken
Crime Mapping and Analysis Program, National Law Enforcement and Corrections Technology Center, University of Denver, Denver, USA

A survey of the crime analysis community on the use of spatial forecasting techniques in Tactical Crime Analysis is presented along with the results of a study on the effectiveness of the various techniques. The Jennrich-Turner Ellipse, Minimum Convex Polygon, Standard Distribution Rectangle, and Kernel Smoothing are looked at in depth for their ability to "predict" the area of the next event in a crime series. The history and evolution of these techniques towards use in Crime Analysis, the methods used to evaluate each technique, and the final results of the study will be discussed, along with the potential of spatial forecasting in law enforcement.

Crime Forecasting as a Tool for Police Resource Allocation

Donald E. Brown and Michael Smith
Department of Systems and Information Engineering, University of Virginia, Charlottesville, USA

Different groups within municipalities encourage police to allocate resources according to their perceived needs and interests. Because of these lobbying efforts, allocation decisions are sometimes made as the result of a political process rather than from an analytical assessment of the patterns of crime in the area. This paper examines the use of crime forecasting techniques to help guide both police and the political leadership in the allocation of limited police resources. This work shows how the forecasts enter into a larger resource allocation problem and how they can shape a more informed set of allocation decisions and policies.

Email: gorr@cmu.edu

MJ4

Invited Session: Supply Chain II

Monday, June 13th 4:10 pm – 5:30 pm   Room: Chula Vista Boardroom

Chair: Akbar Marvasti
         University of Houston, Downtown

Applying Data Preprocessing to Input Variables to Improve Prediction Results in Sales Forecasting Systems for a Supermarket

Luis Aburto
         Penta Analytics S.A., Santiago, Chile

Richard H. Weber
         Department of Industrial Engineering, University of Chile, Santiago, Chile

Demand forecasts play a crucial role in advanced systems for supply chain management. Having a good and reliable estimation for a products future demand is the basis for the respective systems. Various forecasting techniques have been developed, each one with its particular advantages and disadvantages motivating the composition of hybrid systems combining different techniques and their respective advantages. Based on a comparison with ARIMA models and neural networks, we propose different types of preprocessing to input data to be included in neural networks. We evaluated different approaches to filter out input time series applying ARIMA models and evaluate accuracy level combining their result in neural network forecasting models. Our sequential hybrid approach takes the output from an ARIMA-type model as input for a neural network trying to reproduce the original time series. We used several time series representing demand in a supermarket in order to evaluate and compare the different models. The proposed sequential hybrid forecasting system outperformed its single components as well as the additive hybrid system.

Forecasting Accuracy of Fixed Business Investment vs. Inventory Investment

Akbar Marvasti
         Professor of Economics, University of Houston, Downtown Houston, TX, USA

David Smyth
         Research Professor of Economics, Middlesex University Business School, London, England

Out-of-sample forecast accuracy of fixed investment and inventory investment in the U.S. economy are compared. Typically manufacturing of finished goods is chosen in empirical studies even though it is the smallest and most stable. It has been argued, however, that each component of inventory has a life of its own. In this study, in addition to the manufacturing, retail and raw materials and supplies sectors are analyzed. The model includes a combination of the cost shocks and some serially correlated demand shocks. Blinder and Maccini's stylized facts are re-examined that variance of inventory is larger than variance of production because production is more volatile than sales, inventory investment and output are not correlated, and estimated adjustment speeds are very slow. The explanatory variables in the fixed investment function include profit rate, productivity index, and lags. The regressors in the inventory investment function include business cycle variables, inflation rate, technology, and lags.

New Perspectives on Forecasting in Centralized Supply Chain Management

Bernard L. Menezes, Pankaj E. Gulhane, Kalam C. Shah, Timma Reddy
KReSIT, IIT Bombay, Mumbai, India

In this paper we study the effect of decomposing a series into multiple components and performing forecasts on each component separately. The focus in this paper is on monthly retail sales data - most of the series considered here display both seasonality and trend, hence the original series is decomposed into trend, seasonality and an irregular component. We compare the forecast errors with and without decomposition and also variations of Holt-Winter forecasting. We experiment with different types of decompositions Ð additive, multiplicative and hybrid (mixed additive and multiplicative.). We also study the appropriateness of different forecasting techniques for each component series Ð ARIMA using a genetic approach, Holt, double exponential smoothing and neural networks. Finally, we look how the forecasts can be improved by combining the various techniques used for forecasting each component.

Email: marvastia@uhd.edu

Tuesday, June 14th

K3

Plenary Session: Forecasting using Structural Models

Tuesday, June 14th 8:00 am to 9:00 am   Room: Regency West

Chair: Geoff Allen
     University of Massachusetts

Ray C. Fair
     John M. Musser Professor of Economics
     Cowles Foundation and School of Management – Economics
     Yale University

The presentation will cover the more traditional economic forecasting. In addition, presidential vote forecasting will be examined. Some additional, non-traditional topics will include forecasting college football games.

Ray C. Fair

Ray C. Fair is a professor of economics at Yale University. His main research is in macro-econometrics, but he has also done work in the areas of finance, voting behavior, and aging in sports. He is a 1964 graduate of Fresno State College and received his Ph.D. from MIT in 1968. His two recent books are "Estimating How the Macro-economy Works," Harvard University Press, 2004, and "Predicting Presidential Elections and Other Things," Stanford University Press, 2002. His web site, http://fairmodel.econ.yale.edu allows you to compute whether you are slowing down faster than you should be.

Email: ray.fair@yale.edu

TA1

Feature Session: Econometric Forecasting

Tuesday, June 14th 9:05 – 10:25 a.m.   Room: Live Oak

Chair: Geoff Allen
University of Massachusetts - Amherst

Twenty-Five Years of Progress, Problems and Conflicting Evidence In Econometric Forecasting. What about the Next 25 Years?

Panelists:

Ray Fair
Yale University

B. Morzuch
University of Massachusetts – Amherst

P. Swamy
Bureau of Labor Statistics

In the early 1940s, the Cowles Commission for Research fostered the development of statistical methodology for application in economics. Major contributions by Haavelmo (1943) regarding the statistical implications of simultaneity paved the way for large-scale research activity with econometric models used for both structural estimation and forecasting. This approach stood for decades.

In the 1980s, vector auto-regression (VAR) was clearly an improvement over early Cowles Foundation econometric forecasting models primarily because it paid attention to dynamic structure. As a way of imposing long-run equilibrium restrictions on sets of variables, co-integration and error correction modeling (ECM) gained popularity in the 1980s and 1990s. While successful to a degree, there is also evidence that ECMs have performed poorly in situations where imposition of the necessary parameter restrictions seemed appropriate. Thus, it is much less clear whether these techniques have delivered on their early promise. ARCH and GARCH modeling have been used with great success in specialized financial areas to model dynamic heteroscedasticity. In mainstream econometrics, there is limited and conflicting evidence about their performance. Considering the very basic issue of subjecting an initial model to misspecification tests once it has been estimated, any model will inevitably fail some of them for the simple reason that there are many possible tests. Which failures matter? The root of the difficulty regarding all issues related to modeling is that we never know the true data generating process. Processes to be modeled are so complicated and high dimensional that specifying the underlying process in model form becomes next to impossible. So, what of the next 25 years? What new avenues will open up? We have much greater computational capacity than 25 years ago and more complex models with larger data sets seem the way to the future. Will they require the automatic model selection methods that have recently been introduced? Preliminary evidence is that these methods can do well. The quality of aggregate data is no better than it was. Will greater use of more disaggregated data be sufficient to provide better forecasts? That remains an open question.

Email: allen@resecon.umas.edu

TB1

Invited Session: Exponential Smoothing II

Tuesday, June 14th 9:05 – 10:25 a.m.   Room: Directors

Chair: Ralph Snyder
Monash University

A non-seasonal forecast evaluation of the VES methodology

Ashton J. de Silva, Rob Hyndman, Ralph Snyder
Department of Econometrics and Business Statistics, Monash University, Australia

The Vector Exponential Smoothing methodology is a relatively new forecasting tool. An evaluation of its forecasting performance against commonly used alternatives will be considered in this presentation. The alternative methodologies considered are the Box Jenkins methodology and seemingly unrelated time series equations. Performance is measured in terms of relative accuracy measures.

Estimating Value at Risk Using Exponentially Weighted Quintile Regression

James W. Taylor
University of Oxford, Oxford, UK

Value at risk (VaR) is a standard measure of financial market risk, which involves the estimation of tail quantiles of the conditional distribution of returns. In this paper, we propose several new univariate approaches to estimating VaR. The common use of exponential smoothing for volatility prediction motivates the development of the approach for conditional quintile estimation. We propose the use of exponentially weighted quintile regression, which we show amounts to exponential smoothing of the cumulative distribution function. This nonparametric method can be expressed in a kernel estimation framework, and then modified using a double-kernel estimator, in order to provide greater accuracy for tail quantiles that are changing relatively quickly over time. Turning to extreme value theory, we use an exponentially weighted log likelihood approach to modify the standard peaks over threshold approach to produce conditional quintile estimates. We also consider a nonparametric extreme value approach in which the exponentially weighted double-kernel method is used to estimate conditional quantiles of the extremes distribution. We combine conditional quintile estimates with combining weights estimated by exponentially weighted quintile regression. Our empirical results indicate that the new methods compare well with a variety of VaR methods, including GARCH-based methods and CAViaR models.

A Bilinear Statistical Framework for Exponential Smoothing

Ralph Snyder
Department of Econometrics and Business Statistics, Monash University, Australia

A statistical framework is introduced that encompasses traditional forms of exponential smoothing but which admits extensions such as covariates and error variances that change with time. It is then possible to allow for interventions when forecasting; using more parsimonious representations of seasonality than the Winters method of forecasting; and to model error variances that display seasonal variation.

It is argued that the formulae for exponential smoothing and the envisioned extensions are usually bilinear relationships. A theory of estimation and prediction is developed on this basis. An important practical consequence of bi-linearity is that a rich range of nonlinear relationships can be specified with a collection of tables of numbers. The need of a formal computer programming language to specify the nonlinear relationships is avoided.

Email: Ralph.Snyder@BusEco.monash.edu.au;

TC1

Contributed Session: Econometric Applications

Tuesday, June14th 9:05 – 10:25 a.m.   Room: Pecan

Chair: Thomas Fullerton
        University of Texas at El Paso

Predictions of early exits from Royal Naval Services

Shabbar Jaffry, Yaseen Ghulam
        University of Portsmouth, Portsmouth, UK

This paper analyses the issue of the premature (voluntary) employment exit from the British Naval Services, with the use of a unique administrative longitudinal data source. The econometric technique of survival analyses is adopted to test a series of hypotheses that are consistent with the job search theory. In particular, we test how the internal job related factors, external labour market conditions and other fluctuations in the macro economy affect the premature voluntary exits of Royal Naval Ratings.

This paper reports predictions of premature (voluntary) employment exits, with the use of a unique naval administrative longitudinal data set. A group as well as individual level predictions of early exits, using econometric techniques of duration analyses (continuous time) and logistic regression (discrete time) are compared. This paper is one of the first attempts to thoroughly investigate early exits from the Royal Navy, and provides relevant insights and predictions of early exits for the manpower retention policy in the Royal Navy.

An Evaluation of Real-Time Forecasting Performance Across 10 Western U.S. States

Keith R. Phillips, Joaquin Lopez
        Federal Reserve Bank of Dallas, San Antonio, USA

The accuracy of different types of forecasting models has been well-researched in the academic literature. In recent years researchers have emphasized the importance of looking at the true real-time performance of models and not simply an analysis of out-of-sample results. In this study I utilize real-time forecasts from the Western Blue Chip Economic Forecast to analyze and evaluate a host of different forecasters and models across time and 10 U.S. states to see if some models and forecasters consistently outperform others. I use the forecast accuracy criteria established by the Blue Chip publication Ð in approximately May following the forecast year, the forecast for job growth published in January of the forecast year is compared to the existing data for the forecast year. To evaluate accuracy I count the numbers of years that the forecaster/model was closest to actual and utilize standard measures such as the root mean squared error and Theil's U.

Border-plex Housing Forecast Accuracy

Thomas M Fullerton, Kelley W. Brian
University of Texas at El Paso - El Paso, Texas

Because of its implications for local business cycles, regional econometric forecasting systems frequently include equations for residential construction activity. Evidence to date indicates that the accuracy of housing start forecasts is less precise than that for regional employment forecasts. Previous research has not examined, however, the accuracy of other regional housing variables such as prices, stocks, affordability, mortgage payments, or sales of units. This paper analyzes the accuracy of econometric housing sector forecasts for El Paso, Texas published between 1998 and 2003.

Email: tomf@utep.edu

TD1

Contributed Session: Forecasting International Inflation

Tuesday, June 14th 9:05 – 10:25 a.m.   Room: Pecos

Chair: **Marlene U. Amstad**
Swiss National Bank, New York, US

Forecasting inflation through a bottom-up approach: the Portuguese case

Antonio Rua, Claudia Duarte
Portuguese Central Bank, Lisbon, Portugal

The aim of this paper is to assess inflation forecasting accuracy over the short-term horizon using Consumer Price Index (CPI) disaggregated data. That is, aggregating forecasts is compared with aggregate forecasting. In particular, three questions are addressed: i) one should bottom-up or not, ii) how bottom one should go and iii) how one should model at the bottom. In contrast with the literature, we consider different levels of CPI disaggregation for the bottom-up approach. It is quite reasonable to believe that the results would not remain unchanged if other levels of disaggregation are considered. This paper tries to provide further insight into this question, by considering three different CPI disaggregation levels: the lowest disaggregation level, given by the aggregate price index; an intermediate level, in which appear the traditional five components; and a higher disaggregation level, with 59 subcomponents. Moreover, both univariate and multivariate models are considered, such as SARIMA and SARIMAX models with dynamic common factors. An out-of-sample forecast comparison is done using Portuguese CPI dataset. The univariate modeling outperforms the multivariate one and aggregating the forecasts seems to be better than aggregate forecasting up to a five-months ahead horizon. Moreover, this improvement increases with the disaggregation level.

Predicting inflation in West African countries: cocoa prices and immigrant remittance flows

Adusei Jumah, Robert M. Kunst
University of Vienna, Vienna, Austria

In West African cocoa-producing countries, it is plausible to view consumer price inflation as being affected by cocoa prices and immigrant remittance flows, as well as by fiscal policies of governments. It is presumed that an increase in cocoa prices and immigrant remittance flows tends to generate a balance-of-payments surplus and an accumulation of international reserves, which, depending on monetary policy, may boost inflation.

We use this framework to construct small-scale macroeconometric models for five West African cocoa producers: Benin, Cameroon, Ivory Coast, Ghana, and Togo. The models are specifically designed to predict consumer price inflation. In view of the small numbers of observations, we also consider panel specifications. Forecasts for the most recent observations are generated and are compared to a backdrop model, which views inflation as a purely monetary phenomenon. The backdrop model considers money supply and lagged inflation as the sole sources of price changes.

Real Time Forecasts of Underlying Inflation and Shock Identification

Marlene U. Amstad
Swiss National Bank, New York, US

Andreas M. Fischer
Swiss National Bank, Zurich, Switzerland

This paper develops a new real time measure of underlying inflation for Switzerland (Swiss Core). Unlike other core inflation gauges it is based on a very broad set of nominal, real and financial information at a monthly or daily frequency (a total of 434 time series). The estimation procedure follows the data reduction techniques of Forni, Hallin, Lippi, and Reichlin (2000).

One goal is to provide real time forecasts of underlying inflation. As monetary policy makers are specifically interested in shocks which affect the inflation cycle at a frequency of a year and lower, our final goal is to provide more accurate forecasts of underlying inflation in that particular frequency band. As a second goal a new procedure for shock identification based on real time estimates is proposed. We show that the monetary policy shocks generate an asymmetric response to inflation, that the pass-through for CPI inflation is weak, and that the information shocks to inflation are not synchronized.

Email: marlene.amstad@ny.frb.org

TE1

Invited Session: Forecasting issues in the Supply Chain

Tuesday, June 14th 9:05 – 10:25 a.m.   Room: Llano

Chair: Konstantinos Nikolopoulos
Lancaster University

Demand Forecasting With Combined Bayesian Models

Phillip M. Yelland

Sun Microsystems, Menlo Park, California   USA

To help with inventory management in the face of volatile demand and rapidly-evolving product lines, researchers at computer manufacturer Sun Microsystems have assembled a suite of software that embodies a number of complementary forecasting models. At the core of the system are dynamic linear models, representing a Bayesian linear state-space approach to time-series analysis. These are combined with hierarchical Bayes models for product introduction and phase-out incorporating logistic growth curves. In addition, whole-quarter demand forecasts estimated at the beginning of a financial quarter may be adjusted in the light of interim weekly sales using a stable seasonal model. This talk will provide details of the models that make up the Sun forecasting system, and of the simulation-based algorithms used to calibrate and extrapolate them. Some of the techniques used to elicit priors for the system are also described. Finally, I discuss some of the practical aspects of implementing and using the system in support of manufacturing operations, and the performance of the system in use.

Using Analogies To Forecast Promotion Effects

Wing Yee Lee, Paul Goodwin
The Management School, University of Bath, Bath   UK

Konstantinos Nikolopoulos, Robert Fildes
Department of Management Science, Lancaster University Management School, UK

Michael Lawrence
School of Information Systems, Technology and Mgmt, Univ. of New South Wales, Sydney, Australia

Research in UK supply chain companies has found that forecasters often use informal strategies to predict the effects of product promotions by their customers (typically these are supermarket chains). Often these strategies involve simply recalling a similar promotion campaign and its perceived effects. Such strategies may suffer from errors in recall, difficulties in making judgments about similarity, a failure to discount the noise that is associated with a single case and insufficient adjustment from the reference case(s). An experiment was carried out to determine whether forecast accuracy can be improved by providing a facility in a forecasting support system which identifies the most similar promotion campaigns and their estimated effects. Similarity is dependent on variables such as the customer running the promotion, the type of promotion and the duration of the campaign. The facility is designed to be used as a support, rather than a replacement, for management judgment since there will usually be differences between the case to be forecast and the similar cases that are identified. The paper will discuss the results of the experiment and identify potential areas for further research.

Forecasting SKU Data: Results From 3 U.K. Companies

Wing Yee Lee, Paul Goodwin
   The Management School, University of Bath, Bath   UK

Konstantinos Nikolopoulos, Robert Fildes
   Department of Management Science, Lancaster University Management School, UK

Michael Lawrence
   School of Information Systems, Technology and Mgmt, Univ. of New South Wales, Sydney, Australia

This study examines monthly and weekly demand forecasts for Stock Keeping Units (SKUs) collected from three major U.K. companies. Each company is using a Forecasting Support System (FSS) to produce forecasts per SKU for each period ("system" forecasts). "Final" forecasts are produced at a later stage through the superimposition of judgments based on marketing intelligence by the company forecasters. The benefits of the intervention are evaluated by comparing the actual sales both to the system and final forecasts. Rationality, efficiency, consistency and the determinants of the provided forecasts are discussed in detail. Furthermore, system forecasts are compared to classical extrapolation techniques, as well as established FSSs, in order to assess the potential gains from the adoption of more advanced FSSs.

Email: k.nikolopoulos@lancaster.ac.uk

TF1

Contributed Session: Neural Networks Applications III - Finance

Tuesday, June 14th 9:05 – 10:25 a.m.   Room: Blanco

Chair: Steve DeLurgio
         University of Missouri, KC

Pipelined recurrent pi-sigma neural networks for prediction of EUR/USD exchange rate

Adam C. Knowles, Abir Hussain, Wael El Deredy, Paulo Lisboa
         John Moore's University, Liverpool, UK

Successful results have previously been obtained using fully connected recurrent neural networks in a pipelined structure in the application area of signal processing. Building upon this work, we replace the fully connected recurrent network with a recurrent pi-sigma network. This network consists of two layers, a layer of summing units followed by a product unit and incorporates a feedback link from the output to the input layer. A Bayesian-based confidence measure is also introduced, to explore the networks' performance with a more complex trading strategy.

Our data set is the EUR/USD exchange rate, which has already been benchmarked with multi-layer perceptrons as well as more conventional time-series prediction methods. This data was used to train fully connected and pi-sigma networks, both in single and pipelined form. The results on the out of sample data show that the pipeline structure enhances the performance of the pi-sigma network, but is still outperformed by the pipelined fully connected recurrent network. It would appear that insufficient information about the auto-correlation of the signal can be extracted from the product terms alone.

Neural Network Models for Predictive Classification: An Application to Data Quality Control

Claudia Biancotti, Leandro D'Aurizio, Raffaele Tartaglia Polcini
         Bank of Italy – Rome, Italy

This paper presents an application of neural network models to predictive classification for data quality control. We train a feed-forward network on a set of records from the past three waves of the Bank of Italy's business surveys in order to identify which types of firms are more prone to measurement error. The exercise yields one or more classes of units which should be subjected to tighter monitoring, thus providing a means for improvement in the efficiency of the quality control process and, ultimately, in the reliability of survey data. Our output variable is a binary proxy of unobservable measurement error: we observe whether the data provided by a particular firm have been edited after the completed survey questionnaire was sent to the Bank and before the final database was assembled, either by request of the respondents themselves or as a result of range, variation and consistency controls that are routinely performed before the estimation phase. The vector of input variables includes a wide array of firm characteristics including, but not limited to, size, location, business sector and intensity of information technology use.

Out-of-Sample Validation Experiences with Probabilistic Neural Network Models of Micro-Loan Defaults

Stephen A. DeLurgio, Fred H. Hays
Univ. of Missouri, Kansas City, MO

This presentation will provide an update of a previously published article and presentation on predicting micro-loan defaults using probabilistic neural networks (PNNs). The original study examined 110 loans using data through 2002. Subsequently gathered data for 27 additional loans made in 2002 and 2003 and a to-be-determined number from 2004 will be used to measure the accuracy of one-year-ahead predictions. Previous use of one year of out-of-sample performances using 110, 22, and 5 fold cross-validation methods confirmed that the original PNN was an effective predictor of micro-loan defaults even though the model was not updated during the one-year period. The 22-fold cross-validation was found to be useful in predicting future performance, and the contemporary 5-fold cross-validation confirmed model validity. As shown here, the original PNN based on 110 past observations predicted 2003 loan performance nearly as accurately as a new model. The new model predicted 112 of 137 loan performances while the old, database model more accurately predicted 113 of 137 loan performances.

Email: delurgios@umkc.edu

TG1

Invited Session: Conflict Forecasting III

Tuesday, June 14th 9:05 – 10:25 a.m.   Room: Nueces

Chair: Kesten Green
Monash University

What we know about forecasting methods for conflicts

Kesten C. Green
Department of Econometrics and Business Statistics, Monash University, Australia

J. Scott Armstrong
The Wharton School, University of Pennsylvania

We have learned much about forecasting for conflicts over the past 28 years. On the one hand, we have evidence that the accuracy of judgmental forecasts from domain experts and from game theorists is no better than chance. On the other hand, we know that forecasts from two methods, structured analogies and simulated interaction (a form of role playing), are substantially more accurate, especially when forecasts are combined. The error reduction compared to chance of combined forecasts for eight situations we used in our research was 13% for experts' unaided judgment and game theory experts, versus 31% for structured analogies and 83% for simulated interaction. Our findings are contrary to people's expectations. This situation presents opportunities for those who are first to adopt the new methods. Improvements in decision-making will occur even if only one party adopts the improved forecasting methods. There is still much to learn. For example, might some game-theoretic analysis aid forecasting under some conditions? Can Delphi technique or prediction markets provide useful forecasts for conflict situations? Are there conditions under which simulated interaction fails to provide accurate forecasts?

Red Teaming Approaches for Homeland Security: A Review of Current and Innovative Methodologies

Shelley Kirkpatrick, Shelley Asher, Catherine Bott
Homeland Security Institute

From a U.S. homeland security perspective, the need for understanding and anticipating the adversary's adaptive nature in a dynamic environment is greater now than ever before. Existing approaches used in the homeland security community for assessing the adversary's perspective will be discussed, including war gaming, vulnerability assessment, table top exercises, and red cell approaches. To enhance the ability to address current and future adversaries, innovative red team approaches must be identified. We looked outside and inside the defense and intelligence communities to identify innovative methodologies that could be adapted for use in red teaming. The adversary was not always defined in terms of terrorists or terrorist groups in the methodologies, but rather as competitors, unions, suppliers, or customers. Five innovative methodologies were identified: (1) Competitive Intelligence War gaming, (2) Simulated Interaction, (3) Structured Analogies, (4) Structured Idea Generation, and (5) Rapid Ethnography. The innovative methodologies and issues for potentially adapting them to a homeland security context will be discussed. Additionally, implications for sharing and adopting methodologies across broad sectors and fields will be discussed.

Role thinking: Does standing in the other guy's shoes improve forecast accuracy?

Kesten C. Green

Department of Econometrics and Business Statistics, Monash University, Australia

Two methods have been shown to provide accurate forecasts of the decisions that people will make in conflict situations. The first is simulated interaction, a kind of role playing, using novices; the second is structured analogies, a formal analysis of similar situations by experts. In contrast, when they use their unaided judgment, experts and novices alike provide forecasts that are no more accurate than chance. The success of the simulated interaction method suggests that realistic modeling of role and interaction between parties is important, while the success of the structured analogies method reinforces findings, from other research, that forecasts derived from expert judgments using a structured process are more accurate than those that derive from unaided judgment. Is it possible to obtain forecasts that are more accurate than unaided-judgment forecasts by encouraging participants to think about roles and interactions in a formal way? I will provide a tentative answer to this question using findings from research on the relative accuracy of forecasts from novices' role thinking.

Email: kesten@kestencgreen.com

TH1

Contributed Session: Marketing-Bass Diffusion

Tuesday, June 14th 9:05 – 10:25 a.m.   Room: Frio

Chair: Miriam E. Scaglione
University of Applied Sciences, Sierre-Switzerland

Diffusion of Satellite-supported Telematics in European Passenger Cars

Michael A. Hauser
Vienna University of Business Administration and Economics, Vienna, Austria

Birgit Loecker
ARC Seibersdorf Research GmbH, Seibersdorf, Austria

A new element in the European development of transport telematics is the use of information, communication and satellite navigation systems not only in the classical goods and passenger transportation area like sea, rail and air navigation, but increasingly in individual road transport. European car makers want to grab a piece of the telematics pie by equipping newly produced cars with satellite-supported telematic systems themselves.

The scope of this paper is to model the diffusion of satellite-supported telematic systems in passenger cars and forecast their adoption in the market. Five European car makers supplied their data on European (EU 15) sales of this innovation from 1994 to 2003. The number of adopters is measured as the stock of satellite-supported telematic cars in use. The market potential is seen as the current total stock of luxury and middle class cars.
Due to the short observation period we pool the series assuming the same parameters within a group of car makers. The market shares are kept constant. We detect a group of telematic pioneers and another group with a relatively slow take-off. The forecasts of the stock of cars fitted with telematics, replacement sales, and new and total sales are discussed.

Three types of models are considered: The Bass model, the simple logistic model estimated in a linear form, and a generalized version of the linearized Gompertz function. The models are checked among others for their consistency with respect to the overall replacement demand showing that the generalized Gompertz model describes the most plausible future development.

On the Bass diffusion theory, empirical models and out-of-sample forecasting

Philip Hans Franses

Rotterdam, The Netherlands

The Bass (1969) diffusion theory often guides the construction of forecasting models for new product diffusion. To match the model with data, one needs to put forward a statistical model. This paper compares four empirical versions of the model, where two of these explicitly incorporate autoregressive dynamics. Next, it is shown that some of the regression models imply multi-step ahead forecasts that are biased. Therefore, one better relies on the simulation methods, which are put forward in this paper. An empirical analysis of twelve series (Van den Bulte and Lilien 1997) indicates that one-step ahead forecasts substantially improve by including autoregressive terms and that simulated two-step ahead forecasts are quite accurate

Investigating Domain Name Diffusion across Swiss Municipalities

Miriam E. Scaglione, Roland Schegg

Institute for Economics & Tourism, University of Applied Sciences, Sierre, Switzerland

Thomas Steiner

Institute for Management Information Systems, Sierre, Switzerland

Switzerland is a federal country counting 26 cantons and 2815 municipalities. The Swiss Confederation is multicultural country also; has four different federal languages and two main religions (catholic and protestant). This study applies Bass' diffusion of innovation theory to investigate if domain name registrations by the municipalities follow the typical diffusion pattern of other technologies. The study analyzed the time series of more than 1800 names registered by municipalities in the Swiss ".ch" domain and compared their diffusion pattern with the overall registration dynamic.

The interest of the study is threefold: on one hand the study population is well defined and known beforehand. Therefore simulation experiences with different diffusion of innovation algorithms can be conducted in order to find the most appropriate one. On the other hand, this research will show whether there are significant differences in the dynamics of adopting domain names across cultural (language, religions), structural (e.g. size of municipalities) or organizational features (cantons). Finally, using different algorithms, the date of total saturation will be forecasted.

Email: miriam.scaglione@hevs.ch

TI1

Contributed Session: Time Series Analysis Topics
Tuesday, June 14th 9:05 – 10:25 a.m.   Room: Mesquite

Chair: Daniel W. Williams
Baruch College, New York, USA

Disaggregated Estimates of a Monthly Indicator of GDP for the Euro-zone

Gian Luigi Mazzi, Giovanni Savio
Eurostat, Statistical Office of the European Communities, Luxembourg

Filippo Moauro
Istat, Istituto Nazionale di Statistica, Rome, Italy

The availability of statistics suitable to give prompt and reliable pictures of the state of the economy and the business cycle has become a key problem for policy makers and economic analysts.

Unfortunately, actual GDP data are released by most Statistical Institutes worldwide only at quarterly frequency and, though several higher-frequency statistics are available, these provide only a partial picture of the state of economic activity.

Here we derive a monthly indicator of GDP for the Euro-zone which combines the demand for a short-term indicator of economic activity and the requirement of fulfilling an accounting reference framework. The methodology used lies in the interpolation/extrapolation approach to temporal disaggregation of low frequency series through a set of related higher frequency indicators. Disaggregations are carried-out using alternative temporal disaggregation methods and the results are compared in terms of their forecasting performances.

We find that industrial production index plays a key role in explaining/predicting output fluctuations, although other monthly sector-specific short-term indicators help in explaining the bulk of output fluctuations. Furthermore, we show that the ability of the final model to predict values of actual GDP is satisfactory, giving errors very close to the average revision errors historically observed in quarterly GDP.

Ex post and ex ante prediction of unobserved multivariate time series: a structural-model based approach

Fabio H Nieto

Depto. de Estadística, Universidad Nacional de Colombia, Bogotá, Colombia

A methodology for estimating high-frequency values of an unobserved multivariate time series from low-frequency values of and related information to it is presented in this paper. This is an optimal solution, in the multivariate setting, to the problem of ex post prediction, disaggregation, benchmarking or signal extraction of an unobserved stochastic process. Also, the problem of extrapolation or ex ante prediction is optimally solved and, in this context, statistical tests are developed for checking on-line extreme values of the unobserved time series and consistency of future benchmarks with the present and past observed information. The procedure is based on structural or component models, whose assumptions and specification are validated with the data alone.

Exponentially Weighted Loss Functions

Daniel W. Williams

Baruch College, New York, USA

In time serial methods it is assumed that autocorrelation and moving average substitute for specific knowledge of causal factors. The dynamics of those causal factors may change. Therefore, treating the underlying causality as static is irrational. This paper examines the use of exponentially weighting in the loss function in parameter fitting to attain lower out of sample forecast error.

Email: Daniel_Williams@baruch.cuny.edu

TJ1

Invited Session: The Use of Scales in Judgmental Forecasting
Tuesday, June 14th 9:05 – 10:25 a.m.   Room: Chula Vista Boardroom

Chair: Erica Riebe
          Marketing Science Center, Adelaide, Australia

Who is best at forecasting the sales of an innovation - using the Juster Scale to help find out

David Corkindale, Margaret Faulkener
          International Graduate School of Business, University of South Australia

This paper tests propositions about the ability of various types of people to predict the extent of adoption of an innovation: a lottery which has novel features for the targeted community. Subjects range from Experts through to 'ordinary people.' The Juster scale is used to enable different types of subjects to predict their future purchase behavior. Previous work has shown that the Juster scale tends to over-predict when used for repertoire market products. In the case of a gambling product it might be expected to under-predict due to respondents' reluctance to admit to gambling. We also explore the use of the Juster as a projective research tool we ask respondents both about their future behavior and also that of other people. Research was undertaken in the month prior to the lottery closing and we then compare the predictions with the actual outcome. We found that the closest predictor of total ticket sales was the mean prediction of a random sample of non-experts. The Juster scores, nevertheless, over predicted actual sales for all samples of respondents. Experts were the most pessimistic about the likelihood that all tickets would be sold, which proved to be the case. The paper then examines our findings with those in the literature on the prediction performance of Experts and non-experts.

Probability Scales in Evaluation Research

Erica Riebe, Anne Sharp, Jenni Romaniuk
          Marketing Science Centre, Adelaide, Australia

Empirical testing has shown probability scales as a superior direct forecasting approach for purchasing behavior. In this paper we extend the application to evaluation research, examining the impact of a Government financial assistance payment on the future uptake of paid work by assistance recipients. Such an application is extremely useful as social and Government interventions have experimental design constraints that rule out the use of control groups and test markets.

We use longitudinal data that covers 835 respondents, each interviewed three times over the course of four years. At each interview the Juster Scale was used to create a benchmark for respondents' likelihood of taking up paid work in the next year. We then examined the impact of a reduction in the Government financial assistance and life changes on this work estimate. The research identified scenarios that would have the biggest impact upon behaviors relevant to payments, making it possible to gauge the importance of the payment to the family without having to change it.

As a longitudinal study, we were able to assess the accuracy of the Juster Scale benchmarks in predicting aggregate and individual future behaviors. This is unusual for research on the Juster Scale, as most is not conducted over time with the same respondents. We suggest that the Juster Scale can be used to assess the relative merits of possible initiatives without the need for test markets.

Combining self-explicated reference prices with stated purchase probabilities to understand price-demand effects for a new product

Erica Riebe, John Dawes, Michelle Tustin

Marketing Science Centre, Adelaide, Australia

An important task for planning new products is to estimate likely demand. Associated with this task is the need to determine the price that will generate an acceptable level of demand, as well as appropriate profit margins for the company. There are a plethora of texts and papers that address how to forecast sales and set prices for new products. In this study, using a proposed new consumer product, we focus on one method - consumer surveys, and one tool - the well known Juster / Verbal Probability Scale. Our contribution is to integrate the Juster scale method of predicting demand with two important issues in consumer behavior: the notion of consumer \'reference prices\'; and the well accepted asymmetry between consumer 'gains' (from lower than expected prices) and \'losses\' (from higher than expected prices) derived from Kahneman and Tversky's Prospect Theory.

We test the impact of reference price levels using two consumer surveys. In each case, self-stated purchase probabilities were elicited at both a nominated reference price. Then further probabilities were obtained for manipulated departures from it. We find that (1) changes to reference prices have a strong impact on stated purchase probabilities; (2) higher than expected prices impact on purchase probability more than lower than expected prices, consistent with Prospect Theory; and (3) stated probabilities of purchase at a specific price point are strongly related to the initial reference price given.

The managerial implications are that understanding consumers' reference price is important. If the launch price is higher than the reference price, sales volume will suffer. If the launch price is lower than the reference price, sales will not be much greater than what they might have been if the product was launched at the reference price level. Therefore the idea that it is advisable to obtain information from consumers about the price they expect to pay for a new product is validated.

Will they stay or will they go? Improving predictions of brand loyalty

Nick Dannenberg, Byron Sharp

Marketing Science Centre, University of South Australia

Predicting future buying behavior has long been one of marketing's greatest challenges. Very limited success has been achieved in predicting individuals' future buying behavior. In this paper we examine the ability of probabilistic scales to predict future buying behavior at the individual level. Probabilistic measures of future behavior have performed well in providing aggregate level predictions of future behavior, showing greater predictive accuracy than attitudinal and intention scales. However, they are not typically used to provide individual level predictions and have been exposed to very limited testing in this area and thus this paper represents a novel application of probabilistic scales of future behavior. The aspect of buying behavior of interest is measuring loyalty. Specifically, we test the Verbal Probability Scale's ability to correctly predict future switching behavior. We do so in subscription markets where customers subscribe to one provider for a long period of time rather than holding a repertoire of brands (as in repeat-purchase markets, e.g. fast moving consumer goods). Thus, the switching behavior we are examining is non-repetitive future behavior which makes the task of prediction considerably more difficult.

We present the results of a longitudinal study examining the ability of the Verbal Probability Scale to correctly classify (predict) switchers and non-switchers. The verbal probability scale correctly classified 30% of the actual switchers 6 months before they switched. This 'hit rate' was achieved through targeting only 9% of the population. This is a considerable improvement over chance alone (which should have correctly classified only 9% of the switchers; an improvement of over 300%). And an improvement over intention scales which have previously reported correct classification rates comparable to the proportion of intenders in the population and therefore have not represented a real improvement over chance.

Email: Erica.Riebe@MarketingScienceCenter.com

TK1

Invited Session: A Practitioner View of Some Fundamental Issues in Business Forecasting

Tuesday, June 14th 9:05 – 10:25 a.m.   Room: Chula Vista

Chair: Michael Gilliland
          SAS

Fundamental Issues in Business Forecasting

The blind pursuit of forecast accuracy leads many organizations to huge costs (for consultants, systems, and staffing) and huge frustration – when the promised forecasting improvements fail to materialize. Glamorous new statistical methods, software products, and elaborate collaborative processes may yield no benefits if certain fundamental issues have not been properly addressed. This presentation examines several overlooked but important issues such as the definition of demand, what should be forecast, setting accuracy expectations, demand volatility, managing participant bias, and performance measurement.

Forecast Value Added

Traditional forecasting performance metrics such as MAPE tell you the magnitude of your forecast error. However, traditional metrics give no indication of what accuracy is reasonable to expect given the nature of your demand patterns, or how effective your process was at achieving your level of accuracy. "Forecast Value Added" (FVA) is defined as "the change in a performance metric (such as MAPE or bias) that can be attributed to a particular step or participant in the forecasting process." This presentation shows how to perform a rudimentary FVA analysis. The FVA approach has been applied at several companies to identify process activities that fail to improve the forecast – or may even be making it worse! FVA analysis allows a company to identify and eliminate non-value adding activities from their forecasting process, and thereby achieve better forecasts with less effort!

The Aphorisms of Business Forecasting

The presentation provides five aphorisms that characterize a new forecasting approach – focusing first on efficiency of the process, and then on improving accuracy. The aphorisms are:
- Forecasting is a huge waste of management time
- Forecast accuracy is determined more by the nature of the pattern being forecast, than by the specific technique used to forecast it
- Organizational policies and politics can have significant impact on forecasting effectiveness
- You may not be able to control the accuracy you achieve, but you can control the process uses and the resources you invest
- The surest way to get a better forecast is to make the demand forecastable.

Michael Gilliland is Marketing Strategist–Demand Forecasting at Marketmax, a division of SAS, where he develops forecasting solutions for retailers. He has worked in consumer products forecasting for over ten years, most recently as Director of Forecasting at Sara Lee Intimate Apparel. His prior experience includes three years of process design and system implementation consulting at Answer-think. Mike holds a Masters' degree in Philosophy and Mathematical Sciences from Johns Hopkins University. He has presented at numerous APICS, Institute of Business Forecasting, SAS User Group and Manugistics User Group conferences. Mike has published in Supply Chain Management Review, serves on the Advisory Board of the Institute of Business Forecasting and on the 2005 APICS International Conference Committee

Email: mike.gilliland@sas.com

TA2

Invited Panel Session: Presidential Election Forecasting I
Tuesday, June 14th 10:40 am to 12:00 am   Room: Live Oak

Chair: Randall J. Jones, Jr.
Professor, University of Central Oklahoma

Roundtable on Ray Fair's Presidential Vote Equation

Ray Fair responds to critiques and evaluations of his presidential elections forecasting model.

Participants:

Ray Fair
Professor of Economics, Yale University

James E. Campbell
Professor of Political Science, University of Buffalo

Alfred G. Cuzán
Professor of Political Science, University of West Florida

Richard Gleisner
Professor of Economics, St. Cloud State University

Joe Stone
Professor of Economics and Dean of the College of Arts and Sciences, University of Oregon

Email: ranjones@ucok.edu

TB2

Contributed Session: Seasonality I

Tuesday, June 14th 10:40 am to 12:00 am   Room: Directors

Chair: Jose J. Gallego
       Universidad de Cantabria, Santander, Spain

All causes and periodicities in Portugal in the period 1980 - 2000

Emanuel E. Rodrigues, Paulo P. Nogueira
       Observatory of Health Portugal, Lisbon, Portugal

Several studies point out the existence of periodicities/seasonality on mortality data. This paper presents results, from a systematic application of standard spectral decomposition methodology, on Portuguese all causes mortality data, globally, by sex, by age group, by age group and sex, for three different time periods; (1) 1980-2000; (2) 1981-1990; (3) 1991-2000. METHODOLOGY: For each data series linear trend was removed when present. Data analysis was done, calculating the Shusters' period-gram, and statistical significance was obtained applying Priestley's test. RESULTS: This work allows some global conclusions on the evolution of mortality in Portugal between 1980 and 2000. Several periodicities were found that call out for ready interventions (7 day period on males 15-24 age group); new insights (disappearance of neo-natal mortality periodicity and new patterns on women aged 45-54).

Building blocks for ARIMA and structural seasonal time series models

Jose J. Gallego
       Universidad de Cantabria, Santander, Spain

Compare the statistical properties of several building blocks for ARIMA and structural seasonal time series models. These buildings blocks clearly highlight the similarities and differences between these two representations, and the implications on forecasting and seasonal unit root tests. Some case studies are presented.

Group Seasonal Indices Methods vs. Individual Seasonal Indices Method

John Boylan
Buckinghamshire Chilterns University College, Chalfont St. Giles, UK

Huijing Chen
London, UK

Traditionally seasonality is estimated from the individual series. However, for a product family or a certain stock keeping unit (SKU) stored at different locations, estimating seasonality from the group may produce better estimates and improve forecasting accuracy. Two group seasonal indices (GSI) methods have been proposed in the literature: one by Dalhart (1974) and one by Withycombe (1989). Both are compared with the individual seasonal indices (ISI) method. A rule is established to decide under what conditions a GSI method is better than the ISI method.

Theory presented at previous conferences has been fully tested on empirical data of 218 series. Mean squared error (MSE), mean absolute error (MAD) and symmetric mean absolute percentage error (sMAPE) are used as error measures. In general, the theoretical rule is validated. Other issues such as the effect of forecasting origins and horizons on forecasting accuracy of these different methods are also discussed.

Email: h.chen@londonmet.ac.uk; jboyla01@bcuc.ac.uk

TC2

Invited Session: Use of Improper Forecasting Models

Tuesday, June 14th 10:40 am to 12:00 am   Room: Pecan

Chair: Geoff Allen
    University of Massachusetts

Improper forecasting models-Do sophisticated econometric methods produce better forecasts?

Jason Dana, Robyn Dawes
        Department of Social and Decision Sciences, Carnegie Mellon University

We discuss the efficiency of improper (i.e. biased, inconsistent, and almost always wrong) forecasting models. Common examples of improper models for cross-sectional data include using as coefficients equal weights or zero order correlations with the criterion. While in the limit these models incur more loss than econometric models, in "real" problems with finite samples and ill-conditioned data matrices they may make better forecasts than optimized models. We demonstrate analytically why and under what conditions this result occurs, showing that improper models are another case of introducing bias to improve efficiency. Based on the concepts behind improper linear models in cross-sectional contexts, we demonstrate extensions to time series data.

The results point to the conclusion that we often do not need sophisticated econometric models for messy forecasting problems. This conclusion speaks more broadly to the issue of the fit between the precision of our models and the precision of our measurements in social sciences. There simply isn't a need for sophisticated and precise models when our measurements are so flawed. We must learn to, as Einhorn argues, "accept error to make less error" and use models that are wrong but robust.

Panelists:

Roy A. Batchelor
        Cass Business School, City of London University

Rob J. Hyndman
        Dept. Economics and Business Statistics, Monash University

J. Keith Ord
        McDonough School of Busines, Georgetown University

Email: jdd@andrew.cmu.edu; rd1b@andrew.cmu.edu

TD2

Contributed Session: Forecasting international inflation and exchange rates
Tuesday, June 14th 10:40 am to 12:00 am   Room: Pecos

Chair: Richard H. Cohen
       University of Alaska, Anchorage, AK, USA

Analysis of Core Inflation Indicators in Ukraine

Mykyta Mykhaylychenko
       CASE, Ukraine Kyiv, Ukraine

Przemyslaw Wozniak
       CASE, Warsaw, Poland

How to filter out transitory noise out of price data and construct a measure that can serve as an appropriate guideline for monetary authorities? This paper aims to shed some light on the answer to this complex question in the context of Ukrainian inflation data.

In this paper we analyzed a sizeable population of core inflation indicators for Ukraine and evaluated them according to standard criteria postulated in the literature. The investigated population included not only all the statistical methods that are used among central bankers but also some new or modified ones that have not been formalized before, but contain elements of the previously applied approaches (such as means trimmed according to price stability). Due to full parametrization of the methodologies, we obtained a population of 15706 series that can be considered comprehensive and complete when it comes to statistically calculated core series. The final choices of the best series made using a set of 3 criteria: (i) Unbiasedness, Attraction and exogenity; (ii) Deviation from the trend; (iii) Stability.

The authors wish to thank CASE – Center for Social and Economic Research (Warsaw, Poland) and CASE Ukraine for their encouragement and support to attend ISF2005.

Forecasting inflation in the EURO areas using monthly Time-series models and quarterly econometric models

Rebeca Albacete, Antoni Espasa

Departamento de Estadística, Universidad Carlos III de Madrid, email:

Economic agents and financial authorities require frequent updates to a path of accurate inflation forecasts and need forecasts to include an explanation of the factors by which they are determined. This paper studies how to approach this need, developing a method for analyzing inflation in the euro area, measured according to HICP. Time-series models using the most recent information on prices and an important functional and geographically disaggregation can provide monthly forecasts which are reasonably accurate, but they do not provide an explanation of the factors by which the forecast is determined. In this respect, it is important to enlarge the data set used considering explanatory variables and build congruent econometric models including variables which, following previous works by D. Hendry, capture disequilibria on different markets, goods and services, labour, monetary and international. The final result of this work shows that combining the forecasts from a monthly time series vector model, constructed on price subindexes from a disaggregation of the HICP by countries and sectors, with the forecasts derived from a quarterly econometric vector model on aggregate inflation and other economic variables, very accurate forecasts are obtained. Both vector models are specified including empirical cointegration restrictions, which in the first case capture the constraints necessary present between the trends of the price subindexes and in the second approximate the long-run restrictions postulated by economic theory.

Rationality, Heterogeneity and Learning in Foreign Exchange Survey Forecasts

Richard H. Cohen

University of Alaska, Anchorage, USA

Carl S. Bonham

University of Hawaii-Manoa, Honolulu, USA

This paper examines the diversity of industry-level survey forecasts of the yen-dollar exchange rate collected by the Japan Center for International Finance. Specifically, we
test for individual unbiasedness, micro-homogeneity, and forecast accuracy. In our systems estimation and testing, we use an innovative GMM technique (Bonham and Cohen, (2001))that allows for forecaster cross-correlation due to the existence of common shocks and/or herd effects. Micro-homogeneity test results for correct unbiasedness specifications are uniformly negative. There does not, however, appear to be a close relationship between patterns of individual deviations from unbiasedness and micro-homogeneity test results. Because of the demonstrated heterogeneity of the industry groups, we develop and test a variety of models of the forecast generating process, at the individual level and for different forecast horizons. We show that nearly all conventional (single process) as well as mixed (e.g., chartist-fundamentalist) expectational mechanisms fail a battery of specification tests. We
employ the Bai-Perron (1998, 2003) technique to show that virtually all models (even the most complicated mixed mechanisms) are characterized by structural breaks in coefficients that do not appear to be related to different exchange rate regimes. We conclude that expectation formation processes should be modeled as truly dynamic, rather than time independent.

Email: afrc2@cbpp.uaa.alaska.edu; bonham@hawaii.edu

TE2

Invited Session: Forecast Support Systems

Tuesday, June 14th 10:40 am to 12:00 am   Room: Llano

Chair: Marcus O' Connor
     The University of Sydney, New South Wales, Australia

Why Bad Forecasting Support Systems are Bought and Sold

Michael Leonard
     SAS Institute Inc., Cary, USA

Many forecasting support systems do not enable the practice of sound forecasting principles. As might be expected, the lack of adherence to forecasting principles results in large out-of-sample prediction errors for the organization that use these systems. Despite this obvious flaw, the software vendors that make such bad software are often successful in selling their software to willing buyers for large profits. Many members of the professional forecasting community place too much reliance on software vendors to diffuse forecasting principles. In the current marketplace, creating software that enables the practice of sound forecasting principles does not lead to software sales. The professional forecasting community needs to help software vendors who try to diffuse sound forecasting principles. This paper describes some of the software marketplace dynamics involved with the buying and selling of forecasting support systems.

Implementing A Forecast Support System For Health Care Management

Mark Van Den Hende, Hans Levenbach
     Delphus Inc., Morristown, NJ, USA

The health care industry has at its disposal extremely large repositories of data that are available for large-scale data mining, modeling and forecasting applications. In this paper we describe an implementation of an FSS for hospital management applications in New York State. The system allows hospital-planning organizations to forecast trend and seasonal patterns (patient counts, length of stay, etc.) and performance (costs, market share, etc.) in their marketplace. A hospital's marketplace is defined by geographical areas where the hospital draws most of its patients. The presentation describes the forecast data requirements, data modeling, and applications along with implementation issues and lessons learned, working with very large datasets.

A Comparison of Software Designers and Users Perceptions of the Development and Use of Forecasting Software in UK

Stavros Asimakopoulos, Robert Fildes, Nikolopoulos Konstantinos
Lancaster University Management School, Lancaster, United Kingdom

The growing importance of forecasting software, used by organizations to support supply chain and demand, demonstrates the need to investigate the design and use of such systems. Most research in forecasting has focused on the enhancement of statistical methods available in the software packages, whereas software designers and users' perceptions of forecasting software development and use are rarely considered. The grounded theory development approach (Glaser & Strauss, 1967, Strauss & Gorbin, 1998) is a process whereby theory is derived from data, systematically gathered and analyzed through the research process. Thus, grounded theory may be able to offer insights and a better understanding of under researched phenomena. Semi-structured interviews were conducted with two software designers and three users of forecasting software in order to provide insights into the dynamics of software development and actual use. Preliminary analysis of the interviews revealed insights into users and software designers' common perspectives on forecasting software development and use, and also important areas of disagreement where users' priorities did not match those of the designer.

Supporting the Incorporation of Event Information through a FSS

Marcus O' Connor
The University of Sydney, New South Wales, Australia

In many practical product forecasting environments, there is a significant amount of event information (non time series) that is of great relevance to the forecasting task. For example, knowledge of a severe raw material shortage may provide a strong reason to explain some of the past behavior of the time series. Statistical approaches to forecasting typically ignore such event information. This paper describes a FSS designed to help people assess such information and to improve the accuracy of their forecasts. It also examines the utility of combining statistical and judgmental forecasts (where the latter have used the FSS).

Email: M.Oconnor@econ.usyd.edu.au

TF2

Contributed Session: Neural Networks Competition I

Tuesday, June 14th 10:40 am to 12:00 am   Room: Blanco

Chair: Sven F. Crone
      Lancaster University Management School, Centre for Forecasting, Lancaster, UK

The ISF2005 Neural Network Forecasting Competition - 25 Years of Progress in Forecasting?

Sven F. Crone
      Lancaster University Management School, Centre for Forecasting, Lancaster, UK

The silver anniversary conference theme of "25 years of progress in forecasting" calls for a reflection on the progress in forecasting with neural networks. Despite over 15 years of research and over 2000 publications on neural forecasting since their resurgence in 1986, they are not an established forecasting method in practice. This is often attributed to the heuristic and often ad-hoc modeling process and the large degrees of freedom, questioning the validity, reliability and robustness of their application. However, the heuristic decisions guiding the modeling is rarely documented in publications. Therefore we seek to encourage the dissemination of implicit knowledge through demonstrations of current "best practices" through a forecasting competition on two historical datasets. We invited submissions for a forecasting competition of two trend-seasonal time series, one being the well researched airline passenger dataset to serve as benchmark for improvements over time, the second being an unknown time series form the M3-competiton in order to assure consistency of the modeling approaches across different datasets. The results of the competition are presented and evaluated, prior to a presentation of the different submitted approaches.

Time Series Prediction with Focused Time Lagged Feed-Forward Network

Sandro S. Camargo, Paulo M. Engel
      Federal University of Rio Grande do Sul, Porto Alegre – RS, Brazil

The real world problems are generally described by non-linear and chaotic processes which make them hard to model and predict. The time series prediction is a most complex task, because the time must be represented in the model. In our model for time series prediction we have done an implicit transformation of one-dimensional time vector into an n-dimensional spatial vector.
We have used a focused TLFN (Time Lagged Feed-Forward Network) to make the predictions for airlines and unknown datasets. Focused TLFN could learn the pattern and could generalize the knowledge to make a stable prediction to airlines dataset. In the unknown dataset, the pattern was learned, but the prediction was very unstable.

Time series forecasting competition: A multi-network approach

Rohit Dhawan, Marcus O'Connor
The University of Sydney, Sydney, Australia

In this study involving two sample data sets, we a multi-network approach to investigate how to effectively model the series' to make n-step ahead predictions. Whether it is one or n points, results show that it is usually best to limit the neural network to make only one lead prediction. The most effective methodology seems to be to train n neural networks to predict n points into the future. Standard backpropagation technique is used. With respect to preprocessing, we observe that detrending and deseasonalisation of the data series produce better results. The training set is used to estimate the parameters and the validation set is used to select the best model among all models. The architectures of the neural networks are similar and the network parameters are estimated using both, experimentation and theory. To prevent getting trapped in local minima, we train the networks multiple times with initial random weights. In order to achieve the global minimum, an adaptive learning parameter is employed. The above approach seems to produce the best possible results when benchmarked against other traditional neural network and statistical models.

Forecasting Competition Methodology

Aniruddha G. Pant, Balaji Raman
Tata Consultancy Services, Pune, India

Many widely cited publications have demonstrated that neural networks and linear time series models like ARIMA give satisfactory forecasting results for datasets with seasonality. We are incorporating a learning technique called Support Vector Regression (SVR), pioneered by Vapnik in 1995. It uses Mercer's kernels to transform the input data to a higher dimensional feature space. In this feature space it becomes a problem of linear regression and it is easy to develop an optimal decision surface.

We have used ARIMA and SVR to model the given datasets. Airline dataset contains yearly seasonality with an increasing volatility and trend. To stabilize the volatility, we have used the log transformation. We further transformed the data using a twelve-order differencing followed by a single-order differencing. Other trend removal techniques such as subtracting a twelve-order lagging moving average and the Hodrick-Prescott decomposition were also tried. In general, we found that SVR predictions perform better than ARIMA predictions. To improve the forecasts further, the average of the forecasts from various methods mentioned above is also given as an attribute to the SVR model. We plan to use similar approach for the 'unknown' dataset as well.

Email: s.crone@lancaster.ac.uk

TG2

Contributed Session: Short-term forecasts

Tuesday, June 14th 10:30 am to 12:00 am   Room: Nueces

Chair: Ullrich Heilemann
        Universit Št Leipzig, Germany

Short-term forecasts of euro area real GDP growth: an assessment of real-time performance based on vintage data

Frauke Skudelny, Marie Diron
        European Central Bank, Frankfurt am Main, Germany

Short-term forecasts of GDP growth based on monthly indicators are commonly used by practitioners. Various studies for the euro area have provided a partial assessment of the reliability of these forecasts, based on so-called pseudo real-time exercises. These exercises mimic the real-time situation of schedule of releases and thereby availability of monthly indicators. However, they are not genuine real-time assessments to the extent that they use current estimates of GDP and the monthly indicators, i.e. post revisions to the series. Assessing the impact of data revisions on the reliability of short-term forecasts is essential since policy makers and businesses need to interpret the forecasts and use them before data revisions become available. This paper aims at bridging this gap in the literature. Using data vintages, the paper provides estimates of forecast errors for euro area real GDP growth. It documents the relative roles of the three sources of forecast errors: differences between real GDP growth and the estimated relationship(s) with monthly variables; erroneous assumptions on the monthly indicators over the forecast period; and revisions in monthly indicators and GDP. This assessment provides guidance to practitioners about where further effort to improve the overall reliability of short-term forecasts should be concentrated.

Forecasting asset returns and volatility using realized volatility Ð the case of grain futures

Jae H. Kim
        Monash University, Melbourne, Australia

Chris Doucouliagos
        Deakin University, Melbourne, Australia

The aim of this paper is to use realized volatility to generate interval forecasts for daily return and volatility of grain future prices. We consider three alternative realized volatility estimation methods: one based on the sum of squared intra-day returns (Andersen et al., 2004) and two others based on the power and bipower variations of intra-day returns (Bardorff-Nielsen and Shepherd, 2004). We consider 5-minute intra-day returns from future prices of five grains (the soybean oil, corn, soybean meal, soybean and wheat) from 1 August 1982 to 30 October 2004.

Following Andersen et al. (2003), we fit (heterogenous) autoregressive models to realized volatility estimates and generate forecasts for the future volatility. Based on these forecasts, we generate interval forecasts for daily returns, following Granger et al. (1989). The adequacy of these interval forecasts is examined using the tests proposed by Christoffersen (1998) and Clements and Taylor (2003). We also generate interval forecasts for daily volatility using the bootstrap method.

How low can we go? Limits of accuracy of macroeconomic short term forecasts

Ullrich Heilemann
Universit St. Leipzig, Leipzig, Germany

The discontent with the accuracy of macroeconomic forecasts is old and widespread. Just as frustrating is the fact that over the last 40 years accuracy has not improved (Zarnowitz 1992, Heilemann, Stekler 2003), despite vast investments to improve it. This raises the question whether we have already reached a level of accuracy that can not be augmented. This paper aims at determining upper boundaries of accuracy (error minima) for German macroeconomic forecasts. The study is based on simulations with the RWI-model, a medium sized macro-econometric model for the FRG in steady use for more than 30 years. A first upper limit of accuracy is marked by the accuracy of predetermined variables and outside stability of model relationships. Further limits are found by a decomposition of model forecast errors into equation errors, model errors, and errors of dynamics. For forecasts of growth and inflation the model simulations suggest that (1) present forecast errors do not have much potential for improvement; (2) most of this potential lies on the level of the single equations.

Email: Heilemann@wifa.uni-Leipzig.de

TH2

Contributed Session: Marketing Issues

Tuesday, June 14th 10:30 am to 12:00 am   Room: Frio

Chair: Wendy Moe
         University of Maryland, College Park, USA

Forecasting the Impact of Product Experiences and Expectation Fulfillment in Launching New Products

Con C. Korkofingas
         Macquarie University, Sydney, Australia

One of the most difficult tasks facing a marketer considering launching new products into the market is adequately forecasting key decision making inputs such as first trial and re-purchase rates and timing of first purchase for consumers.

Test marketing provides a tool to predict the key inputs above. Some test markets provide limited experimental scenarios where the impact of altering various product feature options or marketing mix possibilities is explored. However, this type of experimentation is limited and does not systematically link initial product expectations, actual product experiences and future behaviors in an appropriate experimental design.

This paper is concerned with modeling linkages between product expectations, product experiences and future choices. The paper uses a stated choice approach based on an underlying expected utility analysis and a two stage design to systematically vary initial product expectations and product experiences. The impacts of product experiences given expectations are assessed using a stated choice of re-purchase on the next purchase occasion.

Delivered Pizza services are used in the paper to model the connection between initial product expectations, actual product experiences and future choices. The paper examines additionally the impact of catastrophic product experiences on the first purchase on probabilities of initial re-purchase.

Predicting Box Office Revenues for Motion Picture Sequels

Ragnar Lesch
         San Francisco, USA

We present in this paper ideas to tackle the problem of analyzing and forecasting box office revenue and profitability prior to release for the subset of movie sequels shows in the US during the last three decades.

We investigate first the target distributions of total gross revenues and of profits using various distribution models such as the Stable Paretian distribution as well as a Gaussian mixture model.

Furthermore, we analyze the correlation between the target quantities and various input parameters such as the genre, the MPAA certificate, the history of the involved actors, directors and producers. Finally, we discuss a model to predict the target quantities.

Forecasting the Risk of Branding Alliances in Multiple Sectors

Nathan A. Heller
Arizona State University

While branding is a subject given much attention in marketing research, there is little written regarding the risk that is involved with different co-branding or brand alliance strategies. This paper reviews the literature on branding to explicate the concepts of branding, strategic branding and co-branding, including the value of creating a brand. Answering the question, in what ways does developing and promoting a brand constitute promises regarding the product or service? Following is a discussion regarding the multiple types of brand alliances as discussed in the current literature, Cooke & Ryan proposed that there are two types of brand alliances.

They proposed that forms of brand alliances range along a continuum from reputation based efforts, which revolve around abstract or symbolic characteristics of the brand to those which are based on product related or functional brand attributes and which involve a physical combination of resources. The opposing ends of this continuum reflect the strategic objectives and nature of these different forms of alliances: reputation endorsement and collaboration on core competencies. This view of brand alliances mirrors the perspective developed in the literature that brand alliances range from publicity based agreements to alliances involving co-operation further along the value chain in co-product development and/or commercialization.

Based on this framework this paper will examine the risk involved in reputational types of brand alliances in multiple industries and sectors. The research design provides results for multiple combinations of both positively and negatively perceived brands, across different types of organizations. The results are outlined in a data set that can be used to forecast potential outcomes for brand alliances, including the forecasting of potential risks. The forecasting of potential results is in the format of a consumer rating of the likelihood of purchase. These results are reported in two formats. The first is a statistical analysis of the quasi-experimental design. The second is a matrix that can be used as a tool to forecast potential risk and reward for each type of brand alliance measured in the design.

Pre-launch forecasting based on advanced purchasing

Wendy Moe
University of Maryland, College Park, MD, USA

Peter Fader
University of Pennsylvania, Philadelphia, PA, USA

A model that forecasts product sales prior to the actual launch of a product can be a very important tool for managers in making key launch decisions. Previous research that develops such prelaunch models focus on simulating futuristic environments or creating artificially controlled experimental environments in which to solicit consumer feedback. Though these efforts have make great strides toward developing new forecasting methods, the reliability is limited by the realism of the simulated or controlled environment as well as biases resulting from consumer self-report. Empirical forecasting techniques based on observed sales data have also been developed but, until now, have only been able to provide early forecasts based on initial sales, not prelaunch forecasts. Here, I will discuss two papers that develop prelaunch forecasting models for advance purchase data. In one case, purchase orders are collected prior to the actually launch of the product. This data is leveraged to project the pattern of post-launch sales. In a second case, advanced purchasing for tickets to a live event is modeled, and forecasts based on early ticket sales are obtained well in advance of the event, providing the opportunity for event marketers to adjust capacity, pricing, and marketing strategies.

Email: wmoe@rhsmith.umd.edu; fader@wharton.upenn.edu

TI2

Contributed Session: Discontinuities in Time series

Tuesday, June 14th 10:30 am to 12:00 am   Room: Mesquite

Chair: Eric Hillebrand
    LSU Dept of Economics, Baton Rouge, USA

Estimating Single-factor Jump Diffusion Interest Rate models

Ghulam Surwar
    Nottingham University, Nottingham, UK

Recent empirical studies have demonstrated that behavior of interest rate processes can be better explained if standard diffusion processes are augmented with jumps in the interest rate process. In this paper we examine the performance of both linear and non-linear one factor CKLS model in the presence of jumps. We conclude that empirical features of interest rates not captured by standard diffusion processes are captured by models with jumps and that the linear CKLS model provides sufficient explanation of the data.

Forecasting Business Cycle and Convergence in the European Union

Jose Luis J. Cendejas, Juan J. Hoyo
    Universidad Autonoma de Madrid, Madrid, Spain

In spite of the fact that business cycle and long run economic growth are both present in economic variables, relatively few papers have analyzed in an integrated manner both kinds of dynamics. The same applies when considering the international dimension of business cycle and the convergence between economies. In this paper we model and analyze the common cyclical components and the convergence processes in several real variables (GDP, per capita GDP, productivity, unemployment rates) and financial variables of the European Union economies. The presence of both common cycles and convergence is potentially important to obtain improvements in the forecasting performance compared to univariate models that ignore such common dynamics. Additionally, taking into account some breaks in the parameters (e.g. fixing of euro-parities in '98) can affect forecasting ability. The methodology based on multivariate unobserved component models which are estimated by applying the Kalman filter.

Neglecting Parameter Changes in Autoregressive Models

Eric Hillebrand
    LSU Dept Economics, Baton Rouge, USA

We study situations in which autoregressive models are estimated on time-series that contain switches in the data generating parameters that are not accounted for. The geometry of this estimation problem causes estimated vector autoregressive models to display a unit eigen-value and the sum of the estimated autoregressive parameters of ARMA and GARCH models to be close to one. This is a confounding factor in the analysis of persistence. If changes in parameters that affect the mean cannot be ruled out, autoregressive models are an inadequate research tool to capture the dynamics of the series. Data must be analyzed for possible change-points before the sample period for an autoregressive model can be specified.

Email: erhil@lsu.edu

TJ2

Contributed Session: Climate and Environment

Tuesday, June 14th 10:30 am to 12:00 am   Room: Chula Vista Boardroom

Chair: Steve A. Reames
     Angelo State University

Forecasting the Outbreak of Moorland Wild Fires

Jonathan Aylen
     PREST, University of Manchester, England

Julia McMorrow
     School of Environment and Development, University of Manchester, England

Gina Cavan
     CURE, University of Manchester, England

Kevin Albertson
     Department of Economics, Manchester Metropolitan University, MANCHESTER, England

This research is part of project to assess the impact of climate change on the visitor economy of north-west England. Warmer, drier summers pose a threat of increased frequency of wild fires on the moorland of Derbyshire. These fires are costly to fight, damage the eco-system and cause erosion scars. Risk of fires may cause the moors to be closed to public access.

The precise impact of weather and human activity is established in order to forecast the effect of changing climate and tourism numbers upon the prevalence of wild fires and to assess the efficiency of existing short-run prediction models based on meteorological considerations.

This paper reports development of non-linear probability models to assess the chance of fires at different times of the year, different days of the week and under various weather conditions and habitats. The number and size of fires are also forecast. The model combines geographical evaluation and time series modeling in novel ways. Potential biases in the likelihood of reporting, in the spatial distribution of fires and measurement of fire size are discussed along with modeling of seasonality in the data. Models developed have wider applications in forecasting similar spatially distributed hazards.

Forecasting Change - A sampling and estimation strategy for agricultural systems utilizing aerial videography

Steve A. Reames, Rod Reed
    Angelo State University – San Angelo, USA

Cecil Hallum
    Sam Houston State University - Huntsville, Texas, USA

There is currently no effective tool available to quickly and economically measure a change in landmass in the setting of environmental specialists. The purpose of this paper is to forecast and demonstrate a statistical change-detection method using remotely sensed data that large area estimation of various water uses and an associated temporal change assessment in agricultural systems with control over the estimation and change assessment accuracy and reliability.

The approach makes use of aircraft videography, still images, and state-of-the-art SAS analytics software for sampling in arriving at a cost-effective and timely method (e.g., one day by one person) for conducting large area estimation of various water uses and an associated temporal change assessment in agricultural systems. A recent experiment by the collaborators has been highly encouraging by utilizing aircraft-based videography and still image capability. A $73,000 grant provided by the United States Department of Agriculture (USDA Rio Grande Valley #2004-06737/Reed-Reames) provided a proof of concept for this methodology. Older studies conducted by co-collaborator, Dr. Hallum (Hallum, 1997) over the Sam Houston National Forest and the second experiment was conducted by co-collaborator, Dr. Reames (2002) that demonstrated a change-detection method using aircraft-based, remotely sensed data (aerial videography) that assigned quantitative "severities" of change to landscape canopies and land cover types at the pixel level.

A two-stage sampling and aggregation approach takes advantage of the accuracy of the labeling that can be achieved with the use of low-altitude aircraft videography and still images   The aerial videography and still images, in conjunction with SAS analytics software generated sample survey methods, provide remote sensing personnel an economical means to arrive at more accurate and timely estimates of the extent of and changes to various water uses, vegetative canopies, and associated temporal change assessment in agricultural systems

Email: sreames@angelo.edu

TK2

Invited Session: Time Series Analysis - Prediction Bounds
Tuesday, June 14th 10:40 am to 12:00 pm   Room: Chula Vista

Chair: Manuela M. Oliveira
        Universidade de Evora

Forecasting European Union Economics

Manuela M. Oliveira
        Universidade de Evora

Joao T. Mexia
        Universidade Nova de Lisboa,

Classification and Regression trees are used to group the European Union country members into large and small countries. The evolution of the countries in these groups, after admission in EU, is studied using Dual STATIS and PLS methods. This last method is used to obtain forecasts for relevant social and economics variables. The models derived from Dual STATIS and PLS methods are validated through statistical tests instead by empirical criteria.

Prediction bounds for maximum claims

Pedro Corte Real
        New University of Lisbon

Carlos A. Coelho
        Instituto Superior de Agronomia, Lisbon

Prediction bounds for the maximum claim are obtained and their geometry is studied. These bounds will be based on exact and limit distributions recently obtained, see Mexia and Corte Real (2005). The case in which excedances have generalized Pareto distributions is considered. An application to real data is presented.

Prediction Bounds for Quantiles in Nested Two-Way Random Models

Miguel Fonseca
New University of Lisbon, Portugal

Thomas Mathew
University of Maryland Baltimore County

Roman Zmylony
University of Zielona Góra, Poland

For the balanced two-way nested random model tolerance intervals are obtained using generalized test variables. These variables are then used to derive prediction bands for quantiles. The efficiency of this approach is assessed through Monte Carlo methods.

Forecasting based on Stochastic Vortices, Applications to Insurance

Ines Jorge Sequeira, Gracinda Rita Guerreiro, João Tiago Mexia
Department of Mathematics, FCT- New University of Lisbon, Portugal

In the Stochastic Vortices model, it is shown how to describe the structure of open populations using finite Markov Chains with one recurrent class. The model applies to populations divided into sub-populations which will correspond to the transient states of the Markov chain, assumed to communicate. Conditions for stability are obtained and are used to carry out predictions. Applications are given to Bonus Malus systems in automobile insurance and to Social Security responsibilities with permanent disability.

Email: mmo@uevora.pt

TA3

Invited Session: Prediction Markets-Forecasting Elections

Tuesday, June 14th 1:00 pm to 2:20 pm   Room: Live Oak

Chair: Justin Wolfers
        Wharton School University of Pennsylvania

Speculative Attacks and Manipulation in Political Stock Markets

Paul Rhode, Koleman Strumpf
        University of North Carolina – Chapel Hill

Political stock markets have a long history in the US. Organist prediction markets for presidential elections have operated on Wall Street (WSM 1880-1944), the Iowa Electronic Market(IEM, 1988-2004),and Tradesports (2004). Such markets claim superior forecasting power to polls because they efficiently aggregate information. A counterclaim is that such markets may be subject to manipulation and speculative attacks. This paper investigates this issue using data from both historical and contemporary markets. First, we survey the activities of partisan participants in the WSM and examine the behavior in odds prices in the window of published charges of manipulation. Second, we report an experimental test of efficiency in the IEM for the 2000 presidential election. A series of large and random investments were made and resulting asset prices compared to various controls. While spurious interventions may cause large price changes and small arbitrage opportunities, such shifts appear transitory.

Predicting Electoral College Victory Probabilities from State Probability Data

Ray C. Fair
        Yale University

A method is proposed in this paper for predicting Electoral College victory probabilities from state probability data. A 'ranking' assumption about dependencies across states is made that greatly simplifies the analysis. The method is used to analyze state probability data from the Intrade political betting market. The Intrade prices of various contracts are quite close to what would be expected under the ranking assumption. Under the joint hypothesis that the Intrade price ranking is correct and the ranking assumption is correct, President Bush should not have won any state ranked below a state that he lost. He did not win any such state. The ranking assumption is also consistent with the fact that the two parties spent essentially nothing in most states in 2004.

Correlation vs. Causation in "Decision Markets" and the 2004 Elections

Justin Wolfers, Eric Zitzewitz
        Wharton School, University of Pennsylvania

Prediction markets can be used as an input to decision making, but as in other empirical research, care needs to be taken in distinguishing correlations from causation. For example, we find that a pre-election OLS analysis of the effect of Bush's reelection probability on equity prices would have overstated the relationship by almost an order of magnitude, since most of the relationship was driven by reverse and third-factor causality (i.e., a good market and economy helping Bush). Similar problems affect "Decision Markets", such as those that attempt to pick the best candidate by running markets in general election performance, conditional on being nominated. We outline three approaches for separating correlation from causation in these analyses: 1) traditional IV, 2) Instrumental events, and 3) running markets in "Prediction IV" securities.

Email: jwolfers@wharton.upenn.edu

TB3

Contributed Session: Energy Forecasting I

Tuesday, June 14th 1:00 pm to 2:20 pm   Room: Directors

**Chair: Eliane da Silva Christo
        Catholic University of Rio de Janeiro, Brazil**

A midway between hourly and daily models for electric load forecast

Jerome Collet, Jean-Sebastien Roy
        EDF R&D Division, Clamart, France

We address the issue of load forecasting with an hourly time step and a yearly horizon, for a stable set of temperature sensitive customers. Our variables are both continuous such as the temperature, and categorical, such as the day type. The dependency between load and the continuous variables is affected by the categorical variables (mostly the hour), which leads to building separate models for each combination of the categorical variables (typically at least a model per hour).

However, this approach leads to a huge number of parameters, most of which will be equal for different value of the categorical variables. Another choice is to forecast the daily load average, and use this forecast as an input of an hourly model with less categorical variables, an approach that will omit some of the dependency between the variables. Such mixed models are not easy to understand and maintain.

A last approach is to create a single model, with a variable dependency between parameters and categorical variables. For instance, the effect of low temperature could be dependent on the hour but not this of the high temperature. We present such a model, and show its effectiveness.

The Optimal Combination Of Forecasts Of Industrial Consumption Of Electrical Energy In The South Of Brazil.

Eder Daniel Corvalao, Robert W. Samohyl, Geibi P. Souza
        Universidade Federal de Santa Catarina (UFSC), Florianopolis, Brazil

The energy crisis that Brazil had to overcome in the middle of 2001 unleashed a series of programs for electrical energy rationing and the phenomenon called consumption rationalization in the southern most region of the country. The phenomenon was responsible for a change in the pattern of consumption behavior which up to then had been thought of as relatively fixed with respect to the consumption of electrical energy in the State of S. Catarina, thereby making forecasting studies for the sector even more useful and necessary.

This paper concentrates specifically on industrial consumption of electrical energy, 45% of total consumption in the State of S. Catarina, this series being recognized as the most difficult to predict. This article proposes the optimal combination of forecasts from different regression and univariate models using two different techniques: one based on a weighted average of forecasts and the other based on a regression equation. The paper shows that the use of techniques for combining different forecasts permits a substantial reduction in prediction error. In this article, the criteria applied to evaluate model fit are Mean Absolute Percentage Error (MAPE) and Theil's U statistic.

An econometric analysis of crude oil price differentials

Seyed Jazayeri, Aziz Yahyai
OPEC, Vienna, Austria

The differentials between light and heavy, and sweet and sour crude oil prices rose to record high levels in late 2004 and early 2005. This article first describes crude oil quality measurement standards. It then examines the 1994-2003 data to highlight the trend of the world oil production by quality and to explain some of the reasons behind the current wider than normal differentials. The limited spare capacity in crude oil production and the high capacity utilization rates in oil refineries and conversion facilities are too identified as factors contributing to the unusually high differentials. This article also studies historical crude oil price series and uses unit root tests to demonstrate that all of the price series are non-stationary, that the differentials are stationary in the long run, and that all of the crude oil prices are co-integrated and can be considered as elements of a unique pool of inter-related series, all moving basically in the same direction. The article also suggests that the current wide-range differentials provide an opportunity for investors, especially for OPEC members, to invest in new sophisticated refining and conversion facilities capable of processing heavy-sour crude.

Reactive Power Forecasting

Eliane da Silva Christo
ESC, Catholic University of Rio de Janeiro (PUC-Rio), Rio de Janeiro, Brazil

Reinaldo Castro Souza
RCS, Catholic University of Rio de Janeiro (PUC-Rio), Rio de Janeiro, Brazil

Many countries are restructuring your Electric Energy Sector in order to improve the efficiency of energy transmission. It is more usual to active power forecasting; moreover the reactive power forecasting has too technical and economic importance. According to this, the present work has as its purpose to introduce a new reactive power hourly forecast technique in the short run by substations using distributed lag of reactive and active powers.

The proposed model, called Robust Dynamic Regression is divided on two parts: On the first part, the data are classified through unsupervised neural network - Kohonen Self-Organizing Map. On the second part, on each cluster is used on hybrid regression model with two correcting: One of serial autocorrelation and other of heterocedasticity.

The reactive load forecast in the short run is divided in sample and out of sample. The out of sample forecast is applied to hourly period ahead. The results are compared with a conventional Dynamic Regression and with a supervised neural network Multilayers Perceptrons using an algorithm of error back-propagation.

Email: eliane@ele.puc-rio.br

TC3

Contributed Session: Analysis of Time series

Tuesday, June 14th 1:00 pm to 2:20 pm   Room: Pecan

Chair: Thomas R. Willemain
Rensselaer Polytechnic Institute

Optimal Prediction using the Autoregressive Conditional Duration Model with Asymmetric Loss

Matthew L. Higgins
Western Michigan University, Kalamazoo, USA

The Autoregressive Conditional Duration (ACD) model of Engle (1998) is useful for predicting the timing of events. Over predicting versus under predicting the waiting time for an event seldom have the same costs. In general, optimal predictors under asymmetric loss are rarely used because of the perceived analytical and numerical difficulties in obtaining them. In this paper, we present a simple procedure for finding the optimal one period ahead predictor in an ACD model with a general asymmetric power loss function. The conditional distribution in the ACD model is assumed to be Weibull. The optimal predictor is easily computed using standard statistical software. In financial markets, predicting the timing of interest rate movements can be as important as predicting the direction of interest rate movements. We apply the procedure to predicting with a quadratic/linear loss function the number of weeks until the U.S. Federal Reserve changes the Federal Funds Rate.

Measuring Macroeconomic News and Their Uncertainty using Kullback-Leibler Information

Kajal Lahiri, Fushang Liu, Terrence Kinal
University at Albany-SUNY, Albany, USA

ARCH-type models formulate forecast uncertainty as a function of past forecast errors, which measure new information about forecast uncertainty. In fixed target multi-period forecasts, however, forecast error is not very appropriate because forecasts for the same target are made repeatedly before the realization of the actual. Better measures of news can be derived in real time based on various information measures. We estimate macroeconomic news and their uncertainty using the Kullback-Leibler Information as the mean and variance of information gain respectively. This approach is applied to the SPF density forecasts data on inflation and real GDP growth. We examine the impact of news on volatility (uncertainty), an issue first raised by Engle and Ng (1993). Our panel data analysis shows that the effect of news on uncertainty is asymmetric but not persistent.

The Wavelet Bootstrap for Generation of Long-Memory Time Series, with Application to Option Pricing

Thomas R. Willemain, Aparna Gupta
Rensselaer Polytechnic Institute, Troy, NY, USA

Huaguang Feng
Trilegiant Corporation, Norwalk, CT, USA

Standard methods of option pricing assume short-memory returns in the underlying asset, but evidence suggests some assets have long-memory returns. We describe the use of a new bootstrap method, the wavelet bootstrap, that can generate scenarios consisting of sequences of either long-memory or short-memory returns. Simulations show that the wavelet bootstrap can be used to improve the accuracy of prices for path-dependent options.

Email: willet@rpi.edu

TD3

Invited Session: Panel on Conflict Forecasting
Tuesday, June 14th 1:00 pm to 2:20 pm   Room: Pecos

Chair: Kesten Green
         Monash University

How to accelerate adoption of superior conflict forecasting methods

Panelists:

Donald E. Brown
         University of Virginia, Charlottesville, VA

Shelley Kirkpatrick
         Homeland Security Institute

Allen Moulton
         MIT Sloan School of Management and Center for International Studies

Steven Rieber
         Kent Center for Analytic Tradecraft

Empirical research has led to the identification of methods for forecasting in conflicts that are superior to the current practice of using unaided judgment. Accurate forecasts of how people will behave in conflicts offer the prospect of better decisions. Adoption of superior practices can be slow, however. For example, it was 264 years after the discovery that lemons could be used to prevent scurvy that the British Merchant Marine changed their practices to take advantage of this knowledge. We think that improving conflict forecasting practice can and should be more rapid. Panelists will describe briefly their experiences in facilitating the adoption of superior methods and their thoughts on how best to achieve wider adoption. We will invite questions and suggestions from the audience.

Email: kesten@kestencgreen.com

TE3

Contributed Session: Forecasting Software in the UK and US

Tuesday, June 14th 1:00 pm to 2:20 pm   Room: Llano

Chair: Paul Goodwin
      University of Bath

An Interpretive Study of the Use of Forecasting Software in a UK Supply Chain Company

Paul Goodwin, Yee Lee Wing
      The Mgmt. School, Bath University, Bath, UK

Robert Fildes, Konstantinos Nikolopoulos, Stavros Asimakopoulos
      Department of Management Science, Lancaster University Management School, UK

Michael Lawrence
      School of Information Systems, Technology and Management, University of New South Wales, Sydney, Australia

A study of short-term forecasting in UK supply chain companies has revealed that some companies make minimal use of the facilities that are available in statistical forecasting software that they have purchased. Despite their costs, the software packages are often used for little more than data display and management judgment is the predominant element in the derivation of the forecasts. An in-depth interpretive study was conducted in one company to investigate the reasons for this. The interpretive approach focuses on the way people make sense of, or perceive, the world, both individually and through social interaction. Observations of the company's forecasting process and interviews with participants generated insights into the different perspectives and motivations that led to the purchase of the software and the subsequent under use of its statistical methods.

Twenty-five years of Forecasting Software

B. D. McCullough
      Drexel University, Philadelphia, USA

This paper surveys the evolution of forecasting software over the past twenty-five years, from just prior to the introduction of the IBM PC to the present. While the technological changes in software are rather obvious, these changes have increased the scope of forecasting problems for which software is available and fundamentally altered both forecasting research and the way that forecasting is done in practice.

Email: mnspg@bath.ac.uk

TF3

Contributed Session: Neural Networks Competition II

Tuesday, June 14th 1:00 pm to 2:20 pm   Room: Blanco

Chair: Sven F. Crone
   Lancaster University Management School, Centre for Forecasting, Lancaster, UK

An adaptive neural technique as tool for increasing the accuracy of financial forecasting

Iulian Nastac
   Polytechnic University of Bucharest, Bucharest, Romania

Mikael Collan, Barbro Back
   Abo Akademi University, IAMSR, Turku, Finland

The paper advances an original artificial intelligence based mechanism for specific economic predictions. The time series under discussion are inherently non-stationary; therefore the distribution of the time series changes over time. The algorithm establishes how a viable structure of an artificial neural network (ANN) at a previous moment of time could be retrained in an efficient manner, in order to support modifications of a complex input-output function of financial indices forecasting. A remembering process for the old knowledge achieved in the previous learning phase is used to enhance the accuracy of the predictions.

Time Series Forecasting by finite mixture of ARMA-GARCH

Chi Kui To, Sai Cheong Lui, Ka Chun Chan, Sing Wai Cheung
   The Chinese University of Hong Kong, Hong Kong, China

In the literature, Mixture of Expert (ME) is commonly used for general forecasting. However, we found that the time series is not considered in traditional ME. Using the ME as reference, we develop a new approach toward the goal called the finite mixture of ARMA-GARCH.
During which, each component is denoted as a normal ARMA series and the residual term is assumed Gaussian white noise with variance denoted by the (Generalized autoregressive conditional heteroscedasticity (GARCH). Moreover, we used generalized expectation maximization (GEM) algorithm to learn the model to yields prediction results.
To deal with the several days' prediction, our programs will keep learning during the prediction process. We purposed several methods on stimulating the error term of each prediction value and to be used to forecast the next result. On top of stimulating the error, we also tried different combinations of time series to predict the result. We experiment new approaches on general forecasting and stimulating error.

Neural network ensembles for robust forecasting

Weizhong Yan, Kai F Goebel, Xiao HU
GE Global Research Center, Niskayuna, USA

This paper introduces an ensemble of neural nets that performs robustly as measured by a number of metrics and addresses the specific nature of the data sets in questions. Specifically, the data sets are characterized by small, non-stationary training sets; the ratio of training vs. forecasting data set is small; and future input values are expected to be outside the bounds of the training set. To meet that challenge, we propose the use of a neural net ensemble where individual nets were designed to be diverse in both architecture and well as input strategies. A subset of neural net models was selected based on small error correlation. Each neural net was designed to meet metrics of small mean squared error in both training and test sets (the latter is a small set that was withheld from training), and that they meet two assumptions imposed on the forecast: 1) they must follow the global trend and 2) the values must meet expectations of non-negativity and not produce outliers (characterized by values > 2 sigma from the mean). The individual models include: a) feed-forward net with different inputs; b) Linear filter net; c) Recurrent net; d) Generalized regression net (GRNN); and e) ANFIS. Aggregation of the models was accomplished using simple averaging. The resulting output itself meets the metrics outlined above and is better than those from the individual models.

Multi-dimensional Nonlinear Regression

E. Thomas Lewicke
915 S. Kihei Rd., Kihei, HI 96753-9127, U. S.A.

The relationship between the value of the coefficient and the degree of fit can be described as a curved line for terms with a single constant, or a curved surface if there are multiple constants. Finding the point on the curved surface with the greatest statistical significance provides the values of the constants. Terms containing multiple constants allow the use of transcendental functions of variables in regression models. As any number of constants can be determined, terms such as trigonometric functions with a zero point and fixed, variable or cyclical cycle length, or exponential terms containing any function, constant or variable can be used. Various combinations of terms with multiple constants are also possible, such as sine waves with variable magnitudes.

This method allows the construction of equations that can describe past events very accurately and can hopefully forecast future behavior. Types of data that can be modeled using this method include economic, physical, financial, biological and images. This method also has applications in noise reduction/data smoothing and data compression.

Email: yan@crd.ge.com

TG3

Contributed Session: Judgmental and Scenario Forecasting

Tuesday, June 14th 1:00 pm to 2:20 pm   Room: Nueces

Chair: Marcus O'Connor
      University of Sydney, Australia

Extrapolating trends by hand

Konstantinos Nikolopoulos
    Lancaster University Management School - Lancaster, UK

Evangelos Skarogiannis, Stavroula Skylaki
    NTUA – Athens, Greece

Vassilis Assimakopoulos
    Ministry of Economics and Finance – Athens, Greece

The trend is arguably the most important component of a series. Successful estimation of the trend is the basis of any seasonal adjustment procedure, while accurate trend extrapolations are essential for medium to long-term time series forecasting. When it comes to lead times of two years or more, simple linear regression is a common option for extrapolating the trend. An interesting question is: can humans make better estimates and extrapolations of the trend just by drawing a line with their own hand? To address this question an experiment was run with a class of senior engineering undergraduates who were participating in a workshop on a "Forecasting Techniques" course. The students were provided with printouts of 20 yearly series from the M3 competition. Each series was drawn on a separate sheet of ruled graph paper and forecasts were required for horizons of up to 10 years ahead. The task was repeated twice: initially by "free" hand and the second time by using a provided ruler. The individual performance of each subject - as well as the group average- is compared with regression, trend-oriented exponential smoothing approaches, more advanced methods and various combinations of these approaches

Using judgment to combine forecasts produced by computers and people: Does source similarity matter?

Nigel Harvey, Clare Harries
    University College London, London, United Kingdom

In our first study, people received forecasts from two sources, one of which was more competent than the other. They were better able to learn to combine these forecasts when the source of one was a computer and that of the other was a person than when both forecasts were provided by computers or both were provided by people. Thus source discriminability helped people remember which was the better forecaster. In our second study, people combined forecasts from four sources, two of which were good and two of which were poor. They were better able to learn to combine the forecasts when those of the same quality (good or poor) came from different types of source (computer and person) than when they came from the same type of source. It appears that an inconsistent mapping between source type and forecast quality forced people to pay additional attention to their task and improved their performance.

Usefulness of Stochastic Decision Aids in Judgmental Forecasting and Decision Making

Jeffrey Lim, Marcus O'Connor
The University of Sydney, Sydney, Australia

Decision aids, utilizing modeling and simulation techniques, are being incorporated increasingly in businesses to improve decision-making processes and subsequent forecasting decisions. The predictive ability of decision aids and whether ones increased reliance on them is warranted are often debated by academics and practitioners. This study examines the usefulness of decision aids by requiring subjects to forecast a successful launch between choices of two products and whether the statistical estimations generated by the decision aids actually help forecasters in their judgment and decision making.

In this experiment, subjects were presented with probabilistic information enabling them to forecast the product's profits and risk levels etc. Results of these task experiments indicated that forecasts using a deterministic approach tend to be higher when forecasting profits, less optimistic when forecasting profit ranges, and overall forecasting consistencies are of a concern. As hypothesized, a probabilistic approach to forecasting decisions resulted in more consistent projections overall and was reported to lead to increased forecasting confidence. However, forecaster's ability to use the decision aid appropriately played a major role in forecasting accuracy.

Email: k.nikolopoulos@lancaster.ac.uk ; vagos_sk@yahoo.gr ; el00189@mail.ntua.gr; vassim@mnec.gr; n.harvey@ucl.ac.uk; clare.harries@ucl.ac.uk; j.lim@econ.usyd.edu.au; M.Oconnor@econ.usyd.edu.au

TH3

Contributed Session: Marketing-Technology Forecasting

Tuesday, June 14th 1:00 pm to 2:20 pm   Room: Frio

Chair: Steven Schnaars
        Baruch College-CUNY, New York, USA

A Probabilistic method for Model Selection and Combination of Technological Forecasts from Diffusion Models

Christos Emmanouilides
        Department of Economics, Aristotle University of Thessaloniki, Thessaloniki, Greece

A forecast classification technique for model selection and combination of technological forecasts generated by diffusion models is discussed. Long-enough simulated series based on about 500 real technology diffusion data are employed together with a collection of diffusion models with good forecasting performance. The aim is to model both the probability of each model to produce the best forecasts and the magnitude of the expected forecast error as functions of: a) early diffusion summary data, b) structural characteristics of the diffusion models, c) estimation performance measures, and d) the forecast horizon. The method's performance is formally assessed and is applied to real diffusion data.

Forecasting Components of ICT Expenditure Ð A Model Based Approach with Applicability to Short Time Series

Gary G. Madden
        Curtin University of Technology, Perth, Australia

Russel J. Cooper
        University of Western Sydney, Sydney, Australia

This paper takes a model based approach to forecasting components of info-communications technology (ICT) expenditure which has special applicability when very short time series are available. Cross country data is pooled under a technology specification which takes special account of non-homotheticity arising from the general purpose technology (GPT) characteristic of ICT. By allowing for the influence of the stage of economic development on the degree to which the economy of a country exhibits New economy features, ICT expenditure share predictions for countries where the new economy is more dominant may be used as forecasts for future ICT expenditure shares of economies with currently greater reliance on the old economy.

Repeating Patterns in Technological Forecasting: Lessons From A Century Of Estimating Demand for Radically New Products.

Steven Schnaars
Baruch College-CUNY, New York, USA

Based on a subjective review of thousands of technological forecasts contained in hundreds of articles published in the business press over the course of more than a century, this paper examines how people actually make technological forecasts and what their outcomes were. It uncovers numerous repeating patterns in technological forecasting patterns that have manifested themselves blatantly and consistently for more than 100 years. The results show something much different from the usually descriptions or methodological tweaking of growth curves and diffusion of innovation models. Comparing what was predicted with what actually happened, the results show that forecasters tend to rely on a form of intuitive extrapolation that leads them to overestimate the market potential of radically new technological products. Furthermore, the technologies that do end up revolutionizing future life are often unforeseen and unappreciated at the start.

Email: schnaars@baruch.cuny.edu

TI3

Contributed Session: Portfolio Management

Tuesday, June 14th 1:00 pm to 2:20 pm   Room: Mesquite

Chair: Christian A. Johnson
         Universidad Adolfo Ibañez, Santiago, Chile

Beyond Equal Weights: Interplay between Portfolio Selection and Forecasting techniques

Claudio Antonini
         UBS - Credit Derivatives Research, Stamford, CT, USA

The forecasting of future returns is the Holy Grail of financial analysts and investors, and some mathematical techniques produce adequate overall performance only when the returns are correctly forecasted. In lieu of a perfect knowledge of future returns, the most common approach is to have equal weight for each item in a portfolio, producing far-from-optimal overall returns. In this paper we show that the composition of equity portfolios is not independent of the techniques to forecast the returns. The techniques include equal weights, last-month optimal weights, x-month-old optimal weights, GARCH-based weights, and a proprietary technique, all compared to the ideal optimal portfolio weights (known only on hindsight).

Particularly, and based on recent research, we study the performance of some types of stratified portfolios which have shown significant performance improvement when compared to an index based on a random subset of its constituents. The stratifications studied provide consistent improvements both in the Sharpe ratio and monthly returns, a desirable situation for equity portfolio managers. Besides simplifying the selection of stocks, the recommendations allow to reduce the number of equities to a manageable subset to be used in portfolio optimization runs.

Dynamic Optimal Portfolio Using Genetic Algorithms

Christian A. Johnson
         School Of Business, Universidad Adolfo Ibañez, Santiago, Chile

This paper generates a dynamic portfolio optimizer using genetic algorithms as a tool to solve highly complex problems that requires more than a myopic view of key future financial parameters. Concepts like reproduction, crossover, mutation, and matching were used to find a dynamic optimal multi-currency portfolio using a wide range of daily data for 36 assets, including four currencies U.S. Dollars, British Pounds, Japanese Yens, and Euros) and nine fixed income assets (time deposits, notes and bonds). The exercise shows the direction and allows viewing the trend in which the investment's weighting vector should be oriented, introducing dynamic elements to static traditional efficient frontier optimizers.

Email: CHJOHNSON@UAI.CL

TJ3

Invited Session: Aviation Forecasting I

Tuesday, June 14th 1:00 pm to 2:20 pm   Room: Chula Vista Boardroom

Chair: Pam Texter
      Center for Advanced Performance & Policy Analysis CAASD, The MITRE Corporation

Forecasting hub emergence and future network structure in an origin-destination model of passenger air traffic

Pam Texter, Mike Wells, Dipasis Bhadra
      MITRE/CAASD

This paper will discuss an origin-destination forecasting model to endogenously choose which airports will be used as hubs. Over one-third of air traveler itineraries involve changing planes at a hub airport. Passenger demand, however, is driven by the desire to reach the ultimate destination, with the actual itinerary as a secondary choice. In order to capture these choices, a bottom-up forecasting model such as CAASD's Future Air Traffic Timetable Estimator (FATE) will be used to investigate network structures.

A look into the Future: An Analysis of Airport Demand and Operational Capacity Across the NAS

Steve Urlass
      Senior Airport Planner, FAA

The Future Airport Capacity Analysis (FACT) study was undertaken in 2003 because the Federal Aviation Administration wanted to assure that the long-term capacity of the aviation system matched forecasts of demand. The FACT analysis looked across multiple studies to identify airports and metropolitan areas that did not have sufficient capacity to meet demand in future years. There were nearly 300 commercial service airports evaluated in this study, including the top 35 airports. The results of the study underscore the importance of continuing the current investment plans in order to meet future airport capacity demands.

Probabilistic Air Traffic Demand Forecasting for Real Time Decision Support

Craig Wanke
      MITRE/CAASD

Air traffic management is the art of balancing traffic demand against available airspace and airport resources. Effective traffic management requires good forecasts of traffic demand, and since these predictions are subject to significant uncertainties, the statistical properties of the predictions are important. Therefore, a probabilistic traffic demand forecast, for 1 to 4 hour timeframes, has been developed.

Email: ptexter@mitre.org

TK3

Invited Session: Extensions of Exponential Smoothing Models

Tuesday, June 14th 1:00 pm to 2:20 pm   Room: Chula Vista

Chair: Richard Lawton
        University of the West of England

A Modification of Gardner and McKenzie's Variance Procedure

Natasha Atanackov
        Belgrade University, Belgrade, Serbia

John E. Boylan
        BCUC, Buckinghamshire, United Kingdom

A modified version of Gardner and McKenzie's variance procedure will be suggested and assessed in this paper. The original procedure was introduced in 1988 and it has been criticized as not being theoretically coherent and, moreover, for exhibiting poor performance in practice. Based on the idea of calculating three variances (of the series, the once-differenced series, and the twice-differenced series) and subsequently comparing them, a modified procedure for identifying an exponential smoothing method for the time series under concern has been designed in the form of a decision tree.

The forecasting performance of the original and modified Gardner and McKenzie's (GM) variance procedure has been tested and compared using a simulation experiment with theoretically generated data. Following the analysis of the series generated by the Steady State, Linear Growth and Damped Trend models it was possible to conclude that overall the modified GM procedure performs better than the original, especially for series containing up to 50 observations. For the longer time series the differences are negligible. The procedures were further compared using non-seasonal M3-competition data and data from a software company. The analysis revealed the improved performance of the modified GM procedure for the short-term forecasts (up to 6-steps ahead).

A New Approach to Method Selection Based on Mixing Methods

Richard B. Lawton
        University of the West of England, Bristol, Britain

A variety of method selection techniques have been recommended for selecting suitable exponential smoothing techniques for a set of data. These include the use of either the Akaike Information Criterion (AIC) or the Bayesian Information Criterion (BIC). These techniques use information based on the fit of the methods to the data to try to decide which to use. Previous research on method selection (presented at a previous ISF) has shown that the AIC is a reasonably successful way to decide which of three exponential smoothing methods is most suited to a particular set of data.

This paper looks at an attempt to find another approach using the idea of mixing methods, to try to generate new information on which to base the decision about which method to choose. The success of this is reported and is based on the technique's ability to correctly determine which method to use. In these simulations the selection technique has aimed at trying to distinguish between data created by three models, one for which simple exponential smoothing is optimal, one for which damped Holts method is optimal and one for which Holts method is optimal.

Email: richard.lawton@uwe.ac.uk

TA4

Feature Session: Transportation Forecasting
Tuesday, June 14th 2:35 pm to 3:55 pm   Room: Live Oak

Chair: Peg Young
        US Department of Transportation

Transportation Forecasting: The Past 25 years

Peg Young
        Department of Transportation, Bureau of Transportation Statistics, Washington DC

Caesar Singh
        U.S. Department of Transportation, Washington DC

Jack Wells
        U.S. Department of Transportation, Washington, DC

Forecasting techniques within the field of transportation cut across diverse issues, needs and data quality. Forecasts have been created to project highway requirements at sub-county levels, to resolve impacts of major intervention on national aviation travel, to test for decreases in highway fatalities, to create baseline scenarios for national transportation plans, to name a few purposes. This presentation will attempt to summarize the breadth of forecasts performed within transportation, with an emphasis on the U.S., over the last few decades. Techniques employed and the data utilized will be highlighted in this historical view. In addition, we hope to provide preliminary results of a survey we conducted, which we designed to summarize the range of forecasting done in the Department of Transportation.

Email: peg.young@dot.gov; Caesar.singh@dot.gov; Jack.Wells@ost.dot.gov

TB4

Invited Session: Rule-based Forecasting I
Tuesday, June 14th 2:35 pm to 3:55 pm   Room: Directors

Chair: Fred Collopy
       Case Western Reserve University

Panel Discussion on Rule-based Forecasting – It works…but why?

Rule-based Forecasting (RBF) is a knowledge-based system that manifests several decades of forecasting expertise and findings from empirical research. RBF provides forecasts that are more accurate than several competing benchmarks. What makes RBF work? This panel will discuss factors that have emerged to be critical to the success of RBF. Is it the integration of causal forces, the domain and task features, use of rules as a pure selection mechanism or possibly all of these factors that, in conjunction, make RBF work? In debating these issues, the panelists will recap over 15 years of research efforts that have gone into the design, validation, and improvement of RBF rules and feature identification.

Panelists:

J. Scott Armstrong
       Wharton School, University of Pennsylvania

Fred Collopy
       Case Western Reserve University

Monica Adya
       Marquette University

Len Tashman
       Institute for Forecasting Education

Robert Vokurka
       Texas A&M University, Corpus Christi

Email: Collopy@case.edu

TC4

Contributed Session: Time series analysis III

Tuesday, June 14th 2:35 pm to 3:55 pm   Room: Pecan

Chair: Hasan Al-Madfai
University of Glamorgan, Wales, UK

Rationalism Forecasting Model for Time-Series Based on Hypothesis of Instantaneous Interaction Equilibrium between Drive and Drag

Gao Xiao Qiang
College of Economics and Business Administration, Chongqing University, Chongqing, China

Yiming Wang
College of Materials Science and Engineering, Chongqing University, Chongqing, China

Zongli Wang
College of Mathematics and Physics, Chongqing University, Chongqing, China

Most of Time series forecasting methodology is based on phenomenal statistics. In this paper, a Rationalism Forecasting Model for time-series is presented. Time-series is regarded as observation, from some world view, for a system movement which is because of much of interactions in the system and between the system and its environment. Phenomenally, a time series consists of three type of subprocess, i.e., ascending, descending and invariant. Each subprocess can be identified with turning point or local minimum or maximum. There would exist a point at which the drive resulting in time-series toward a direction and the drag to opposite direction trends to an instantaneous interaction equilibrium, but inertia that should be at a maximum of its value would keep the series go ahead. Based on above instantaneous interaction equilibrium hypothesis, instantaneous interaction equilibrium points in the history of a time-series can be estimated, from first principle, i.e. conservation law, and statistically analysis. Furthermore, the equilibrium point and turning point for next sub process can be predicted and all points in next future subprocess can be estimated with similar logics. Simulating and real-life time series have been used for the purpose of model validation. Results, strength and weakness of the model have been discussed.

An ignorance measure of macroeconomic variables

Lars-Eric Öller
Statistics Sweden and Stockholm University

A measure is presented that could be said to reflect the quality of a macroeconomic statistical time series. The measure is a combination of how predictable the series is and how much its statistics needs to be revised. An "ignorance window" provides a snapshot of the quality.

Gamma Test Embedding Analysis Method (GTEAM): A univariate model identification procedure for linear and non-linear time series

Samuel E. Kemp, Hasan Al-Madfai
>   Division of Mathematics & Statistics, University of Glamorgan, Wales, UK

Andrew J. Ware
>   School of Computing, University of Glamorgan, Trefforest, Wales, UK

GTEAM is a model identification procedure for linear and non-linear time series. It utilizes the Gamma test to obtain residual variance estimates of all possible combinations of inputs. The insight is that salient inputs are expected to result in a significant reduction in residual variance estimates when included, and a significant increase in these estimates when excluded from the inputs space. Using the highest and lowest 12.5% of the range of residual variance estimates, the occurrence frequencies of the inputs as percentages of the total number of models is observed. The normal approximation of the uniform distribution is used to formulate confidence limits for the frequency percentages. These are based on the hypothesis that the mean frequency percentage for irrelevant inputs in the combined high and low residual variance estimates regions is 25% with variance 0.188.

Due to known limitations of the Gamma test, empirical GTEAM validation experiments considered trend and seasonality-free datasets. Forty sets of two classes of simulated datasets were investigated, stationary linear autoregressive and non-linear autoregressive. GTEAM successfully identified 70% of the linear models, compared to 85% using the Box-Jenkins approach, and 85% of the non linear models. Similar success rates were observed using established datasets.

Email: jaware@glam.ac.uk

TD4

Contributed Session: Dynamic Portfolio Management I

Tuesday, June 14th 2:35 pm to 3:55 pm   Room: Pecos

Chair: Robert J. Sweeney
       Wright State University, USA

Beyond the Fundamental Law: Multiperiod Dynamics of Active Portfolios

Leigh Sneddon
       Westpeak Global Advisors, Boulder, USA

Grinold and Kahn wrote Active portfolio management is a dynamic problem É This full dynamic problem is both complicated and important. Significant questions still remain unanswered. What is the right turnover? What are the best weightings for short- and long-term signals? How does multiperiod performance compare with the predictions of the Fundamental Law? This paper gives a solution for the time dimension of active management. It presents a model of, and a closed-form solution for, the long-term, multiperiod performance of active portfolios. The solution includes the multiperiod Information Ratio, portfolio alpha, active return, position size, tracking error, and turnover. As applications, it shows the impact on multiperiod performance of predictive power beyond the current period, and of changing the relative weights of a value and a growth signal. The model contains the Fundamental Law as a special case, and the solution shows how actual performance can deviate significantly from the Law's predictions. The applications illustrate how the dynamic solution can be used to optimize the multiperiod performance delivered to clients.

Accuracy of Analysts' IPO Forecast - Linking Economic Forecasting to Provide Better Management of Waterway Assets

Arvin Ghosh, J. K. Yun
       William Paterson University of New Jersey

Suresh C. Srivastava, Richard Cohen
       University of Alaska

The objective of this paper is to analyze the corporate earnings forecast of the Initial Public Offerings (IPOs) made by the financial analysts for the years 2000 and 2001. Financial analysts' earnings forecast data were divided into NYSE and Nasdaq markets for these two years. The statistical methods were used to analyze the data were: Mean Error Percentage, Ordinary Least-Square Regression, and Multivariate Regression. The main findings of the paper are: first, there is a significant difference in forecast error between the years; second, trading location does make a difference in forecast error -- the forecast error for NYSE was lower than that of NASDAQ; third, analysts' number between 11 and 15 was the ideal group in the lowest forecast error; finally, the larger the company size, generally the more accurate was the analyst's earnings forecast.

Email: robert.sweeney@wright.edu

TE4

Invited Session: Healthcare Forecasting I
Tuesday, June 14th 2:35 pm to 3:55 pm   Room: Llano

Chair: Hans Levenbach
         Delphus, Inc., USA

Practitioner Track in Health Care Forecasting, Quality and Productivity Issues

Hans Levenbach
         Delphus, Inc.

The Health Care Forecasting track will focus on the analytical opportunities and forecasting difficulties faced by practitioners in the industry. The production models of management rarely consider sophisticated OR scheduling tools to balance capital investment and operating capacity. Operating margins are usually well below two percentage points and yet the organizations survive and if necessary are rebuilt at extraordinary cost to the communities they serve. Duplication and redundancy persist at an extraordinary cost while little is done to forecast the real market demand placed on individual institutions.

The opportunities for OR and management science specialists to make lasting contributions cannot be better timed. In this session, the speakers explore the problems and issues in health care management in terms of mining data repositories, identifying the value of forecasting throughout the production environment, exploring the problems of measuring and improving cost and quality performance.

The US and International Health Care Crisis: Cost Effectiveness and Quality.

Paul Savage
         Healthcare Intelligence, Stamford, CT, USA

The health care industry in the United States is facing a huge challenge. For decades health service providers and hospitals have experienced unbounded growth, increasing their share of the GDP from less then 6% to now more the 15% of the U.S. economy. However, with an inflation rate of 60% over the past four years, neither government nor other business entities that pay for health benefits can afford to support such an expensive system along with such unrelenting cost increases.

We will briefly explore the evolution of this industry to understand the motives and incentives that have encouraged unbridled inflation for nearly three decades. We will explore the dynamics and conflict among the stakeholders, payers, patients, physicians and providers, which have mired the working relationships and resulted in sub-optimum silos of activity.

Forecasting community level needs, even in the short term, requires the insight of our most sophisticated tools. The use of simulation tools to balance the workload among the silos has only begun. However the results are too small and disjointed to be effective.

Principles Underlying the Evolution of the U.S. Health Care Market.

Michael Pine, MD.
Michael Pine Associates, Chicago, IL.

Extensive research has been done to understand and forecast behavior and performance in industries that operate in free market environments. Structural, operational, economic, and political differences between the reality of modern health care and free market principles have produced a dysfunctional health care system that is often ineffective and inefficient. Increasing fragmentation and specialization of care has resulted in the disappearance of clearly defined products or sets of services that can be associated with utility (desired outcomes). The introduction of third party payers has eroded traditional market restraints, disrupting the economic equilibrium of product and price availability. Traditional insurance has been transformed into a mechanism for shifting cost rather than spreading risk. This has given rise to a managed care model in which entities that bear financial risk actively treat health care services as losses that must be minimized. In this environment, rapid scientific and technological advances exacerbate unrestrained demand for expensive new interventions that often combine small marginal benefit with large marginal cost. Also, the lack of a clear definition of effectiveness and efficiency has resulted in wide variations in regional practices.

An essential step in creating an effective and efficient health care market is the development of self contained, clinically valid episodes of care that can serve as service sets designed to satisfy definable utilities. Once episodes are defined, outcomes can be forecast based on intrinsic patient risk. Then, and only then, will it be possible to evaluate quality and establish and reward best practices. By combining clinical insight, sound economic theory, and sophisticated analytic and forecasting techniques, an infrastructure can be created for reimbursement systems that reintroduce free-market principles into the production and purchase of health care products and services. If successful, such a transformation will restore the applicability of macro- and microeconomic forecasting techniques to the health care marketplace.

Forecasting Hospital Emergency Department Arrivals

Bernard J. Morzuch
Department of Resource Economics, University of Massachusetts, USA

David R. Eitel
Department of Emergency Medicine, York Hospital, USA

Health care capacity planning is a major focus of medical-care facilities. It is concerned with predicting both the quantity and specific attributes of those resources required to deliver health care at specified levels of quality and cost. This type of demand forecasting is essential for each department within a hospital. Predicting the demand for any department's services is contingent upon the arrival distribution of incoming patients. We focus on one particular hospital's emergency department (ED), its arrival distribution on an hourly basis, and the triage level sought. We initially analyze the hourly dispersion for each day of the week using quartiles. We then attempt to model each daily arrival distribution using density estimation techniques. Finally, we attempt to forecast hourly arrivals for each day using exponential smoothing methods. We explicitly model events that deviate from a usual day's activity. We validate our forecasts with a holdout sample. Accurate hourly forecasts are important guides for physician and nurse staffing, both of which are major components in health care capacity planning.

Email: hlevenbach@delphus.com

TF4

Contributed Session: Non-linear Time series models

Tuesday, June 14th 2:35 pm to 3:55 pm   Room: Blanco

Chair: Ismael I Sanchez
        Universidad Carlos III de Madrid, Leganes, Spain

Stochastic Volatility (SV) Model: Markov Regime Switching (MRS) Model of Asset Returns: FIGARCH (1, d, 0) Error

Chitro Majumdar
        CAU zu Kiel, Germany

We propose a MRS and scaling behavior of absolute moments with convex function for estimated data. The approach of regime-switching and the estimation of asset returns developed FIGARCH process of Baillie, Bollerslev et al(1996) and in the forecast front it improves on GARCH (1,1) at daily intervals while the relationship between FIGARCH (1,d,0) process at different time scales in a discrete-time SV model. The SV model was introduced by Taylor (1986). Our context would be analyzed in a significant way of FIGARCH and SV model: option implied, intraday return, and range volatility.

Nonlinearity in Real Exchange Rate and Forecasting

Sangkuck Chung
        Inje University, Kimhae, Korea

In this paper we considered new time series model which can describe long memory and nonlinearity simultaneously, and which can be contributed to the debate on the relevance of nonlinear modeling and forecasts in the deviation from PPP. Upon fitting it to the monthly deviations from PPP for six countries, we found that a parsimonious version of the model captures the salient features of the data rather well. We also compare linear (autoregressive and random walk) models and nonlinear (ESTAR and fractionally integrated ESTAR) models in terms of their point forecast performance, and interval or density forecasts. From the empirical results, point forecasts generated by nonlinear models are very similar to forecasts generated by linear models, and we find no strong evidence that the point forecasts generated by nonlinear models are statistically superior to forecasts generated by linear models. However, there is a clear indication that the performance of the fractionally integrated ESTAR model improves weakly according to the evaluation of interval and density forecasts.

Recursive Estimation of Dynamic Models Using Cook\'s Distance

Ismael I. Sanchez
        Universidad Carlos III de Madrid, Leganes, Spain

This article proposes a new class of adaptive forgetting factor for the recursive estimation of time varying models. The proposed procedure is based on Cook\'s distance of the new observation.
It is proven that the proposed procedure encompasses the adaptive features of classic adaptive forgetting factors and, therefore, has a larger adaptability than its competitors. The proposed forgetting factor is applied to wind energy forecast, showing advantages with respect to alternative procedures.

Email: ismael@est-econ.uc3m.es

TG4

Contributed Session: Empirical Applications

Tuesday, June 14th 2:35 pm to 3:55 pm   Room: Nueces

Chair: Gaylord May
          Wake Forest University, Winston-Salem, NC, USA

Microsoft's Excel Incorrect Exponential and Power Curve Fits

Rick Hesse
          Pepperdine University, Malibu, USA

Those who have used exponential and power curve fits know well that using log transformations is really a quick & dirty method that does not reduce the sum of squares in the original XY space. For years, calculator manuals have encouraged users to simply take the log of the data, fit a straight line, and then transform the coefficients to an exponential or power fit. Now Microsoft has joined in with the same incorrect fit for their Add Trendline function on graphed XY data. The paper will show why this fit is incorrect and recommends that Microsoft at least label this as a quick & dirty rather than an optimal method.

Hierarchical Forecasting – A case study

Gaylord May
          Wake Forest University, Winston-Salem, NC, USA

A cellular phone company provided the research context for this case study. The company is divided into several regions. There was a strong interest in improving revenue forecasts at the company level and for each of its regions. This interest suggested an application of hierarchical forecasting.

Two years of monthly revenue figures were provided for each region. For this preliminary investigation, two of the companies regions were selected to represent the revenue segments for each month; a sum of the revenues from the two segments comprised the aggregate revenue.

The author decided to compare the accuracy obtained from ordinary least squares (OLS) regression with the accuracy from least absolute value (LAV) regression. A traditional bottom-up/top-down forecasting process was applied to two different forecasting models. One model uses (OLS) while the other uses (LAV) regression. In addition the author developed a hierarchical forecasting model which consists of a single (LAV) goal program. Months 1-12 (Year 1) were used to develop each of the three hierarchical models. The forecasting horizon for each model was months 13-24 (Year 2). The accuracy of each model was computed and compared using the mean absolute deviation (MAD) of the forecast from the actual revenue.

Email: mayg@wfu.edu

TH4

Invited Session: Forecasting Marketing Metrics – Bass model II

Tuesday, June 14th 2:35 pm to 3:55 pm   Room: Frio

Chair: Philip Hans Franses
Erasmus University

Non-linear Models for Market Shares

Philip Hans Franses
Econometric Institute and Department of Marketing and Organization, Erasmus University Rotterdam

Shuba Srinivasan
The A. Gary Anderson Graduate School of Management, University of California, Riverside, CA

The attraction model for market shares is often used to examine the competitive map for brands within a category. Such a map contains, for example, estimates of the own and of the cross brand price elasticities. Applications of the attraction model usually assume that these elasticities are constant over the sample period, that is, these are not dependent on, for example, the intensity of competition or on, say, seasonality. In this paper we examine, for a range of categories, whether there is evidence of, so-called, state- or regime-dependent competitive maps. Indeed, it may be that brand A has a strong effect on brand B, only in periods when price fluctuations occur frequently, while these two brands do not compete in low activity periods. For this purpose we introduce measures for the intensity of competition to be estimated for weekly scanner data. Furthermore, we propose extensions of the familiar attraction model that allows for regime-dependent price elasticities. We propose diagnostic measures, to see if such extensions are really relevant, and we discuss parameter estimation of nonlinear attraction models. We illustrate the relevance of our study by considering a variety of categories.

Assessing the Marketing Impact on the Life Time Value of Donors

Trichy V. Krishnan, Shanfei Feng, Suman Ann Thomas
NUS Business School Singapore

LTV analysis has generated a lot of interest in the recent years in marketing academia and industry due to the possibility of analyzing individual level of data. Existing research looks at each individual, his/her membership duration and analyze the profitability of marketing efforts to retain him/her or acquire a new one. In our analysis, we look into the donation behavior of individuals to a society cause, and take the view that a donor\'s willingness to donate changes over time due to the impact of marketing efforts. Interestingly, companies currently do some optimization plan and change their marketing mix and target markets on a periodical basis. Hence, there is some endogeneity issue that has largely been ignored in the extant literature. In our research, we model the 'dynamic nature' of the relationship and compute the LTV, taking into account the endogeneity of marketing mix variables.

Skewness in New Product Sales Growth

Trichy V. Krishnan

School of Business, National University of Singapore, Singapore

V. Kumar, Rajkumar Venkatesan

School of Business, University of Connecticut, USA

The Bass diffusion model has been used extensively for forecasting new product sales by both academicians and practitioners. The Bass model however assumes that the rate of sales growth for a new product before peak sales is reached is equal to the rate of sales decline after peak sales. However, there are several instances, where the product lifecycle or the diffusion of a product, exhibits a marked skewness, i.e., the rate of sales growth is not equal to the rate of sales decline. Also, the skewness in the product lifecycle could be due to several reasons such as the impact of marketing mix instruments and cultural factors. In this study, we propose using a power transformation approach for obtaining reliable sales forecast using the Bass model even when the new product sales curve exhibits skewness. The power transformation technique has its roots in the Box-Jenkins approach for forecasting non-normal time-series data. The proposed approach also allows us to identify and evaluate the impact of various exogenous factors that lead to skewness in the product lifecycle. To this end, we believe that our proposed method will be useful for both theory development and for practitioners.

Forecasting Customer Value

Rajkumar Venkatesan, V. Kumar

School of Business, University of Connecticut, USA

Customers are considered a critical element of the marketing assets that a firm posses and effective management of customer assets is expected to directly impact firm profits. In this context, the emphasis has shifted towards the metrics used for measuring and forecasting the value of customer assets, understanding the impact of marketing expenditures on these customer metrics, actively utilizing marketing actions to maximize the customer metrics and hence firm value. Faced with a limited marketing budget managers are forced to prioritize their communication strategies towards customers they forecast to provide the highest Return on Investments (ROI) in the future. Several customer metrics have been proposed for identifying customers who would be profitable in the future. However, there has been no systematic comparison of the capabilities of these metrics in identifying profitable customers. In this study, we therefore compare the ROI implications of the various customer metrics in a Bayesian decision theory framework. Our results indicate that selecting customers to target based on their Lifetime Value (CLV) leads to higher profits than other commonly used metrics for customer selection. We also find that accounting for forecasted marketing costs in addition to using CLV for selecting customers leads to higher profits. Our study provides managers a framework to improve their customer targeting capabilities, increase the accuracy of forecasting customer value and thereby increasing the Return on Marketing Investments.

Email: franses@few.eur.nl

TI4

Invited Session: Presidential Elections Forecasting-A Survey of Methods, Part I.

Tuesday, June 14th 2:35 pm to 3:55 pm   Room: Mesquite

Chair: Alfred G. Cuzán
> **Professor of Political Science, University of West Florida**

A Review of Presidential Election Forecasting in 2004

Randall J. Jones, Jr.
> University of Central Oklahoma, USA

This paper describes and evaluates the forecasting experience in the 2004 presidential election. It was a year of eclectic forecasting methods, ranging from the simple to the complex, from a variety of disciplines. Traditional cut point or threshold indicators were mostly accurate in identifying the winner, as were national-level regression models which, however, tended to be too optimistic for the incumbent candidate. The Internet-based Iowa Electronic Markets, offering futures contracts on the candidates, continued to provide accurate forecasts, as in past elections. It was a difficult year for exit polls and for trial heat polls, with results of the latter often varying widely among polling organizations. Polling data, however, were much more accessible than in past campaigns, thanks to the appearance of free poll data sites on the Internet. One consequence was the participation of forecasters from such non-traditional fields as physics, engineering, and neuroscience. These researchers brought new forecasting methods to the enterprise and were largely concerned with predicting electoral vote probabilities from state polls, reporting their results on the Internet. New in 2004 were the first Delphi surveys of American politics experts, which correctly predicted the winner. Also new were efforts to combine poll results across polling organizations and across time, as well as an effort to combine forecasts from different methods. Combining these forecasts improved forecast accuracy.

The Trial-Heat and Economy Forecasting Equation of the U.S. Presidential Vote, 1948-2004

James E. Campbell
> University at Buffalo, SUNY

This paper evaluates an equation designed to predict the in-party residential candidate's share of the national two-party popular vote. It uses two predictors: the in-party's share of support in the trial-heat poll (preference poll) at Labor Day roughly two months before the election and the growth rate in the economy during the second quarter of the election year as indicated in the August release of the real gross domestic product measure (GDP). A theory of predictable campaign effects provides a rationale for the model. The forecast equation is estimated over the 15 elections since 1948. The equation accounts for 89 percent of the variation in the vote over these elections, has a median absolute out-of-sample error of 1.5 percent, and all of the out-of-sample errors are smaller than 4 percentage points. The model or earlier variants of it has been used to forecast elections since 1992. The mean error in these forecasts has been 2.26 percentage points. This is just slightly larger than the mean error of the preference polls conducted on the eve of the election.

Forecasting the Presidential Vote: Forecasting from Leading Economic Indicators and Presidential Approval

Robert S. Erikson
Columbia University

Christopher Wlezien
Nuffield College, Oxford University

Forecasting presidential elections is an inexact science. Everybody knows that "the economy" matters, but simple projection from economic conditions at the time of the forecast is not enough. And the most important economic shocks to the economy are the late shocks, which may arrive too late to be measured by the forecaster. Our economic forecasting tool is the cumulative growth of leading indicators (weighing recent growth most heavily) which provides an early warning, as early as quarter 1 of the election year, regarding the economy on Election day. In addition we incorporate presidential approval, to control for "other" events that economic indicators ignore. Of course one can forecast the presidential race from trial-heat polls available at the moment rather than trying to capture the fundamentals that will matter on Election Day. But the whole purpose of forecasting is to present information about the voters' future behavior that is not yet evident in the trial heat polls. Besides, early polls only tell us relatively little about the final election outcome. Based on readings as early as June 2004, our model's out-of-sample forecast for 2004 was within 1.7 percentage points of the outcome.

Email: ranjones@ucok.edu

TJ4

Contributed Session: Forecasting in Agriculture II

Tuesday, June 14th 2:35 pm to 3:55 pm   Room: Chula Vista Boardroom

Chair: Pradip Kumar Sahu,
     Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India

Modeling and Forecasting of Agricultural Variables by Semi-parametric methods

Satyabrata Pal
          Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India

With the introduction of stochastic modeling, the arena of modeling and forecasting science is enriched with newer tools, which have contributed to generating models capable of claiming more accurate representations in many real-life data situations, the non-deterministic fitting, however, is dependent on parameters, the estimation of which is a part of the process of fitting. It is observed that parametric modeling depends on the form which is being considered in the construction of it and that is why the fit in the precision suffers if the assumed model is inappropriate. Though there exists a latitude to try different models but it is a reality perceived by the modelers that developing precise representation to generate accurate forecasting to model real-life data situations remains a challenging task In order to allow more flexibility in the model, nonparametric models are called for and it has been shown that such models have potentiality in offering precise representations in real-life data situations. Three situations, namely, fish-growth modeling and forecasting under captive condition; developing gauge-discharge relationship and making forecasts from the model; modeling dynamics of crop productivity and forecasting there-from, have been considered under the purview of the paper. A detailed exposition of non-parametric and semi-parametric models has been presented in the paper and it has been shown that non-parametric/semi-parametric models employed here have superior performance (judged on the basis of suitable criteria) over the parametric counterparts.

Predicting plant nutrient sustainability in soil under same long term cropping system

A L Kundu, Pradip Kumar Sahu, P K Mani, M. Pramanick
          Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India

Sustainability of any cropping system over the years depends on sustainability of soil health (a component of environment) along with other factors which in turn control the food safety to the human beings of a particular region, as cropping systems are mostly region / zone specific. The present study is an attempt to examine the change in soil nutrients and soil characters, influencing soil nutrient availability to plants over the years under Rice – Wheat cropping system (mostly followed in indo-gangetic plains and supplying food to millions of people), using information from experiment conducted over eighteen years in the same field under different nutrient (inorganic, organic and or different combination of both) management. Altogether twelve treatments were tested for eighteen consecutive years and each year soil characteristics were measured. The study attempted to foresee the future soil characteristics, to find out the treatment(s) that are more sustainable in maintaining the soil health and can forecast steady crop production under same system of cropping. Using time series data trends in soil nutrient availability were worked out and used to forecast. Out of twelve treatments, treatments with combination of both inorganic and organic sources of nutrients at different combinations were found to be superior in sustaining soil health and the crop / system yield potentiality as well under same cropping system.

Prediction model: In comparative analysis of major crops grown under irrigated agro-eco system

P. K. Sahu

Department of Agricultural Statistics, Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India

The main objective of present day agricultural development is to harvest maximum produce from unit area of land per unit time with out sacrificing economics of production and maintaining environmental balance. As a result, irrigated agro-ecosystem got much importance in boosting agricultural production because of it's superiority over rain-fed agro-ecosystem. West Bengal, a state in India, being the habitat of more than 80millions of people draws attention to the planners continuously for supplying balanced diet to this huge population. Along with other parts of India, green revolution has also taken place in West Bengal.

The present study aims at examining the growth and trend in productions of major staple food crops grown under irrigated agro-eco system which plays pivotal role in meeting the food requirement for this huge population. Future production potentialities of these crops have been studied with the help of modeling technique. Different autoregressive (AR) models are found to fit well in explaining the production behavior of the major crops grown in this system.

The study reveals that there has been decline in trend in productivity of rabi rice (occupying maximum area) contrary to positive growth rates in other crops, competing for area under irrigated agro-ecosystem. While forecasting the production potentialities of the major crops under the agro eco-system the study also reveals that, keeping in mind the above objectives, potato cultivation may be promoted in the state, alternatively, there is a need in technological breakthrough in the production of rabi rice to meet the challenge of supplying food to this huge population.

Email: pksahubckv@rediffmail.com

TK4

Contributed Session: Business Cycles II

Tuesday, June 14th 2:35 pm to 3:55 pm   Room: Chula Vista

Chair: Frederick Demers
        Bank of Canada, Ottawa, Canada

Constructing a coincident index of business cycles without assuming a one-factor model

Yasutomo Murasawa
        Osaka Prefecture University - Sakai, Japan

Roberto S. Mariano
        Singapore Management University – Singapore

The Stock--Watson coincident index and its subsequent extensions assume a static linear one-factor structure for the component indicators. Such assumption is restrictive in practice, however, with as few as four indicators. In fact, such assumption is unnecessary if one defines a coincident index as an estimate of latent monthly real GDP. This paper considers VAR and factor models for latent monthly real GDP and other coincident indicators, and estimates the models using the observable mixed-frequency series. For US data, Schwartz's Bayesian information criterion selects a two-factor model. The smoothed estimate of latent monthly real GDP is the proposed index.

Predicting US Recessions: A Comparison of Three Leading Indexes

Anirvan Banerji
        Economic Cycle Research Institute, New York, USA

According to The Economist, the three best-known leading indexes of the U.S. economy differ markedly in their recession-predicting record. However, their relative performance has not been systematically evaluated in the forecasting literature.

A head-to-head comparison of the OECD Composite Leading Index (CLI), the Conference Board Index of Leading Economic Indicators (LEI) and the ECRI Weekly Leading Index (WLI) is therefore performed. Specifically, nonparametric statistical tests are employed to determine whether the CLI, the LEI and the WLI have statistically significant leads over U.S. business cycle turning points and over each of the others, based on currently available historical data.

The effect of data revisions on the relative performance of the three leading indexes is then discussed. The results of the statistical tests are assessed in this light to decide which leading index is best for a forecaster to monitor in practice, in order to predict turns in the U.S. business cycle.

Forecasting Canadian GDP: Region-specific versus country-wide information

Frederick Demers, Dupuis David
Bank of Canada, Ottawa, Canada

This paper investigates whether the aggregation of region-specific forecasts improves upon the direct forecasting of Canadian GDP growth. To answer this question, we consider an array of multivariate forecasting models for the five Canadian regions and single-equation models for direct Canadian GDP forecasts. We focus on forecasts at one-, two-, four-, and eight-quarter horizons which best represent the monetary policy transmission framework of long and variable lags. Region-specific forecasts are aggregated to the country level and tested against aggregate country-level forecasts. The empirical results show that Canadian GDP growth forecasts can be improved by indirectly forecasting the GDP growth of the Canadian economic regions using a multivariate approach, namely a VARMAX model.

Email: fdemers@banqueducanada.ca; ddupuis@banqueducanada.ca;

TA5

Feature Session: Improving Forecasts through Textbooks
Tuesday, June 14th 4:10 pm – 5:30 pm   Room: Live Oak

Chair: Tom Yokum
        Angelo State University

Improving Forecasting Through Textbooks – A 25 Year Review

Dr. James E. Cox, Jr.
        Professor, Department of Marketing, Illinois State University

David G. Loomis
        Associate Professor, Department of Economics, Illinois State University

In celebration of the ISF's 25th anniversary, this paper reviews the improvement in forecasting by looking at changes in forecasting textbooks over the last 25 years. Today, more texts are available to both introductory students and seasoned forecasters and many of these are more specialized than ever before. Today's textbook authors are standing on the shoulders of the previous authors while adding original ideas and discussing innovations contained in the more recent forecasting literature. This paper details changes in the number, length, presentation, organization and influence of forecasting textbooks during the past 25 years. In addition, we review the changes in topic and technique coverage and the diffusion of forecasting literature into textbooks.

Email: tyokum@juno.com

TB5

Contributed Session: Technology Diffusion Forecasting III

Tuesday, June 14th 4:10 pm to 5:30 pm   Room: Directors

Chair: Saku Makinen
      Tampere University of Technology, Finland

Broadband fixed wireless access (BFWA) networks in the 42 GHz frequency band as an alternative or complementary solution to DSL: investment analyses

Nils Kristian Elnegaard
      Telenor R&D, Fornebu, Norway

Households and businesses not served by high speed DSL and cable will in many cases be too costly to cover with these technologies, therefore alternative solutions such as broadband fixed wireless access (BFWA) systems at frequencies above 20 GHz could be a viable alternative for services beyond the present ADSL-based offerings.

This paper shows a thorough analysis of the investment cost per line for broadband fixed wireless access networks in the 40 GHz band as an alternative to high speed DSL such as ADSL2Plus and VDSL when offering triple play services to the consumer market as well as symmetric data connectivity to small and medium enterprises. The impact of a number of important variables will be analyzed such as service take-up rate, traffic growth patterns and equipment price predictions for millimetre wave radio access technology. A set of different areas has been considered: Urban areas with dense population and multi-tenant office and residential buildings, suburban areas with moderate density, small town/village surrounded by spread population in flat landscape and remote rural areas with spread population/small clusters.

Service take-up rates have been modeled by diffusion models. Extended learning curve models have been used in modeling the price trends of network equipment.

A cross-country study on diffusions of communication technologies: the Internet, mobile phone, and telephone

Jeong-Dong Lee; Minkyu Lee; Jongsoo Lee

Seoul National University, Korea, South

This paper analyses diffusion patterns of communication technologies such as the Internet, cellular phones, and telephones in different country groups and identifies factors that determine why the adoption process varies across different country groups. We make diffusion analysis based on national and technological characteristics. To estimate diffusion process accurately, we apply the multiproduct interaction model to diffusion analysis. Using the Bass model, we measure the degree of diffusion of a specific communication technology. Then, we compare the diffusion indicators of different country groups and examine the effects of national characteristics Ð GDP in capita, human capital, surface area, and international trade in goods (% of GDP). Finally, we categorize country groups according to the patterns of diffusions. The results of the paper can serve as a general guideline of international marketing of communication technology businesses.

A cross-national study on the effects of cultural dimensions, and the level of economic progress on a takeoff timing of technology adoption

Saku Makinen, Suur-Inkeroinen, Henri

Tampere University of Technology, Tampere, Finland

Earlier literature has validated that the co-evolution of science, technology, economy, culture and politics needs to be taken into account when dealing with studying economical evolution. This paper posits itself into considering the two of the above mentioned national level attributes, namely culture and economic progress.

Globally national markets have become more and more consolidating and open in recent years. This has lead to a homogenization hypothesis between national cultures and markets which has found support also in research literature. Also contrary empirical evidence has been found reporting results that globalization and convergence in economic conditions actually result in a more heterogeneous international market.

Data in the present study was the yearly cumulative number of analogue and digital cellular telephone subscribers in national market between 1978 and 2000. From the time series the study determined the national takeoff points i.e. start of the growth phase.

The paper studies the effects of cultural dimensions and economic variables on technology evolution with standard multivariate regression. The paper presents results of three different multivariate regressions, namely independent variables being takeoff timing for analogue technology, $t(a_i)$, takeoff timing for digital technology, $t(d_i)$, and the difference variable $t(d_i) - t(a_i)$, $z(i)$, for each nation i.

Email: saku.makinen@tut.fi

TC5

Contributed Session: International Economic Issues

Tuesday, June 14th 4:10 pm to 5:30 pm   Room: Pecan

Chair: Pat L. Burr
      University of Incarnate Word

Consensus Forecasters: Copycats or not

Qiang Xu, Robert Megna
      New York State Division of the Budget, Albany, NY, USA

Kajal Lahiri
      University of Albany, Albany, USA

Many questions have been raised in the economic literature pertaining to the consensus forecasting process. Gallo, Granger, and Jeon (GGJ, 2002) have reported evidence of copy-cat behavior in a British consensus forecast panel series. The authors suggest that if professional forecasters exhibit copy-cat behavior, consumers of the consensus cannot be sure they are getting an unbiased assessment of the future state of the economy.

GGJ's methodology and findings raise some issues that merit further investigation. First, the sample panel used in the study is very short (1993 to 1996). Second, it is recognized that in estimating dynamic panel data models, the neglect of coefficient heterogeneity results in correlation between the regressors and the error term, and serially correlated disturbances.

This paper extends the work of GGJ in two ways. We use a longer period of Blue Chip consensus forecast (1984 to 2003). We re-estimate GGJ's model employing the MCMC method. Although evidence of copy-cat behavior still emerges, the extent of the behavior is reduced.

We re-examine the issue of copy-cat behavior in the context of whether the use of information contained in last periods consensus forecast is rational. The framework we used to evaluate rationality is based on Davis and Lahiri (1995). Our results suggest that last periods Blue Chip consensus forecast does influence individual forecasts during the current period, but more than rationality warrants.

Estimating a business chronology for the Spanish Economic Climate Cycle - A probabilistic algorithmic procedure

Beatriz B. Farina, Jose Luis Rojo

Departamento de Economia Aplicada, Universidad de Valladolid, Valladolid, SPAIN

In a previous work presented in the 20th ISF, the authors introduced a new concept for the business cycle, the Economic Climate Cycle, and showed a first turning points chronology for the Spanish case obtained through a new technique based on an empiric and multidimensional approach and by means of an indicator, the Median Cycle Indicator, which summarized that kind of cycle.

But a drawback of the above mentioned method was the loss of cyclical signal at the end of the sample, so that it could not be used for short-term analysis.

Hence, in this paper we develop an algorithmic procedure based on the Sequential Probability Rule which allows the estimation and the forecasting of the probability of the occurrence of a turning point and complements the information provided by the Median Cycle Indicator with the corresponding to a leading indicator, specifically, a diffusion index.

Consequently, we establish the final dating for the Spanish Climate Cycle and we analyze the differences between both chronologies. We also compare our results with others obtained by means of different methodologies.

An Examination of International Remittances, Their Impact and Predictions for the Industry

Pat L. Burr, Nursen A. Zanca

University of Incarnate Word, San Antonio, Texas

International remittances play an increasingly dynamic role in the international funds movement, the sustainable development of developing economies and the formation of the micro-enterprise sector of developing nations. The authors of this paper will (1) examine recent historical funds movement, (2) describe the user base, (3) identify which countries are the high-recipient nations, and (4) draw some conclusions as to how the industry is evolving electronically to move funds more quickly and at lower costs from users to recipients.

Particular emphasis will be placed upon the U.S.-Mexico relationship and what might be expected in that relationship in the future.

Email: burr@universe.uiwtx.edu

TD5

Contributed Session: Combining Factors and Models

Tuesday, June 14th 4:10 pm to 5:30 pm   Room: Pecos

Chair: Eva Senra
   Universidad de Alcala, Madrid, Spain

Forecasting Muscat Stock Market Monthly Returns

Muhammad Idrees Ahmad
.   Sultan Qaboos University, Alkhod, Muscat, OMAN

Muscat Securities Market (MSM) is an emerging stock market in the Middle East. It was established in 1988 and it commenced operation in 1989. MSM index was established in 1992 and the base date was June 1992. MSM was restructured in 1998 into two separate entities, Muscat Securities Market where all the listed securities are traded and the Capital Market Authority (CMA) the regulatory body.

A number of companies included in the index sample have changed over time to reach currently thirty companies from different sectors of the market namely, Banking and Investment sector, Industrial sector, Services sector. Separate indices for each of these sectors along with overall composite indices are computed and closing price of these indices are published daily.

We have taken monthly closing prices of each of the composite and each sector indices for seven years from 1st September 1997 to 30th September 2004. From these indices monthly percent returns were worked out which provided 84 observations for each sector. Based on this historical information we intend to develop a mechanism to make forecasts for monthly returns from MSM. There are several procedures to obtain individual forecasts but the combination of forecasts has been proved as a useful tool to improve forecast accuracy. But there are several procedures to obtain combined forecasts and for a layman in particular it becomes a great problem to choose a method. Moreover each of the individual or combined forecasting method are based on several assumptions which further complicate the choice.

In the present study, several simple but powerful nonparametric and parametric forecasting techniques such as Simple Exponential, Double exponential, Moving Average, Dummy Variable Regression etc are used to compute forecasts for monthly returns from each sector of the market as well as from the main index. These individual forecasts by each of the forecasting techniques are then combined by various forecast combination method such as simple average, weighted average, ridge regression and OLS regression. These forecast combination method are compared for their performance in terms of MAPE, MAD and MSD.

Are Pooled Forecasts Superior? - An empirical analysis for Timely Estimations of the German GDP

Andreas Cors
>DIW Berlin, Berlin, Germany

Many papers suggest an improvement in the quality of forecasts when the estimation system is given by of a combination of different approaches. Instead of getting into the problem to decide which estimation model is superior it is argued that each model can add additional value. From the viewpoint of national account calculation several approaches are available. The paper presents an econometric system for the estimation of demand side variables in Germany and aggregates the forecasts to real GDP. Together with the estimation of GDP from the production side and a single equation approach a combination forecast system is build up. Only a linear combination of the forecasts with equal weights is considered. In an out-of-Sample forecast it turns out that the pooled forecasts outperforms the three several approaches with respect to root-mean-squared-errors (RMSE) when compared to the reference figures from the Federal Statistical Office (FSO) in Germany.

Combination of Forecasts Using Factor Models

Eva Senra
>Departamento Estadistica, Estructura Economica, Universidad de Alcala, Madrid, Spain

Pilar Poncela
>Dpto. de Análisis Económico, Universidad Autonoma de Madrid, Madrid, Spain

This paper considers factor models to combine the individual forecasts for different macroeconomic variables from the Survey of Professional Forecasters, provided since 1990 by the Federal Reserve Bank of Philadelphia. Taking as benchmark model the average of the forecasts, factor models show better forecast accuracy but sometimes it is necessary to consider more than one factor.

Also the paper discusses the interpretation of the two first factors given the high correlation of the first factor with the average of the forecasts and what is more surprising, the correlation of the squared of the second factor and the variance between the forecasters. In this case, we could interpret the first common factor as the level of our forecast, while the second common factor would be related to its uncertainty.

Email: eva.senra@uah.es

TE5

Contributed Session: Health Care Forecasting II

Tuesday, June 14th 4:10 pm to 5:30 pm   Room: Llano

Chair: Hans Levenbach
        Delphus, Inc., Morristown, NJ, USA.

Leadership Challenges in Large Health Care Networks: Improving Quality and Managing Complex Professional Relationships.

Sandra Sperry
        Health Care Intelligence, Stamford, CT,

The dynamic organizational problems being faced by health care institutions are more complex than ever imagined. Many multi-hospital networks have failed to provide the economies of scale envisioned and have lead to conflict with Board members, medical staffs, Regulators and even the communities they serve. Information is vital to measure and improve the clinical effectiveness of every organization and the econometrics model that has traditionally served management is no longer sufficient.

The clinical leadership, exemplified by the Chief Medical Officer and Medical Department Chiefs, must become key executives in the strategic planning process. The information they demand is multi-dimensional, like their patients, in presenting a cause for admission and several co-morbidities that drive resource consumption. Quality must be a driving principle while the capacity of the whole system can be balanced with the needs of the marketplace. This improvement in performance and productivity takes many forms and leads to total systems improvement.

Changing the Working Culture

Raymond Seigfried
        Christiana Care Health Services, Newark, DE

The management of Christiana has undertaken to improve the performance dynamics among the many silos of activity that comprise a modern Hospital. System Service Improvement (SSI) is based on measurable performance metrics that are routinely monitored with phase-plane analysis. By viewing the organization with a ""Wholeness Theory"" the participants are affecting the quality of care experienced by patients and improving the cost effectiveness of the entire organization.

The change in management culture is positively affecting the relationships between service departments and is enhancing the image of the organization in the Community. This is in no small way attributed to new tools that are brought from the academic setting to the production environment of the Hospital.

Strategic Planning to Operations Management – Health Care Management Solutions

Paul M. Savage

Healthcare Intelligence, Stamford, CT

The scope of problems facing health care executives and operating managers is daunting whether the crisis arises from governance (Boards, Regulators and Physicians), payers, service consumers, or the organizations they manage. The solutions are very complex in balancing the performance of the organization with the disparate needs of many stakeholders.

It is only very recently that the technology has evolved to solve these multi-dimensional problems with quantitative techniques from Operations Research, Data-Mining and Forecasting. These executives and managers have not yet been trained in advanced statistical techniques as Other Industries have adopted Business Intelligence and productivity tools. The academics from many industries must be recruited to the health care field to share the benefits that can be derived from simulation modeling of marketplaces, operations and workflow planning.

Email: hlevenbach@delphus.com

TF5

Invited Session: Forecasting a Product Hierarchy

Tuesday, June 14th 4:10 pm to 5:30 pm   Room: Blanco

Chair: Eric Stellwagen
      Forecast Pro

Considerations for Effectively Forecasting a Product Hierarchy

Many corporations require a consistent set of forecasts across product and/or geographical hierarchies. Forecasters charged with preparing these numbers grapple with a host of issues that are rarely addressed in the forecasting literature. This session will compare and contrast different forecasting strategies emphasizing best practices. Issues to be discussed include:

-   Constructing the hierarchy to optimize forecasting
-   Reconciling forecasts generated at different levels of aggregation
-   When to use top-down vs. bottom-up approaches
-   Capturing seasonal variation for short life cycle series
-   Handling product line extensions and replacement products
-   Current research

Several real-life examples will be presented to illustrate how the techniques are applied to corporate data.

Eric Stellwagen is the Vice President and co-founder of Business Forecast Systems, Inc., He is the co-author of the Forecast Pro software product line. He has consulted widely in the area of practical business forecasting and spends part of the year presenting workshops on the subject. He has worked with many leading firms including Coca-Cola, Procter & Gamble, Merck. He has presented seminars and workshops under the aegises of many groups including the American Production and Inventory Control Society, the Institute for Business Forecasting, the World Research Group, the Electric Power Research Institute, and the International Institute of Forecasters. He is also currently serving on the board of directors of the International Institute of Forecasters.

Email: estellwagen@forecastpro.com

TG5

Open Session: Ask The Editors

Tuesday, June 14th 4:10 pm to 5:30 pm   Room: Nueces

Chair: Herman Stekler
        George Washington University

Panelists:

Rob Hyndman
        Monash University

Len Tashman
        Institute for Forecasting Education

Lars-Erik Öller
        Statistics Sweden

Email: hstekler@gwu.edu

TH5

Contributed Session: Marketing Applications

Tuesday, June 14th 4:10 pm to 5:30 pm   Room: Frio

Chair: Huang Chun-Yao
>   **Institute of Technology Management, National Tsing Hua University, Hsinchu, Taiwan**

Bootstrap inference on a nonlinear time series model of advertising effects

Miguel A. Arranz
>   Bayes Forecast, Madrid, Spain

This paper deals with the analysis of a nonlinear time series model of the effects of advertising. Given the nonlinear nature of the process it is not possible to rely on the asymptotic inference. Furthermore, we can not provide an (asymptotic) pivotal statistic. Our solution is the application of bootstrap techniques. In particular, we find that the double bootstrap procedure provides good results. In this case, the choice of model-based time series resampling, sieve bootstrap or moving-blocks (circular blocks) bootstrap seems to have negligible effects on the confidence intervals of the parameters. We also provide a comparison with a Bayesian approach.

Optimal Extrapolative Forecasting Methods and Data Characteristics

Joachim Tan, Gary Madden
>   CEEM, Curtin University, Perth, Australia

Robert Fildes
>   Lancaster University Management School, Lancaster University, Lancaster, UK

Traditionally, forecasting literature assume the underlying time series characteristics of any time series are stable across time. Hence, model selection protocols such as the Box-Jenkins method and rules-based Forecasting by Collopy and Armstrong (1992) are developed.

However, forecasting based on these protocols often requires visual inspection of data that is highly judgmental and using any of these approaches does not control for interaction among data characteristics. Most existing protocols simply break down when interactions among data characteristics occur through time.

This study forecasts telecommunications data share price series through growth, crash and recovery phases. In particular, the study focuses on the transition from growth to bust (January 1993 to March 2000) and bust to recovery (September 2002 to December 2003) phases.

Using the forecasts, the analysis determines the optimal forecast method for each particular series based on standard forecast error measures by employing a multinomial logic model that is both simple to implement and controls for the interaction effects of the data characteristics of the data. Statistically identifying any underlying relationship simplifies in the selection of an appropriate forecasting model.

A Combined Sequential Weighted (CSW) Approach to Sales Forecast of Multiple Lifestyle Goods

Huang Chun-Yao
Institute of Technology Management, National Tsing Hua University, Hsinchu, Taiwan

Relative to consumer package goods (CPG) and durables which have seen continual efforts in their sales forecast in the literature, non-durable lifestyle goods have received far less attention in terms of sales forecast. Generally speaking, lifestyle goods share these characteristics: (1) their sales are impacted by trends and capricious mood of the market, (2) they have a relatively short life cycle, (3) at the SKU level they are seldom re-purchased. These characteristics combined together make sales forecast for lifestyle goods a challenging task.

This paper reports a framework to systematically leverage information that is accessible to a typical lifestyle goods retailer so that (1) pre-sales forecasts of multiple SKUs can be objectively and cost-effectively made and (2) forecast accuracy can be expected to improve over time. In each round of pre-sales forecasting, the framework combines predictions made by the retailer\'s (1) purchasers and (2) store managers and those made from (3) historical data. Given these three components, a set of algorithm based on past forecast accuracy is introduced to assign weights at both the within-component and cross-component levels.

A real-world case is presented to demonstrate the above-proposed Combined Sequential Weighted (CSW) approach to multiple lifestyle goods' sales forecast.

Email: chuang@mx.nthu.edu.tw

TI5

Invited Session: Prediction markets and Public Policy

Tuesday, June 14th 4:10 pm to 5:30 pm   Room: Mesquite

Chair: Justin Wolfers
        Wharton School, University of Pennsylvania

Impolite Innovation: The Technology and Politics of Terrorism Futures

Robin Hanson
        George Mason University

In July 2003, two senators warned that a Pentagon market for betting on terror attacks was about to open, and could make terrorists rich. Amid universal disgust, this project (and all remotely related government research) ended the next day, and its infamous boss John Poindexter resigned the day after. The Policy Analysis Market, however, was to have tested the ability of speculative markets to forecast overall geopolitical trends, not terror attack details. This two-year-old million-dollar research project began before Poindexter joined DARPA, and was five months from public trading of small (<$100) bets. PAM traders could have, for example, bet on the chance of high levels of civil unrest in Saudi Arabia in the fourth quarter of 2004, conditional on the US moving its troops out of there two quarters earlier. By comparing estimates based on different assumptions, PAM could have advised us on the effect of various US Mideast policies. Millions of such estimates would have been possible, due to a new combinatorial trading technology that lab experiments have shown can obtain far more independent price estimates from a given set of traders. We will discuss this new technology, its lab experiments, and the origin, design, press, and politics of the Policy Analysis Market.

Can Information Markets Improve Decisions?

Paul Tetlock, Robert Hahn
        University of Texas at Austin

Market-based decision algorithms have the ability to elicit information from traders about the future payoffs of decisions. All of these algorithms exploit the information aggregation properties of asset markets and some employ the features of a randomized experiment. We explore the properties of some new algorithms and outline possible applications in the private and public sectors.

Using Markets to Inform Policy: The Case of the Iraq War

Justin Wolfers, Eric Zitzewitz
The Wharton School, University of Pennsylvania

Market prices incorporate large amounts of information, and our aim in this paper is to demonstrate that prediction markets can help extract this information, prospectively allowing this aggregated expertise to inform policy decisions in real-time. We provide a case study, exploiting data from a market trading in contracts which paid off if Saddam Hussein was removed as leader of Iraq, to learn about financial market participants' expectations of the consequences of the 2003 Iraq war. We conducted an ex-ante analysis, which we disseminated before the war, finding that a 10 percent increase in the probability of war was accompanied by a $1 increase in spot oil prices that futures markets suggested was expected to dissipate quickly. Equity prices movements implied that the same shock led to a 1½ percent decline in the S&P 500. Further, the existence of widely-traded options allows us to back out the entire distribution of market expectations of the war's near-term effects, finding that these large effects reflected a negatively skewed distribution, with a substantial probability of an extremely adverse outcome. The flow of war-related news through our sample explains a large proportion of daily oil and equity price movements. Subsequent analysis suggests that these relationships continued to hold out-of-sample. Our analysis also allows us to characterize which industries and countries were most sensitive to war news, and when the war turned out somewhat better than ex-ante expectations, these sectors recovered, confirming these cross-sectional implications. We highlight the particular features of this case study that make it particularly amenable to this style of policy analysis, and discuss some of the issues in applying this method to other policy contexts.

Email: jwolfers@wharton.upenn.edu

TJ5

Invited Session: Aviation Forecasting II

Tuesday, June 14th 4:10 pm to 5:30 pm   Room: Chula Vista Boardroom

Chair: Peg Young
    U.S. Department of Transportation, USA

Passenger Origin-Destination Model

Raynald Ouellet, Richard Laferriere
    Place de Ville, Tower C, 25th Floor, Ottawa, Ontario, Canada

The passenger Origin-Destination Model (PODM) is an econometric model used by Transport Canada to generate air traffic forecasts at 77 Canadian airports. The model is divided into three markets: domestic, transborder and other international market. In each market, passengers are grouped into either "economy fare class" or "discount fare class". The "economy fare class" is composed of first-class, business-class, regular-economy and other-discount (very close to regular-economy-class) airfares. The "discount fare class" amalgamates deep-discount and other airfares.

The domestic market is divided into 36 zones. The explanatory variables are: air fare, adult population, gross domestic product, personal disposable income, level of service, travel time by car and linguistic similarity between zones.

Travel Forecasts: Finding Consensus In The Midst Of Crisis

Joseph P. Schwieterman
    Professor of Public Service Management, DePaul University, Chicago, USA

This presentation explores the status of air travel demand forecasts in the midst of the ongoing crisis in commercial aviation, which has pushed several of the country's largest airlines to the brink of liquidation. By examining notable changes in forecasts and forecasting techniques before and after terrorist acts of 2001, it explores critical assumptions behind various estimates of demand, including the current FAA projections. The presentation also explores the effects of technological change, including major advances in the efficiency of small jets, on contemporary forecasts of air travel demand.

How Airlines Forecast their Passengers Demand in a Changing and Unstable Environment - A Survey With Main IATA Airlines

Mohsen Hamoudia
Universite Catholique de Lyon, Lyon, France

Miriam Scaglione
Institut Economie & Tourisme, Switzerland

The Domestic and International Airline business is probably one of the major industries in the world. Since 1990, it faced many constraints: worldwide deregulation, high competition particularly from low cost companies, deterioration in yields, explosion of oil prices, É Then they faced other major crisis : security and terrorism, financial crisis (South America and Asia), SARS (Severe Acute Respiratory Syndrome) in Asia, É In this context, forecasting techniques and processes in Airline Industry were strongly affected by the successive crises and changes.

The objectives of this study are to identify how airlines forecast their scheduled passenger demand, what kind and what are the main problems they have to face, particularly in turbulent environment, and how their forecasting methods have changed from 1990 to 2005.

The method used here is to compare empirical results from surveys conducted from 1987 to 2005. Many of these results were presented (ISFÕ1987, ISFÕ1989, ITAÕ1992 and ITAÕ1995). An on-line questionnaire was mailed to major IATA member airlines that had reported passengers' traffic.

Email: peg.young@bts.gov

TK5

Invited Session: Dynamic Portfolio Management II
Tuesday, June 14th 4:10 pm to 5:30 pm   Room: Chula Vista

Chair: Larry Pohlman
       PanAgora Asset Management, Boston, USA

Multi-scale Technical Analysis of High Frequency Futures Data

Debashis Guha
       Big Sky Quantitative Research, Bangalore, India

This paper studies the application of "filter rules", which have a rigorous interpretation as a cusum test of a breakpoint in a time series with two Gaussian regimes, to the short term forecasting of high frequency data for stock index futures.

We apply multiple filter rules to 5-minute closing prices for the CME S&P 500 index futures. The rules have different thresholds and thus attempt to detect trend breaks at different scales. Some of the filters are used as trend indicators and some as counter trend indicators. A forecast is made only when all filters at all scales agree.

The performance of the forecasts is judged by the return of a portfolio with volatility weighted positions that are entered into according to the direction of the forecast. Over the period 1990-2002 this portfolio produces returns in excess of the S&P 500. The Sharpe Ratio of the portfolio is 1.0, considerably higher than that of the S&P 500 Index.

Return Forecasts and Optimal Portfolio Construction: A Quantile Regression Approach

Lingjie Ma, Larry Pohlman
       PanAgora Asset Management, Boston, USA

In finance, there is growing interest in quantile regression with the particular focus on value at risk and copula models. In this paper, we first present a general interpretation of quantile regression in the financial market. We then explore the full distributional impact of factors on returns of securities, and find that factor effects vary substantially across quantiles of returns. Utilizing distributional information from quantile regression models, we propose two general methods for the return forecasting and portfolio construction. We show that under mild conditions these new methods provide more accurate forecasts and potentially more value-added portfolios than the classical conditional mean method.

Mining for Money

Larry Pohlman
   PanAgora Asset Management

Anthony Waclawski
   SAS Institute, Inc.

Researchers have found that fundamental economic factors can be used to forecast security returns. However, what factors to include and how to model the relationship remain open questions. Financial economists have carefully selected and tested a small set of variables suggested by economic theory. At the other extreme Morillo and Pohlman (2002) forecasted equity market returns by applying the dynamic factor model of Stock and Watson (1998) to large set of macroeconomic variables. In this article we apply the latest data mining techniques to forecasting equity market returns. The results are economically significant.

Email: LPohlman@panagora.com;

Wednesday, June 15th

K4

Plenary Session: Executive Presentation
Wednesday, June 15th 8:00 am to 9:00 am   Room: Regency West

Chair: Benito Flores
         Texas A&M University

Forecasting at a Point of Oblique Evolution

J. Kenneth Raley
         Vice-President of Network Planning and Advanced Technology, SBC Communications

The discipline of forecasting has made tremendous advancements over the last quarter century in new techniques, improvements in traditional methods, and new ideas in applications.

Mr. Raley will review the history of forecasting within telecommunications, with emphasis on the impact of the break-up of the Bell System in 1984 and the Telecommunications Act of 1996. His presentation will address the regulatory, market, and network evolution at work within the telecommunications industry today. This shift from internal control to external drivers will alter future forecasting methodologies and applications. Examples of new forecast applications triggered by SBC's recently announced IP initiatives would wrap up the presentation.

J. Kenneth Raley

Ken Raley, is the Vice President of Network Planning and Advanced Technology at SBC Communications. In his current position as vice president, SBC network planning and advanced technology, Ken Raley is responsible for enterprise-wide network planning and for program management of SBC Voice over IP (VoIP) implementation and video engineering. A veteran of the telecommunications industry for more than 20 years, Raley has also served as senior executive vice president, business development at TeleDanmark (TDC) A/S and as chief technical officer at Telkom South Africa, where he was responsible for the company's technology strategy and associated capital and operating expenses.

Email: dbelknap@sbcnews.us

WA1

Feature Panel Session: 25 Years of Progress in Combining Forecasts

Wednesday, June 15th 9:05 – 10:25 a.m.   Room: Live Oak

Chair: Nadia R. Sanders
Raj Soin College of Business, Wright State University

This session overviews 25 years progress in the area of combining forecasts. Four presentations are given, each focusing on different areas of combining, to provide a complete view of the field. The session begins with a general perspective of 25 year progress in the field. This is followed by presentations that focus on various aspects of combining, such as the importance of judgmental inputs in the combination process, judgmental adjustments, and Rule-based Forecasting (RBF).

25 Years Progress in Combining Forecasts

Nadia R. Sanders
        Raj Soin College of Business, Wright State University

The area of combining forecasts has made progress over the past 25 years. This presentation provides an overview of the changing view of combining, the developments in understanding the combining process, and advancements in combining methods.

How important is judgmental input in the combination process?

Marcus O'Connor
        University of Sydney

This presentation will argue that, from a number of perspectives, it is important to include judgmental forecasts as input in the combination process. But, it appears that people are in dire need of some help in the combination process. Evidence of the usefulness of judgmental forecasts and the role of a forecasting support system in the process of combination will be presented.

Judgmental adjustment: In from the cold but still in need of support.

Paul Goodwin
        The Management School, University of Bath, Bath, United Kingdom

Twenty five years ago many leading researchers were highlighting the problems of applying judgmental adjustments to statistical forecasts. Now most researchers recognize that, if used with care, judgmental interventions can be effective in improving accuracy. However, our knowledge of how to improve the quality of these interventions through effective decision support is still at an early stage of development.

Rule-based Forecasting: Combining judgment and statistics

Monica Adya
Marquette University

Rule-based forecasting (RBF) is a knowledge-based system that epitomizes combining judgmental and statistical approaches. Its knowledge base manifests several decades of forecasting expertise and empirical research. In this panel, Monica Adya will provide a discussion of how principles of combining are reflected in RBF.

Email: nadia.sanders@wright.edu

WB1

Contributed Session: Seasonality II

Wednesday, June 15th 9:05 – 10:25 a.m.   Room: Directors

Chair: Bruce Curry
   Cardiff Business School, Cardiff, UK

State Space Models for Seasonal Aggregation in Sales Forecasting

Steve Djajasaputra, Tom Heskes
   IRIS, Computer Science, University Nijmegen, Nijmegen, The Netherlands

Pim Ouwehand
   Dept. of Technology Management, Eindhoven University of Technology, Eindhoven, The Netherlands

The objective of this research is to improve forecasts by simultaneously forecasting a group of products which exhibits a similar seasonal pattern. There have been already several publications that demonstrate forecast improvements using seasonal aggregation. However, these papers focused on different adhoc methods to combine seasonal indexes from aggregated time series. Instead, in this paper we develop new state space models in which aggregation is naturally incorporated in the model. In particular, we extend two well-known seasonal state space models: Harvey's seasonal model and (truncated) trigonometric/Fourier-based seasonal model. We show the possibility of forecasting performance improvement using our aggregation models, compared with forecasting individual time series on beers and soft drinks sales data. Aggregation often, but not always, leads to improved prediction performance. The benefit appears largest when the non-aggregation models show a tendency to over-fit, for example truncated trigonometric models with a relatively large number of harmonics.

Practical aspects of the systematic use of spectral decomposition for detection of seasonality/periodicity: Application to daily mortality data for cause of death between 1980 and 2000 in Portugal.

Paulo P. Nogueira, Emanuel E. Rodrigues
   Health observatory Portugal, Lisbon, Portugal

The systematic use of spectral decomposition is not a very common procedure. In this paper such methodology was applied to a batch of 803 data series of mortality by specific ICD-9 (3 digits) cause of death ranging from 1980 to 2000. METHODOLOGY: It was done a division on the study, with and without standardization of the data. In both cases it was carried out the following procedure: applied the Kolmogorov Ð Smirnov test in order to reject the hypothesis of the data set be a white noise. In the necessary cases, the linear trend was removed. It was done a stabilization of the variance, using the Box-Cox transformation. Data analysis was done calculating the Shuster's periodogram and statistical significance was obtained applying Priestley's and Whittle's test. RESULTS: Practical options for the systematic use of spectral analysis are reported. A thorough analysis of how results vary according to different options is presented.

Neural Networks and Seasonality

Bruce Curry
Cardiff Business School, Cardiff, UK

It is sometimes argued that feedforward Neural Networks (NNs) have a limited capacity to deal with seasonality in time series. If this is in fact the case, it contradicts the well-established universal approximation property, which provides the basis for use of NNs to implement flexible nonlinear regression. However, there are strong theoretical reasons why one should still have confidence that the network is indeed capable of modeling typical seasonal variation. These arguments are explored using the established result that a dummy variable representation of seasonality can also be re-expressed exactly in terms of sinusoidal functions. The latter are more convenient for further analysis.

Given the sinusoidal representation it can be seen in the first place that there is some risk of mis-specification: in applying a Neural Network to an autoregressive time series model one is in effect setting the network the wrong task. Secondly, the sinusoidal version of seasonality makes it convenient to invoke certain general theorems on NN approximation. It can then be shown that typical seasonal models indeed satisfy the conditions required for approximation, subject to suitable bounds which one would wish to apply regardless of the estimation technique employed.

Email: curry@cardiff.ac.uk

WC1

Contributed Session: State Space Models

Wednesday, June 15th 9:05 – 10:25 a.m.   Room: Pecos

Chair: Ester Ruiz
     Universidad Carlos III, Madrid, Spain

The Uncertainty of Inflation: Empirical evidence.

Esther Ruiz
     Universidad Carlos III de Madrid, Getafe, Spain

Carmen Broto
     Banco Bilbao Vizcaya Argentaria, Madrid, Spain

We propose to model the dynamic evolution of monthly inflation by an unobserved component models with QGARCH disturbances. The inflation is decomposed into a long-run, a seasonal and a transitory component. The seasonal component is assumed to be homoscedastic but the long-run and the transitory components have QGARCH disturbances that allow the heteroscedasticity to respond asymmetrically to positive and negative movements. Therefore, the model allows distinguishing whether the asymmetric conditional heteroscedasticity affects the short run, the long run disturbances of inflation or both. Furthermore, the model allows testing for the Friedman hypothesis that suggests that higher inflation levels lead to greater uncertainty about future inflation. We analyse the statistical properties of the model and the finite sample properties of a QML estimator of the parameters. The finite sample properties of the estimated autocorrelations of auxiliary residuals used to identify the conditional heteroscedasticity are also analyzed. Finally, we fit the proposed model to monthly series of inflation of eight OCDE countries. We conclude that for most of the series of inflation considered the conditional heteroscedasticity affects the long run component. In the countries where it is significant, we find a positive relationship between the level and the long-run uncertainty.

Extracting measurement and driving noise distributions in state space models using particle filters.

Michel Fuksa

Saint Paul University, Ottawa, Canada

Particle filters have revolutionized the practice of state space modeling by facilitating filtering in the cases where the system model equations are nonlinear and error noises are not necessarily Gaussian. The use of these techniques, among others, requires the complete knowledge of both the driving and measurement noise distributions which describe system behavior.

In practice, however, this may not always be the case: it is possible that information concerning either the measurement or system noises be incomplete. Most often, the precision of measurements is known relatively well, but the statistics of the driving noise are unknown. In this situation, the use of particle filtering may be compromised.

This paper explores the possibility of recovering the true distributions of measurement and driving noises using the particle filter methodology, even though these may not be explicitly known.

Email: mfuksa@business.carleton.ca

WD1

Invited Session: Transportation Forecasting

Wednesday, June 15th 9:05 – 10:25 a.m.   Room: Pecan

Chair: Caesar Singh
Research Development and Technology, U.S. Department of Transportation, Washington

Transportation towards the Swiss canton of Ticino

Miriam Scaglione
Institute Economie & Tourisme, Switzerland

The Ticino is the only Swiss canton wholly situated south of the Alps. Communications to and from it are therefore of central importance to its development. The aim of the present study is to model tourist transportation to the Ticino, using as data statistics regarding the overnight stays of Swiss and European travelers and transport data, on the basis of Time Series analysis. The paper is intended to provide the results which will prove three hypotheses. The first is that leisure tourists, irrespective of whether they are Swiss or European, prefer land transportation to the Ticino, whereas the business traveler tends to use air transportation. The second hypothesis is that European visitors prefer the Gotthard tunnel to all others: a ranking of the more important passes and tunnels is given for Swiss and European tourists. Thirdly, using the statistical property of cointegration, a sociological hypothesis about the perception of the Ticino as a leisure destination is attempted: the perception of this canton by both European and Swiss tourists is the same, i.e. it is perceived by both categories as a foreign destination.

Linking Economic Forecasting to Provide Better Management of Waterway Assets

Mark A. Thoma, Wesley W. Wilson
Department of Economics, University of Oregon, Eugene

Keith Hofseth, Bruce Lambert
Senior Economist, U.S. Army Corps of Engineers, Institute for Water Resources

The U.S. Army Corps of Engineers (USACE) constructs and maintains Federally sponsored navigable waterways in the U.S. Like most public agencies, the USACE is faced with increased pressures to prioritize maintenance expenditures within a limited budget framework. Traditionally, infrastructure maintenance expenditures relied upon peer review or consensus, with limited independent economic analysis supporting these decisions. While engineering models can predict percentages of system failure, the decision maker must evaluate the true cost of the maintenance, not only regarding maintenance budgets, but also the potential cost to public users of that facility. Given limited budgets, the decision maker must now choose between different levels and types of investment, such as maintaining current system performance (limited investment strategies), focusing on key "bottlenecks" or seeking to improve overall system productivity. Understanding both current and anticipated system usage over the budget period remains a critical key in any asset management framework. Knowing anticipated traffic volumes by location becomes critical in making the right investment in the right place at the right time.

This paper identifies a method of developing short run forecasts for river traffic that could be used as an input into the budgeting cycle. By using out of sample forecasting techniques and accounting for co-integration, a few key variables may provide predictive insights into regional waterway traffic patterns. These forecasts, developed for a period of one to five years, would provide some independent forecasts of short-term system usage and serve as a leading indicator of potential changes over time. These waterway forecasts, estimated for both the entire nation and specific waterway systems, may provide one method of comparing projects within the same waterway and across the nation and may assist in the creation of a more informed asset management strategy for the USACE.

Transportation Forecasting in the ERP/Supply Chain Management Environment

Caesar Singh
Research Development and Technology, U.S. Department of Transportation, Washington

Under a business operational environment transportation serves as a final transaction within the cycle of operations. For businesses adopting enterprise resource packages (ERP) and the supply chain management (SCM) systems, the tasks of planning and execution of transportation activities is critical to the overall costs and performance of the delivery of goods.

The paper presents a summary of the business process flows of the various components, from sales order processing to the distribution cycle. It highlights the transportation planning and execution processes and attempts to identify key areas of potential future research in forecasting to assist in further optimization of the overall transportation process.

Email: caesar.singh@dot.gov

WE1

Contributed Session: Demography

Wednesday, June 15th 9:05 – 10:25 a.m.   Room: Llano

Chair: Shahid Md. Ullah,
      Monash University, Melbourne, Australia

Demographically based global income forecasts up to the year 2050

Thomas Lindh, Bo Malmberg
      Institute for Futures Studies - Stockholm, Sweden

Demographic projections of age structure provide the best information available on long-term future human resources and demand. In current data fairly robust correlations between age structure and GDP and GDP growth have been discovered. In this paper we use these two facts and study the forecasting properties of demographically based models. Extending the forecasts to 2050 suggests that due to fertility decreases poor countries of today will start to catch up with developed economies in which the growth process will stagnate due to the growth of the elderly population. That remains the case whether or not indications of positive longevity effects are taken into account.

Functional models for mortality forecasting

Shahid Md. Ullah, Rob Hyndman
Monash University, Melbourne, Australia

Functional time series data arises when each observation in a time series consists of a smooth curve. For example, mortality rates are a smooth function of age and are observed annually. We discuss functional forecasting of mortality data where there are at least two populations of interest, such as the two sexes of a population, different states of a country, or different countries with similar characteristics. We introduce some of the ideas of functional linear modeling to extend the general linear model to allow a functional response and covariates. Particular attention is paid to developing models which give non-divergent forecasts. The methodologies are applied to Australian mortality data.

Email: Shahid.Ullah@BusEco.monash.edu.au; Rob.Hyndman@BusEco.monash.edu.au

WF1

Contributed Session: Forecasting methods and Decomposition

Wednesday, June 15th 9:05 – 10:25 a.m.   Room: Blanco

Chair: Charles Ellichman
       Angelo State University

Intelligent Feature Extraction for forecasting future state

Parag Kulkarni
       Capsilon Research Labs, Pune, India

Niranjan Mirasdar
       Symbiosis, Pune, India

In this paper we propose a pattern based forecasting method. This method uses feature vectors, which represent a state of the system. Method is based on quantitative information and pattern of the same. Behavioral pattern of the system is represented in terms of feature vector. All the patterns in learn-set are clustered and mapped to represent in the form of feature vector. E.g. people with same medical history and similar health parameters can be clubbed together to represent by a single feature vector. Based on inputs and pattern associated with the set to which existing state of the system the next state of the system is forecasted. The system uses statistical technique, Markov model with ANN to forecast next state. Learning of the system takes place based on historical data. When historical data is not available system starts with a standard model and learns incrementally. When the algorithm tested with 100 patents for forecasting future state and verified with experts' opinion it offer 98% success rate. The algorithm also tracks the exceptions an changes in pattern over the time

The Use of Alternative Bases in Forecasting Decomposition by Causal Forces

Charles C. Ellichman, Tom Yokum
       Angelo State University, San Angelo, USA

This research examines potential variations in the forecasting technique suggested by Armstrong, Collopy, and Yokum (2005). That article addressed decomposition through causal forces by dividing a series into two multiplicative components termed a base and a rate. The component and global forecasts are implemented by Holt\'s exponential smoothing technique. In this study, we looked at five series with five different bases in order to ascertain the effect of different bases on accuracy. The five series were from production, sales, and services. Each of these five series used as their base components: oil and gold prices, the Dow Jones industrial average, CPI, and population. Results demonstrated an average 65.5 percent reduction in MAPE.

Forecasting Univariate Time Series Using Automated Procedures

Romulo A. Chumacero
Central Bank of Chile and University of Chile, Santiago, Chile

This paper presents a rigorous framework for evaluating alternative forecasting methods of univariate time series. Automated procedures for model selection and evaluation of point, interval, and density forecasts are considered. As an example, these procedures are used to forecast Chilean inflation using linear and nonlinear time series models (Neural Networks and Threshold Models). A stand-alone executable file compiled with Gauss-Engine is soon to be made available.

Forecasting Retail Food Sales with a Decomposed Method

Huan Jiang
Stanford University, USA

Jerry Shan
HP, Palo Alto, USA

The traditional method for forecasting retail food spending (Sales) is to develop time series models directly from the Sales historical data; we call it the direct method. This paper proposes a new method which takes advantage of the findings that the Sales are closely related to the population and CPI, and that both the population and CPI have a much longer history that can be additionally utilized.

Our method first decomposes the Sales into unit sales, population and CPI, and then models them individually before integrating them back, and finally makes a forecast for the Sales. We call this method the decomposed method. Multiple traditional time series models (AR, MA, ARIMA and others) are studied and compared using both methods and empirical evidences have shown that the decomposed method often outperforms the direct method in terms of forecast accuracy. With the decomposed method applied to similar practical situations, it paves the way for a good likelihood that the planning and marketing functions can now not only improve their forecast accuracy but also gain much more useful insights into the data and data structure.

Email: wjiang@stanford.edu

WG1

Invited Session: Presenting Forecasts

Wednesday, June 15th 9:05 – 10:25 a.m.   Room: Nueces

Chair: Rogelio Oliva
   Mays Business School, Texas A&M University

Presenting Credible Regression-based Forecasts: Some Tips and Tricks

Roy L. Pearson
   Chancellor Professor, School of Business, Williamsburg, USA

Build the right model and your forecast will be used: that is the message sent by forecasting texts and literature, where modeling the data gets nearly all the attention. However, a forecast will not be used unless it is information the users need, they understand it, and they conclude that it is credible.

This PowerPoint presentation identifies some key issues and ways to resolve them in preparing credible forecasts. The context is a business forecaster preparing a monthly one-year-ahead forecast for a product group or major product line, where the decisions to be made have significant bottom-line impact and causal forces are an issue. Regression is the most widely used multivariate method, so it is the assumed method of choice. The target audience includes different functional areas (e.g., marketing, production, logistics, finance), and the goal is adoption of a consensus forecast to be used by all areas.

Issues include selection of independent variables, their accessibility and forecast error; dealing with seasonality; the role for lags and dummy variables; explaining what the model says; presenting the forecast; and providing an assessment of probable forecast error. Examples illustrate some common mistakes as well as recommended practices, derived from a variety of sources.

E-mail: roy.pearson@business.wm.edu

WH1

Contributed Session: Sports Forecasting

Wednesday, June 15th 9:05 – 10:25 a.m.   Room: Frio

Chair: Herman Stekler
        George Washington University

Forecasting baseball performance using Neural Net Analysis

Owen P. Hall Jr., Samuel L. Seaman
        Pepperdine University Malibu, CA, United States

The total payroll for major league baseball (MLB) in 2004 was a staggering $2.1 billion! The enormous sum required to field a competitive baseball team suggest the need for a more analytical approach toward player selection and team composition. The growing ability to predict team performance via analytical modeling makes it possible to design a baseball team that optimizes performance and costs. The purpose of this paper is twofold: 1) to evaluate MLB team performance over the past five years using neural net analysis and 2) to describe a process for assessing individual player contributions, veterans and new recruits, to overall team performance. This analytical paradigm for "engineering" teams has a wide range of applications including the design of management organizations.

How well do betting exchanges forecast event outcomes?

Leighton Vaughan Williams, David Paton
        Nottingham Business School, Nottingham Trent University, Nottingham, UK

Michael A. Smith
        Canterbury Christ Church College, Canterbury, UK

In recent years, person-to-person wagering on 'betting exchanges' has become an increasingly important medium for betting on sports, finance and special events. Some have argued that betting exchanges represent unfair competition to traditional bookmakers. Others argue that betting exchanges have brought about significant efficiency gains by lowering transaction costs for consumers and that they generate less biased forecasts of future event outcomes. We test the latter hypothesis using matched data from betting exchanges and from traditional betting media. Our findings support the hypothesis that forecasts obtained from betting exchanges are less biased than forecasts obtained from traditional betting markets.

Is There a Consensus Among Forecasters of NFL Games: A New Approach

Herman Stekler, Chiung Song, Bryan Boulier
George Washington University, Washington DC, USA

The term "Consensus forecast" has been defined as the mean (median) of a set of quantitative predictions. Kolb and Stekler(1996) challenged this definition and argued that the existence of a "consensus" (or agreement among forecasters) could only be determined by examining the entire distribution of predictions. Previous discussions have only been concerned with quantitative forecasts and are not relevant when the forecasts involve binary decisions: up-down or win-lose. We use the Kappa coefficient for this." a measure of agreement among binary choices to evaluate forecasts of NFL games. This statistic is applied to the forecasts of 74 experts and 31 statistical systems that predicted the outcomes of games during two seasons. We conclude that the forecasters, particularly the systems, displayed significant levels of agreement.

Email: hstekler@gwu.edu

WI1

Contributed Session: Weather Forecasting

Wednesday, June 15th 9:05 – 10:25 a.m.   Room: Mesquite

Chair: William M Briggs
        Cornell University

ARIMA models for summer and winter mean temperature at a centre under Sub-Himalayan region of India

Swaraj Kumar Mukhopadhyay
        Department of Agricultural Statistics, Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India

Statistical modeling of monthly mean temperature data for a station belonging to the Sub-Himalayan Meteorological region of India, during the period 1901-2002 have been studied by the stochastic approach on time series analysis. Twelve months temperature data have classified into two variables viz. summer mean temperature and winter mean temperature. ARIMA models by Box - Jenkins method have been used to construct the stochastic models for the two variables separately on the basis of univariate time series analysis. Time domain and frequency domain procedure suggest the identification, estimation, diagnostic checking and forecasting of ARIMA model for the summer mean temperature and winter mean temperature of the centre separately. The models are fitted by AIC method. Minimising the criterion and verifying the resultant residuals as white noise the model have been developed. Based on the fitted model forecast for the summer mean temperature and winter mean temperature up to 2008 have been estimated. White noise residuals are stationary having no autocorrelations and spectral density function have been applied to detect the hidden periodicity of the residuals.

Value of Quantitative Precipitation Forecast Information: A Methodological Review

Asim Zia, Rebecca Morss, Jeff Lazo
        National Center for Atmospheric Research, Boulder, Colorado, USA

An important area of research related to developing high-valued forecasts for decision-makers is the development and use of methodologies that elicit the value of the forecast information. To address this important area, we have undertaken a review of methodologies that elicit the socioeconomic value of weather forecast information. Focusing on precipitation forecast information, an area that is currently of major interest in the weather forecasting community, we have performed a qualitative meta-analysis of previous studies that aim at eliciting the value of forecast information to individual or organizational decision-makers. In this paper, we identify, compare, and critique the methodologies used in these studies. The methodologies include Bayesian and descriptive decision models, economic valuation models, sector-specific operational models and ecological models. The results of the methodology review and meta-analysis indicate that there is no single best methodology to elicit value of precipitation forecast information in all decision contexts, nor have all the identified methodologies have been tested with empirical data. The research project also identifies knowledge gaps in specific methodologies and provides guidance for future research on the valuation of weather and related forecast information.

On the optimal combination of probabilistic forecasts to maximize skill

William M Briggs
Weill Med. of Cornell University, New York, USA

We seek the best linear combination of forecasts of dichotomous events to maximize skill and value. An expert forecast for a dichotomous event has skill when it is accurate more often than the optimal naive forecast. A forecast has value when the expected loss using that forecast is less than the expected loss of the optimal naive forecast. The optimal naive forecast depends on the unconditional probability of the event being forecast and the loss one suffers from an incorrect forecast. The optimal naive forecast either always says the event will not happen, or that it always will happen.

Forecasts can be dichotomous or probabilistic. If two forecasts for the same event are given, we prove that if these two forecasts are dichotomous then the best linearly weighted combination assigns weight 1 to the forecast with the higher skill, and assigns weight 0 the forecast with the lower skill. If the two forecasts are probabilistic, we show how to estimate the optimal linearly weighted combination. This method generalizes to more than two probabilistic forecasts. Examples and applications from weather and climate forecasts are given.

Email: wib2004@med.cornell.edu

WJ1

Poster Session

Wednesday, June 15th 9:05 am – 12:00 pm   Room: Chula Vista Boardroom

Forecasting of Indonesia's annual CO2 emission based on a non-linear time series method

Subarna Dadang

   LAPAN, Indonesian Aeronautics and Space

Indonesian's industries progress increase rapidly in the last five decades, especially in petroleum industries and the fossil fuel utilities. In the combustion of any fossil fuel, carbon is oxidized and CO_2 is released to the atmosphere. Consequently, an increase of the concentration of these 'greenhouse' gases in the Earth's atmosphere could lead to considerable global temperature increases and other climatic changes. One of these gases is carbon dioxide (CO_2), which is emitted to the atmosphere through both human activities and natural processes. Forecasting of CO_2 emission is very important for decision making of the Indonesian government. Annual CO_2 emission data of Indonesian country was used of beginning 1889 to 2000. A nonlinear time series method was used to predict CO_2 emission for next 6 years. Found out the best parameter for prediction was delay time 30, embedding dimension 6 and coefficient of correlation 0.8 between prediction and observation data. The result of prediction for six years later will increase the beginning 2004: 98764.56, 2005: 99387.09, 2006:98740.441, 2007:111991, 2008:122368.3, 2009:124069.3 (unit in thousand metric tons). This prediction would advise for government policy to control CO_2 emission based on the Kyoto protocol ratification.

Email: dangsub@yahoo.com

The Common Latent Factor Model for Credit Rating Transitions

Andre A. Monteiro, Andre Lucas

   Faculty of Economics, Free University Amsterdam, the Netherlands

We introduce a new reduced-form model for rating transitions whose dynamics are driven by an unobserved stochastic process. Previous studies have shown that, despite their relevancy, macroeconomic variables are insufficient for fully explaining the dynamics of credit rating migration probabilities (including default probabilities). Accordingly we propose a fully parametric intensity-based multi-state duration model driven not only by covariates but also by a univariate dynamic latent factor. The model has a generalized semi-Markov structure thus providing enough flexibility for accommodating many of the stylized facts of the credit rating migration process acknowledged in the literature. We rely on a Simulated Maximum Likelihood estimation procedure for calibrating the model. As a by-product, filtered estimates of the latent process are obtainable which are interpretable as an indicator of the stage of the Credit cycle. We describe a bootstrap procedure to derive the implied short and medium-term forecasts for the credit rating Transition matrices. The use of this new methodology is illustrated empirically using Standard & Poors' database on credit ratings.

Email: amonteiro@feweb.vu.nl ; alucas@feweb.vu.nl

The Application of Neural Network in Setting Up the PE Teaching Exercise Prescription

Xiuping Du, Pilian He
Tianjin, China

In the paper, in order to evaluate the student's body diathesis, we measured four grades:
1000m(male) / 800m(female), 50m, chin-up(male) / sit-up(female) and standing long jump. In order to compare the influence on the body diathesis with different teaching content(PE item) we chose three PE curriculums: WuShu, PE dance and yoga. In addition, the measure on a student's physical check-up included stature, avoirdupois, circumference and vital capacity etc. According to these data, we set up the undergraduate PE management system. To make advice on PE curriculum choosing for undergraduates and improve the teaching effect, we set up the undergraduate exercise prescription system. Making use of the self learning ability of neural network, choosing student's gender, age, PE curriculum, body figure grade, body enginery grade, body diathesis estimate item, and body diathesis estimate grade as input variables, choosing the grade rising or falling as output variable, we trained the neural network and set up the undergraduate exercise prescription system. In the course of practice teaching, we recommended PE curriculum to 30 students in a class by the exercise prescription, the result showed 65% students achieved expecting target and the system had applying value.

Email: duyu@eyou.com; plhe@tju.edu.cn

The Hydropower Management System Based On Neural Network

Xiuping Du, Pilian He
Tianjin, China,

In order to solve the problem of drawing management in the hydroelectric station, the author designed drawing management system and offered the object model for adding drawing to the database. Because there were already many existent electric drawings, they must be accepted in this new system. One of the difficulties was to distinguish the title fields of drawing when we get information from it. Because of the advantages of neutral network study capability, the author utilized it to extract the title fields. The paper focused on the variables choices for inputting and outputting in neutral network, the training algorithm for distinguish title fields in neutral network, as well as the algorithm of practical application in this system. The results show that the correct recognition ratio reaches 96.7% while using neutral network to extract the title fields. The author integrates this method into the system that makes the system more efficient."

Email: duyu@eyou.com; plhe@tju.edu.cn

El-Dorra - Neuronal Network Technology-Remind and Optimization.

Abdallah Omari
Adrar, Algeria

The objective of this paper is to determinate algebraically the exact number of hidden layers necessary to solve a problem of N types, and also the number of neurons in each one. We propose here a problem more complicated than the XOR problem named the AXOR and we present its solution.

Email: omariabdallah@maktoob.com

Radial Basis Function Networks for Classification and Prediction

Indir Jaganjac
Computer engineer, Zenica, Bosnia and Herzegovina

This paper presents results obtained by applying Radial Basis Function (RBF) networks on UCSD Data Contest 2004 datasets, which were produced by mass-spectrographic measurements of air-pollution. There are two tasks: classification and prediction. Datasets contain 30000 observations of 702 variables.

First, pre-processing was done on datasets in three steps:

1. Missing values were managed by: a) Interpolations with cubic spline for 701 column vectors, b) Reconstruction with estimation of ARX model. Better results were obtained with cubic spline interpolations.

2. Testing for linearity and Gaussianity. The glstat detection test was performed on 41 selected variables for 30000 time steps: diameter of particle, 20 positive mass/charges and 20 negative mass/charges. It showed that datasets are non-linear and non-Gaussian.

3. Dimensionality reduction was done with Principal Component Analysis (PCA). The number of variables was reduced from 702 to 125.

Since datasets are both non-linear and non-Gaussian, RBF networks are used. RBF networks have short training time (design time), reasonable execution time, many neurons and very high accuracy. The results were computed in 6 minutes for classification and 9 minutes for prediction, on Intel Pentium 4 (1.8 GHz) and 512 MB of RAM.

Email: ijaganjac@yahoo.com

An Algorithm for Saving the Memory Utilization in the 1-D Cerebellar Model

Chiang Wang, Cheng-Chih Chien
Taipei, Taiwan

The cerebellar model with the merits of simple algebraic operations and local update of weighting number (value) can replace the neural network (with the shortcomings of long-time learning). In this paper, a judging method by the function's slope is adopted to save the district value of average in the same memory when the variation of the output is not great, so the memory utilization can be saved effectively. Hence, the learning effect can be improved and the practical hardware cost can be saved.

Email: johngaliano@ms86.url.com.tw; chien@ee.tku.edu.tw

How to combine forecasts with short history but large number of forecasters

Michael Greszta, Wojciech Maciejewski
Warsaw University, Warsaw, Poland

Main goal of the paper is to find the "best" combining method for macroeconomic forecasts of economy in transition: when there are so many forecasters but history of forecasting is very short.

Our previous investigations show that classical forecasting methods (variance-covariance, regression, Bayesian methods) are very often worse than simple arithmetic mean or median. This is the result of unstable weights of particular forecasts. As a consequence, combining problem in transition countries should be resolved in the different way that in OECD countries.

Our suggestion is to extend set of forecasters but reduce number of combining methods. We use all forecasts (not only regular published) from our Macroeconomic Forecasts Database and apply only the simplest combining methods: arithmetic mean, median and trimmed mean. Since there is a trade-off between number of forecasts combined and maximum forecasts' horizon, we detect the optimal number of forecasts taking into account. Our analysis is focused on three categories (GDP, CPI and unemployment rate) for the period 1995-2004 for Poland. Reduce of average forecast error for the best methods is substantial.

Email: m.greszta@uw.edu.pl; Wojciech.Maciejewski@mercury.ci.uw.edu.pl

Already some credit cards, why need a debit card?---Forecasting consumer debit card adoption

Wen Yin
Garden City, US

In addition to the many benefits that debit cards can offer (no risk of chargeback, increased revenues, direct fund transfer, reduced bad check loss, reduced employee theft, and cash-back option), Debit card transaction cost significantly less than credit card transaction to retailers. Despite debit cards' advantages, the speed of adoption of debit cards remains low possibly because of the prevalence of credit cards. This study sets off to forecast consumers' debit card adoption and investigate whether consumers' decision on adopting debit cards is contingent upon weighing the utilities from using debit cards vs. the utilities from using credit cards. Neural network model is utilized to model the marginal rate of substitution (MRS) to accommodate a nonlinear utility function and variable MRS between debit card and credit card attributes. Using data from a credit union, the study finds that neural network model provides an appropriate solution to the debit card adoption question by incorporating demographic characteristics and debit and credit card features in MRS.

Email: yin@adelphi.edu;

WA2

Feature Session: 25 Years of Energy Forecasting
Wednesday, June 15th 10:40 am – 12:00 am   Room: Live Oak

Chair:

Reinaldo Castro Souza
 Pontificia Universidad Catolica, Rio de Janeiro, Brazil

A Review of the Past 25 years of Research and Practice in Energy Forecasting

Derek W. Bunn
 Professor and Chair of the Decision Sciences area, London Business School, UK

The energy sector has always shown an appetite to adopt leading edge methodologies in forecasting and so the history of research and practice in this sector has been a mirror of forecasting thinking in general. Furthermore, the past twenty five years have witnessed many structural changes, particularly the "commoditisation" of gas and power, and the emergence of all the main energy businesses: oil, gas power and coal, as high risk financial prospects. This review is a selective one, seeking to identify the major changes in forecasting approaches over these years, some of the successes and failures, and the increasing emphasis upon price and corporate performance, as well as demand forecasting.

Derek W. Bunn is Professor and Chair of the Decision Sciences area. He is internationally known for his work in energy forecasting and economics. He has published extensively among books: Modeling Prices in Competitive Electricity Markets (Wiley); Applied Decision Analysis (McGraw-Hill), plus over 160 research papers in academic journals.

His present research interests are in Business forecasting, decision technology, electricity and energy economics. He is the Chief Editor, Journal of Forecasting, Honorary Editor, Energy Economics, Associate Editor of several other academic journals, and consultant to UK and international organizations.

Email: dbunn@london.edu

WB2

Invited Session: Rule based forecasting II

Wednesday, June 15th 10:40 am – 12:00 am   Room: Directors

Chair: Monica Adya
          Marquette University

Rule based Forecasting – The next decade?

Rule-based Forecasting (RBF) has evolved to be an effective forecasting method that combines forecasts from four extrapolation methods based on features of time series and the domain. While much has been achieved in validating and improving RBF, significant work remains. This panel will discuss potential research directions for RBF. Panelists will present the current limitations on RBFs performance that have emerged in the M3 competition. Furthermore, little research has been done on the transferability of forecasting principles outside the automated environment. Participants of this panel will discuss a range of solutions to some of these needs.

Panelists:

Fred Collopy
          Case Western Reserve University

Michele Hibon
          INSEAD

Konstantinos Nikolopoulos
          Lancaster University

Monica Adya
          Marquette University

Email: monica.adya@marquette.edu

WC2

Invited Session: Presidential Elections forecasting: A survey of methods II

Wednesday, June 15th 10:40 am – 12:00 am   Room: Pecan

Chair: Randall J. Jones, Jr.
         Professor, University of Central Oklahoma

The Presidential Primaries Model

Helmut Norpoth
         Dept. of Political Science, Stony Brook University

A forecast model using primary elections as a key predictor picked George W. Bush as the winner of the general election in 2004 with 95 percent confidence as early as January. In addition, the model also relied on long-term partisanship and a presidential vote cycle estimated by means of an autoregressive process. The parameters of the model were statistically estimated with data from presidential elections since 1912, going back farther, and thus covering more elections (23), than any other forecast model known to the author. This vote model, in a post-facto sense, picks the winner in all but one of the elections from 1912 to 2000, deviating from the actual results by no more than 2.5% on the average. The lone miss occurs in 1960, the closest contest in the 20th century. For elections since 1952, the primary-support measure relies solely on the New Hampshire primary. Also note that the model is capable of making forecasts for any incumbent-party candidate against any candidate of the other party. In 2004, none of the Democrats would have fared any better against Bush than John Kerry. The forecast of the Bush-Kerry race, first posted on January 29, 2004, gave Bush 54.7% of the major-party vote.

The Keys to the White House: Forecast for 2008

Allan J. Lichtman
         Professor of History, American University

The Keys to the White House are a historically-based prediction system that retrospectively account for the popular-vote winners of every American presidential election from 1860 to 1980 and prospectively forecast well ahead of time the winners of every presidential election from 1984 through 2004. The Keys give specificity to the theory that presidential election results turn primarily on the performance of the party controlling the White House and that politics as usual by the challenging candidate will have no impact on results. The Keys include no polling data and consider a much wider range of performance indicators than economic concerns. Already, the Keys are lining up for 2008, demonstrating brighter prospects for Democrats to recapture the White House than the conventional wisdom.

The Pollyvote: The Combination Principle in Forecasting Applied to the 2004 Presidential Election

Alfred G. Cuzán
> The University of West Florida

J. Scott Armstrong
> The Wharton School

Randall J. Jones, Jr.
> University of Central Oklahoma.

The outcome of the 2004 presidential election was forecast by applying the combination principle, a procedure which in other contexts has been shown to reduce forecast error. This forecasting technique involved averaging within and across four categories of methods (polls, Iowa Electronic Market quotes, quantitative models, and a Delphi survey of experts on American politics) to compute a combined forecast of the incumbent's share of the two-party vote. We called the resulting average the Pollyvote, because it was derived from many methods and applied to a political phenomenon. When tested across the 163 days preceding the election, the mean absolute error of the Pollyvote predictions was only three-fourths as large as the error of the next most accurate method. Gains in error reduction were achieved for all forecast horizons.

Email: ranjones@ucok.edu

WD2

Contributed Session: Transportation Forecasting

Wednesday, June 15th 10:40 am – 12:00 am   Room: Pecos

Chair: Brian W. Sloboda
    US Department of Transportation, Bureau of Transportation Statistics

Short-term railway passenger demand forecasting via a parsimonious multi-layer feed-forward neural network

Tsung-Hsien Tsai, Chi-Kang Lee, Chien-Hung Wei
    Department of Transportation and Communication Management, National Cheng Kung University, Tainan, Taiwan

This paper will address the issue of input selection for short-term railway passenger demand forecasting using multi-layer feed-forward neural network (MLFN). The relationship between the number of input variables and model parsimony has trade-off effect. If the use of an extra input variable can increase forecast accuracy, then it is effective. Otherwise, it only increases model complexity. We design a new architecture based on MLFN to use input variables as parsimonious as possible for the interest of data, which is non-stationary, non-trend and with strong weekly pattern. Two traditional methods, instinctive selection according to prior knowledge and statistical selection based on ACF and PACF values, are used to select input variables and construct models. The forecast accuracies of three models based on different mechanisms of input selection are compared. The result shows three interesting outcomes. First, cautious selection of input variables can not only improve model parsimony but also increase forecast accuracy for MLFN. It means that irrelevant inputs may be detrimental to model performance. Second, the proposed architecture can make the model maintain parsimony without sacrificing forecast accuracy. Third, MLFN with the proposed architecture can also maintain an identical input set and simplify the process of input selection.

NAFTA and Regional Economies: Trade, Economic Development and Trade Corridors

Vincent W. Yao
    Institute for Economic Advancement, University of Arkansas at Little Rock, USA

This paper evaluates the economic impacts of NAFTA on regional economies at the state level. Most of states in US have gained more trade with NAFTA partners in the 1990s and early 2000s. However, the gains are not geographically even everywhere. The top states gaining the most trade are usually located in the manufacturing belt. The manufacturing states and those on the borders have benefited from the rapidly-growing trade with NAFTA partners. These states also attracted more foreign capital investment than others. Besides trade and capital flows, some states have also benefited from providing transportation and logistics services, which are one of the most important incentives for NAFTA trade and agglomeration. The top trucking states are also clustered along the states between Rocky Mountain and Appalachian Mountain. Thus, there is also a transportation belt or corridor in US, which is overlapped with trade corridor.

Vehicle-Based Demand Modeling: A New Approach

Michael Golias

Department of Civil and Environmental Engineering, Rutgers University, State University of New Jersey

Linear regression, a predictive tool used in transportation demand modeling, performs poorly under limited training data, resulting in models difficult to validate. In this paper a new methodology addressing this problem is proposed. This approach produces better models than ordinary linear regression and allows cross-validation testing to be performed under a small number of training cases. A case study is used and results are compared to a linear regression and a 4-step demand prediction model.

The Effects of Effects of Deregulation on the Wages in the Transportation Industry: A Structural Modeling Approach

Brian W. Sloboda

Bureau of Transportation Statistics, U.S. Department of Transportation, Washington, DC, USA

Many of the prior empirical studies looking at the effects of deregulation on transportation industries, namely motor carrier and railroads have focused on a cross-sectional approach. The disadvantage of the cross-sectional approach is that this approach just examines the effects at one point time, and this approach does not allow the examination for a complete assessment of the effects of deregulation over time. These analyses will the use of structural modeling methods as espoused by Andrew Harvey and others; more importantly, structural modeling will analyze the effects of deregulation on wages in the transportation modes of motor carrier, rail, aviation, and possibly water transportation. The use of time series methods as opposed to the cross-sectional approach allows for control of the macroeconomic effects represents another significant advantage for use of time series methods.

Email: brian.sloboda@dot.gov

WE2

Contributed Session: Demography II

Wednesday, June 15th 10:40 am – 12:00 am   Room: Llano

Chair: Angi Roesch
FOM University of Applied Sciences, Munich, Germany

The Time-lag between the U.S. – Mexican Border and the interior apprehensions of Mexican undocumented labor

Gokce Soydemir, Alberto Davila

University of Texas-Pan American – Edinburg, USA

We conduct an analysis separately for border and interior apprehensions. Our analysis determines whether economic conditions in the United States and Mexico influence the timing of this relationship and also the size of the illegal population in the interior of the country. In this study, we also present empirical evidence that workers will migrate in response to higher wages for an equal amount of work, rather than simply higher wages as the standard immigration theory predicts. While extant literature on undocumented immigration adjusts for inflation when comparing wages between Mexico and the United States, it does not account for productivity differentials between the two countries.

Stochastic population forecasts using functional data analysis

Rob J. Hyndman

Monash University, Clayton, Australia

Heather Booth

Australian National University, Canberra, Australia

We present a new approach for stochastic age-specific population forecasting by applying functional forecasting to the three components: mortality, fertility and net migration. Functional data analysis (FDA) is used to model and forecast mortality and fertility rates for Australia for the period 2004-2029, based on data up to 2003. The residual, composed of net migration and error, is estimated for past years as the difference between the annual population count (estimated resident population) and successive populations one year ahead derived from a projection using fertility and mortality. The residual is then also modeled and forecast using FDA. The three forecasts are used in the stochastic cohort-component method to obtain an age-specific forecast of the population. Probabilistic prediction intervals are also provided.

Immigration and Stable Populations

Angi Roesch
FOM University of Applied Sciences, Munich, Germany

In stochastic demography, the effect of initial population age distribution on its subsequent evolution can be described in terms of reproductive value and the stable equivalent population. The concept of population momentum measures the increase in population which is due to the current age structure after the initial fertility has been dropped to a mere replacement level.

Classical stable population theory assumes that a population is closed with respect to immigration. Several efforts have been made, however, to allow for immigration.
We consider an age-structured population which is \'fed\' with a stream of immigrants in each period of time. Its dynamics is described by a Leslie-type projection model incorporating immigrants' mortality and fertility rates that may differ from those of the natives. It is shown how the notions of reproductive value, stable equivalent ratio and population momentum carry over.

The population's development from the perspective of its individuals is concerned in the definition of genealogies which is based on the transformation of the model into a Markov chain.

Email: angi.r@t-online.de

WF2

Contributed Session: Volatility

Wednesday, June 15th 10:40 am – 12:00 am   Room: Blanco

Chair: James W. Taylor
        Said Business School, Oxford, UK

A Two Factor Long Memory Stochastic Volatility Model

Helena Veiga
        Universidad Carlos III de Madrid, Madrid, Spain

In this paper, we propose a two factor long memory stochastic volatility model (2FLMSV). The volatility, which is not observable, is explained by a short run and a long-run factor. The short-run factor follows an autorregressive process that is stationary and the long-run factor is integrated fractionally as in Breidt et al. (1998) or in Harvey (1998). The purpose of this volatility factor is to fit the long memory observable in squared observations. The introduction of both volatility factors into the model allows the model to generate extra kurtosis, helps accomodating volatility persistence of the squared returns and contributes for small first order autocorrelations of the squared observations. We use the Efficient Method of Moments (EMM) proposed by Gallant and Tauchen (1996) for estimation and testing purposes. The empirical results show that the 2FLMSV model performs slightly better than the benchmark models.

Volatility transmission between the crude oil market and the stock market

Harald Schmidbauer
        Istanbul Bilgi University, Istanbul, Turkey

Crude oil prices have experienced dramatic fluctuations in recent years. News from the crude oil market will impact the stock market; generally news will act on the crude oil market as well as on the stock market.
Periods of high volatility often occur simultaneously in different markets, in other words: Volatility is transmitted from one market (or asset) to another. Understanding the laws of volatility transmission is essential for assessing the risk that is incurred when operating in the crude oil market and the stock market simultaneously. We use a novel bivariate asymmetric GARCH model, which allows for a stochastic conditional correlation process, to investigate joint conditional volatility processes in time series of returns on crude oil and stocks. One of our findings is that an increase in crude oil prices increases overall risk to a much higher extent than a decrease, and our model can quantify this effect.

Asymmetric adjustment of realized volatility of stock returns

Elena Goldman, Jouahn Nam
        Lubin School of Business, Pace University, New York, USA

Jun Wang

Baruch College, CUNY, New York, USA

We investigate non-linearities in the dynamics of realized daily volatility of 30 companies in the DJ30 index using 5-minute returns data. We use multiple threshold autoregressive (TAR) model and find that the process can be characterized by regimes of high, moderate, and low volatility. We find different regime-dependent degrees of persistence or mean reversion and variance of volatility changing with regime. The advantage of TAR model is that it is more flexible than a linear model and allows to capture frequent jumps in realized volatility.

The TAR model is estimated using a Markov Chain Monte Carlo Algorithm, which is more efficient than other algorithms in literature based on a search on a grid of points for the threshold parameter. The Metropolis-Hastings algorithm with efficient jump allows to
estimate multiple thresholds with reasonable computation time. For model selection and specification several techniques are used such as marginal likelihood and information criteria, as well as estimation with and without truncation restrictions imposed on thresholds.

We find that TAR model forecasts of realized volatility are more accurate than forecasts produced by models with fractional integration, the latter were earlier found in literature to produce superior forecasts for realized volatility compared to other popular models.

Smooth transition combining of volatility forecasts

Wei Chong Choo, James W. Taylor

Said Business School, Oxford, UK

Considerable attention has been given to the use of combinations of point forecasts. By contrast, combining volatility predictions is far less common. In this paper, we compare a number of methods for combining the widely used volatility forecasting approaches, including GARCH models and option-implied volatility. In particular, we investigate the use of smooth transition combining, which has not previously been used for volatility forecasting. This approach allows the combining weight to vary over time according to the value of a transition variable. Several transition variables are considered, including the size and sign of the previous period of shock, and also the trading volume. We evaluate the forecast accuracy of individual methods and combinations using stock index data. Of the individual methods, the most accurate were the GJR-GARCH model and implied volatility. Combinations of these two methods led to improved accuracy, with the best results achieved using the simple average and smooth transition combining. Interestingly, we found benefit in the use of the trading volume as a transition variable.

Email: wei-chong.choo@wolfson.oxford.ac.uk

WG2

Contributed Session: Forecasting methods and Decomposition

Wednesday, June 15th 10:40 am – 12:00 am   Room: Nueces

Chair: John E. Boylan
   BCUC, Buckinghamshire, UK

Parametric, Non-Parametric and Hybrid Approaches to Intermittent Demand Forecasting

John E. Boylan, Laurie Smith
   BCUC, Buckinghamshire, United Kingdom

In recent years, improvements in parametric forecasting approaches for intermittent demand have enabled forecast biases to be reduced. These approaches are based on assumptions of Bernoulli or Poisson demand processes. Empirical studies have shown these assumptions to be reasonable in practice for most items within a stockist's range. However, if demand is also lumpy (i.e. demand size is highly irregular), then it is difficult to characterize the overall distribution of demand accurately.

An alternative non-parametric approach, based on bootstrapping, has been proposed by American researchers and tested on empirical data. Bootstrapping has the merit of being a distribution-free method; enhancements have been suggested to take into account autocorrelation of demand and generating demands not previously observed. A weakness of this approach is that, for sparse data, there may be very few observations from which to select.

In this paper, a hybrid approach is suggested, where the occurrence of demand incidences is generated using a Poisson distribution and the demand sizes are bootstrapped. The parametric, non-parametric and hybrid approaches are tested, via extensive simulations, on a wide range of scenarios. The results show that the hybrid approach is very promising.

Characterizing Prediction Bias From a Designed Experiment

C. Roger Longbotham
   Amazon.com, Seattle, WA, USA

Bias in the predictions from a designed experiment may come from many sources. Some of these are model misspecification, changing variable effects over time, measurement bias, input bias, etc. However, even when none of these are causing the model to be biased, the predictions from a designed experiment may still be biased. In this paper I will explain the source of the bias and give a method to calculate the amount of bias for a common approach to analysis of designed experiments that is used by practicing statisticians. I will also explore how this bias could be estimated for a particular set of collected data.

Dynamic Mergence of Quantitative Model Based Forecasts with Judgmental Call Based Forecasts

Jerry Z Shan

HP, Palo-Alto, USA

Businesses today are under intense pressure to compete in an environment of low visibility, tight deadlines and reduced profits. One key to being successful in this environment is having timely and accurate business performance data that reflects the states of the current time and the foreseeable future time. With the recent advent of numerous forecasting systems, quantitative forecasts based on rigorous models are gaining more and more ground in the field of operation. On the other hand, business managers often still have their judgmental forecasts with varying degrees of merits. Some important questions arise: How do we consolidate the two on a solid basis? How do we build a quantitative model that takes judgmental calls and achieves convergence to the final actual?

In this article, we describe a solution that we have developed in addressing this issue. We quantify the judgmental forecast by building a prior distribution, and employ the Bayesian modeling techniques in adjusting and updating the prior beliefs in the light of the newly available data to produce a more refined set of beliefs on the predictions. We illustrate our solution through a successful service that we at HP provided to P&G Company for their product shipment forecasts.

Email: jerry.shan@hp.com

WH2

Contributed Session: Potpourri

Wednesday, June 15th 10:40 am – 12:00 am   Room: Frio

Chair: Haiyan Song,
        The Hong Kong Polytechnic University, China

Forecasting Jury Verdicts When Remedial Tactics Are Used in Auditor Negligence Litigation

Rick C. Warne
        University of Utah, USA

Auditor litigation is a topic of particular interest to both practitioners and academics. Society desires an economically efficient outcome in regards to negligence litigation. This project investigates courtroom tactics that may help an auditor forecast the likelihood of a favorable jury outcome. Prior research has shown that outcome effects cause jurors to experience negative affect (emotion) thereby increasing negligence judgments against the auditor. Research relating to medical malpractice suggests that medical service providers who offer their patients an apology for medical mistakes significantly reduce their liability for these mistakes. The current study examines whether remedial tactics (apology and justification) in auditor negligence litigation reduce guilty verdicts against the auditor. The results of this study show that apology and justification tactics alone significantly reduce guilty verdicts compared to the control group. However, the number of guilty verdicts for the group receiving both remedial tactics did not differ significantly from the control group. These findings may help accountants forecast the likelihood of victory if a case goes to trial. The results suggest that remedial tactics may reduce liability damages by mitigating the negative affect jurors experience against the auditor.

Improving Forecasting Accuracy by Combining the Forecasts of Tourism Demand Models

Haiyan Song, Kevin Wong, Stephen F Witt
        The Hong Kong Polytechnic University, Hong Kong, P. R. of China

This project sets out to examine the ways in which forecasting performance can be improved by using different forecasting combination techniques in the context of the demand for Hong Kong tourism. In practice tourism forecasters tend to select the 'best' forecasting method from a number of competing models based on their forecasting error magnitude. However, Song and Witt (2000) found that no single forecasting technique is superior to other models in all situations, as the relative performance of forecasting models tends to vary across destinations and forecasting horizons. Various modern econometric techniques shown by Song, Witt and Jensen (2003) to perform well in tourism context will be considered in this forecasting combination exercise. The main aim of this study is to improve forecasting performance by combining the advantages of each econometric model. It is expected that the combined forecasts will be more accurate and stable than any of the individual forecasting models. The combination methods considered in the study include variance-covariance combination, discounted mean square forecasting error (MSE) combination, and Bayesian shrinkage forecast combination. The empirical results of this project should provide more accurate and reliable information about the future demand for Hong Kong tourism and allow the government and businesses to make appropriate tourism related decisions in order to meet this demand.

Email: hmsong@polyu.edu.hk

WI2

Contributed Session: Behavior of Prices

Wednesday, June 15th 10:40 am – 12:00 am   Room: Mesquite

Chair: Roy A. Batchelor
        Cass Business School, UK

Skewness and Asset Returns Predictability

Stoyan Iliev
        PhD Candidate in Finance, Queens University, Ontario, Canada

We evaluate a conditional density model allowing for a linear process in the volatility, skewness and tail parameters using the family of stable laws and Hansen's t distribution. Hansen's original work is extended by showing the model derives from a Taylor expansion and the inclusion of cross-products and higher mixed moments may be desirable. Keeping the location parameter constant makes the linear processes in skewness and tail parameters redundant and only volatility provides defensible increases in likelihood. Since this was derived as a Taylor approximation of the unknown true function, the results point to refuting the idea of modeling time-varying skewness and tail parameters.

We investigate the behavior of the model with respect to the inclusion of additional terms in the location equation and evaluate the desirability of these extra terms from both a financial and statistical point of view. This result has implications for market efficiency and option pricing. Some of the important implications are the inability to reject the martingale hypothesis and the resulting estimate of additive volatility over a period for the purpose of option pricing. We also show that the inclusion of (potentially spurious) terms in the location equation leads to more favorable ML results for the skewness and tail equations.

Towards development of a rudimentary financial forecasting system

Aniruddha G. Pant, Balaji Raman
        Tata Consultancy Services, Pune, India

This work deals with the problem of stock price prediction. We present an extensive analysis for the US stock market. The predictions are based only on the past price and volume data. Stock trends in terms of adjacent values as well as nearest neighbors are used as input variables in the k-Nearest neighbor and the Support vector machines (SVM) approaches. Two datasets are used for evaluation of these techniques. One is data of 26 DJIA stocks for the time period from 1985-2003. Second, a larger dataset is of current S&P500 stocks over a period of 10 years from 1995-2004. The methods are compared with na•ve prediction techniques through metrics like Theil co-efficient and relative hit rates. The comparisons of different methods are based on hit-rates.

The optimal SVM models are selected using cross validation as well as Vapnik's learning bound optimization. We use stock ranks in case of SP500 data as input as well as output variables. These are as defined by Thomas Hellstrom (2000) and have been shown to be more predictable than the stock returns for Swedish stock market. We expect to get similar results for US stock market using the newer SVM approach.

Magic numbers in the Dow

Roy A. Batchelor, Richard Ramyar
Cass Business School, London, UK

There is a widespread belief among "technical analysts" in financial markets that trends in stock prices are arrested at support and resistance levels that are to some degree predictable from the past behavior of the price series. Here we examine whether ratios of the length and duration of successive price trends in the Dow Jones Industrial Average cluster around round fractions or Fibonacci ratios. We identify turning points by heuristics similar to those used in business cycle analysis, and test for clustering using a stationary block bootstrap procedure. Some significant ratios appear, but no more than would be expected by chance given the large number of tests we conduct.

Email: r.a.batchelor@city.ac.uk

Workshops

Workshop 1

Basics in Causal Modeling and Forecasting

Charlie Chase
>   Market Strategy Manager
>   Applied Econometrics and Forecasting, SAS Institute

Description:
This workshop will provide an overview of causal methods using time series data for forecasting including a review of various causal forecasting models and how they are applied in real world situations using actual data. Such methods as dynamic regression, ARIMA modeling with interventions and repressors, and a new method gaining popularity known as Unobserved Component Models (UCM) will be covered. SAS tools/applications will be used to demonstrate the power of causal modeling and forecasting.
[Demonstrations of the models covered will be made using SAS ETS, SAS Enterprise Guide and SAS High-Performance Forecasting software]

Areas Covered:
>   1. Introduction to multiple linear regressions
>   2. Autocorrelation (or Serial Correlation)
>   3. Autocorrelation (or Serial Correlation)
>   4. Multi-colinearity
>   5. Multiple Regression forecasting
>   6. Introduction to ARIMA modeling using the Box-Jenkins   Methodology
>   7. Introduction to Unobserved Components Models (UCM)

Time:
>   Sunday, June 12th – 9:00 am to 5:00 pm   Room: Blanco

Workshop 2

Advances of Neural Networks in System Identification and Forecasting Principles, Techniques, Applications

By
Hans-Georg Zimmermann
      Senior Principal Research Scientist, Siemens AG, Corporate Technology

---

Description:
The different topics of the program are presented by first discussing the principle underlying problem, solving it with neural network techniques and showing the consequences for applications. The areas of applications cover financial, demand and supply forecasting.

Areas Covered:
1. Introduction to Neural Networks
2. Neural Networks in Nonlinear Regression
3. Learning = Optimization?
4. The Observer - Observation Dilemma
5. Neural Networks in Approximation Theory
6. From Pattern Recognition to the Modeling of Dynamical Systems
7. Model Based Feature Selection
8. Remedies for over fitting
9. Recurrent Neural Networks
10. Local Algorithms for Non-local Structures
11. Analysis of Open Systems
12. Error Correction Neural Networks
13. Variance - Invariance Separation
14. Optimal State Space Reconstruction
15. Time in Time Series Analysis
16. Continuous versus Discrete Density Estimation
17. Stochastic Modeling of Open Dynamical Systems
18. Causal-Retro-Causal Neural Networks
19. Multi-Agent Market Modeling by Neural Networks
20. Miscellaneous Topics

Time:
      Sunday, June 12th – 9:00 am to 5:00 pm   Room: Nueces

Workshop 3

Forecasting with Intermittent Demand
How to manage and forecast for inventory parts and store merchandizing applications

By
Hans Levenbach,
      Delphus, Inc., USA

John Boylan
      Buckinghamshire Business School

Tom Willemain
      RPI and SmartSoftware

Description:
This how-to workshop takes you from the basics of Croston's approach to modern bootstrap methods for developing forecasts, safety stocks and lead-time distributions with data containing many zero values. Starting with the fundamentals of analyzing zero intervals and nonzero demands, the presenters will stress real-world applications with data from multiple industrial sources. Knowledge of basic business statistics and exponential smoothing will be helpful in this workshop.

Areas Covered:
This workshop will discuss
      1. The nature of intermittent demand
      2. The special problems created by intermittent demand for forecasting and inventory management
      3. Special methods for assessing forecasting accuracy when data contain many zero values
      4. The range of technical approaches to forecasting intermittent demand, with special emphasis on bootstrap based methods.

Time:
      Sunday, June 12th – 9:30 am to 3:30 pm   Room: Frio

Guidelines for chairs of sessions

In advance
- Advise presenters and discussants to follow presentation guidelines.
- Obtain brief biographical information on all participants to use in your introduction.
- Prepare a brief introduction for each presenter. If presenters have handouts, arrange for someone at the session to help distribute them at the appropriate time.
- Standard equipment will be placed in each room (one overhead projector, one screen and one data projector with cables). However, the presenters shall bring their own laptops for their presentations.
- Allow 20 minutes for invited speakers (or 3 speakers in a session) and 15 minutes (four speakers) for contributed speakers. This will leave at least 5 minutes for discussion at the end of each session.

At ISF2005
Before session begins
- Be in the room at least 10 minutes before the session begins
- Check the condition of your meeting room, especially the overhead projector. Alert Reception Desk (ISF Office) if assistance is needed. Check speakers' names (pronunciation), titles and affiliations
- Check Errata Sheet at the Reception Desk for any last minute changes.

During the session
- Announce any changes to the program at the beginning of the session.
- Start on time. Timing and floor discussions are your responsibility.
- Keep introductions very brief when changing speakers.
- Insist that all speakers use a microphone if one is provided.
- Make sure that presenters do not block the view of the screen.
- Hold each speaker to the allotted time.
- Remind speakers about their remaining time. For example, prepare flash cards for 5 minutes and 1 minute remaining. You must have a working watch. Tell each presenter the procedure you will use.
- If a presenter ends early or does not attend, use the extra time for audience questions, comments, the panel or yourself. Do not start the next paper early.
- **Note:** You are authorized and instructed to stop the presentation if any of the speakers do not adhere to the forecasting subject of their paper. Irrelevant or extraneous comments or handouts having nothing to do with the subject being presented are not permitted.
- Be assertive in keeping all questions brief and pertinent for floor discussions. Restate the question to be sure that they are heard by all o the audience.
- End on time. Another session may be using your meeting room. Urge the audience to continue their discussion elsewhere.

Guidelines for Speakers

- Standard equipment will be placed in each room (one overhead projector, one screen).
- Be sure to use handouts or visuals, especially if you have formula, data or graphics.
- Time allocated:
  o Keynote speakers: 1 hour including questions
  o Featured speakers: 50 minutes with 10 minutes questions
  o Invited speakers: 20 minutes
  o Contributed speakers: 15 minutes
- The tips and suggestions below are intended to help you. Please put them to good use. Effective presentations make learning and technical advance more likely. They also enhance the perception of the audience. Boring, ineffective presentations do not hold the audience's attention and are quickly forgotten, especially by the planers for future sessions.

In advance
Content organization
- Make sure the audience walks away understanding the five things a listener to a presentation really cares about:
  a. What is the problem and why?
  b. What has been done about it?
  c. What is the presenter doing about it?
  d. What additional value does the presenter's approach provide?
  e. Where do we go from here?
- Carefully budget your time, especially for short presentations.
- Allow yourself time to describe the problem clearly enough for the audience to appreciate the value of your contribution. This will usually take 30 seconds.
- Leave enough time to present your own contribution clearly. This almost never requires all of your allotted time.
- Put your material in a context that the audience can relate to. It is a good idea to aim your presentation at an audience of colleagues who are not familiar with you area. Your objective is to communicate an appreciation of importance to your work and not just to display your results.
- Give references and a way to contact you, so that those interested in theoretical details can follow up.

Preparing effective displays
- Keep it simple. The fact that you can include all kinds of cute decorations, logos and artistic effects does not mean that you should. These can make important material difficult to read. Less is more.
- Use at least 24-point font so that everyone in the room can read your materials. Unreadable material is useless and inspires a negative attitude in the audience towards your presentation.

- Try to limit the material on each slide, keeping the number of words to a minimum. Summarize the main points without including all the details in your slides.
- Limit the tables to six rows/columns of readability. Sacrifice content for legibility.
- Label your graphs clearly with big readable font.
- Use standard fonts that are easy to read. Avoid overuse of italics.
- Dark letters on light backgrounds look better for overheads and will be easy to read.
- Use equations sparingly. Avoid derivations and concentrate on what your results are. The audience will concede proof and those who are really interested can follow up with you, which they are more likely to do if they understand your results.
- Define your notation when you need to use equations. You can use "callouts" to achieve this.
- Identify all your reference journals, books and articles and include them in you slides.
- Always preview your slides. Eliminate obscure symbols and inserts.

Timing your talk
- All speakers find it valuable to practice their delivery before the actual presentation.
- Do not deliver a 30-minute talk in 15 minutes. Nothing irritates an audience more than a rushed presentation. Engage the audience, have them understand your message and do not flood them with ideas. This means the following:
  o Limit your presentation to the main points in your paper
  o Only materials that can be fitted into the presentation time-period should be presented.
  o Talk at a pace that everyone in the audience can understand. Speak slowly, clearly and loudly especially if your English is accented.
  o Have a few rehearsals.
  o Refining your timing is the most important part of your rehearsal.
  o Balance the amount of material you present with a reasonable pace of presentation.
  o Get a few colleagues, who are not too knowledgeable about your area, to listen to your presentation. They may point out areas where your presentation is vague or difficult to understand.

Handouts
- Handouts are recommended. But you should only read out your handouts to your audience.
- Handouts have an advantage over visual aids as they are not subject to equipment availability and can be kept by the audience.
- If you run out of handouts, be sure to collect business cards or names and addresses of the audience to mail copies later.

At ISF 2005

- Check the Errata Sheet at the Reception Desk for last minute changes
- Talk to your session chair before your session so that they are aware of who you are.
- Check the location of your room so that you can arrive on time.
- Be sure the session chair knows you are there.
- Make arrangements with the chair for distributing handouts.
- In larger rooms, put on the microphone and ensure its working.

The presentation

- Be aware of the time for your presentation. The chair is instructed to stop your presentation at the end of the allotted time irrespective of whether you are finished or not.
- Speak clearly and loud enough to be hear at the back rows of the hall.
- Remember that your words may sound different when presented verbally than in writing.
- Speak from notes and do not repeat verbatim from your paper.
- Never apologize for displays. They reflect badly on your preparation.
- Do not apologize for incomplete results. Readers understand that all research continues and does not have to be complete before the day of the presentation.

When finished

- Thank the audience for their attention.
- Gather your materials and move off quickly enough to allow the next presenter to prepare.
- Stay for the entire session for the courtesy and benefit of you audience and your speakers. Afterwards you may needed by people to answer questions.

Guidelines for posters

A poster session is a presentation where materials such as maps, photographs, graphs, tables and charts are displayed on a board along with textual summaries of their work. Ideally, a well constructed poster will be self-explanatory. Successful poster presentations are those that achieve both coverage and clarity. The poster session will be from **9:10 am – 12:00 pm** at the **Chula Vista Boardroom** on **Wednesday, June 15th.**

Coverage
- All the obvious information should be provided.
- A casual observer should be able to walk away from your poster with a clear understanding of your material.
- A more careful reader should learn enough to ask informed questions.
- Provide a title, author, abstract and brief statements that describe the method, subjects, procedure, results and conclusions.

Clarity
- Indicate the ordering of your material using numbers, letters or arrows.
- Ensure that the content is clearly communicated.
- Include interesting sidelights.
- Your conclusion should leave observers focused on a concise statement of your most important findings.

Displays
- Each poster display should include a lettered sign giving the title and the name(s) of the presenter(s).
- This sign should be 15cm in height and with letters at least 5cm in height in a bold font.
- Extensive use of imaginative, appealing illustrations, graphs and images would be extremely useful in communicating the content of a poster.
- People attending a poster session are free to move from poster to poster and hence do not focus too much on reading material. Text should be limited to 4 or 5 pages.
- Do not mount your material on a heavy board as these may be difficult to position on the poster board.
- Provide clear labels for each section of your poster presentation.

At ISF 2005
- Check the Errata Sheet at the Reception Desk for any last minute changes.
- Be in the poster display area by 3:30 pm to allow plenty of time to set up your presentation.
- You will be provided with a 1.8m×1.3m display board, push pins and a table.
- Bring all other materials you might need, such as handouts.
- After the presentation is concluded, remove your posted materials immediately.
- Do not write or paint anything on the display board.

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 of forecasting. The International Journal on Forecasting is the official journal of the Institute.

Research

Develop and unify forecasting as a multi-disciplinary field of research drawing in management, behavioral, social, engineering and other sciences.

Theory and Practice

Bridge the gap between theory and practice, with the latter helping to set the research agenda and research providing useful results.

Practice

Contribute to the professional development of analysis, managers and policy makers with responsibilities for making and using forecasts in business and government.

International Scope

Bring decision makers, forecaster and researchers from all nations together to improve the quality and usefulness of forecasting.

Annual Conference

The IIF ha held the International Symposia on Forecasting in cities around the world beginning with Quebec City in 1982 and most recently in Sydney, Australia in 2004. Included programs are plenary, featured speakers including international forecasting experts, about 250 research presentations in areas such as new product forecasting, multivariate methods, international trade forecasting, financial forecasting, demographic forecasting, rule based methods and exhibits.

Membership

Membership is for individuals only. It is not available for organizations. Dues are $80 per year for regular members and $40 for student members. Included are four issues of the IJF, price reduction in the Annual Conference registration fee 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, 2004. (If for a different calendar year, write in the applicable year instead.) 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:

Name: _____ Affiliation: _____

Address: _____

City, State/Province: _____

Postal Code: _____ Country:_____

Telephone: _____ Fax: _____

Email: _____ Academic or Practitioner? (Circle one)

Particular forecasting interests: _____

Do you wish your contact information and interests to be added to a list of members accessible to any Internet user? <u>Yes</u> or <u>No</u> (Circle one)

If paying by credit card please complete the following information:

Card: VISA MASTERCARD (Circle one)

Name exactly as on card (if different from above): _____

Account number: _____   Expiration date: _____

Billing address (if different from above): _____

_____

Please send this completed form with payment to: International Institute of Forecasters, c/o P. Geoffrey Allen, Department of Resource Economics, University of Massachusetts, Amherst, Massachusetts 01003-2040 USA Fax: 413.545.5853, Email: allen@resecon.umass.edu

The International Journal of Forecasting

Aim and Scope of the IJF:

The International Journal of Forecasting (IJF), is the official publication of the International Institute of Forecasters and shares its aims and scope. The Journal publishes high quality refereed papers covering all aspects of forecasting. Its objectives are to bridge the gap between theory and practice. The intention is to make forecasting useful for decision and policy makers who need forecasts.

The IJF places strong emphasis on empirical studies, evaluation activities, implementation research and ways of improving the practice of forecasting. It publishes papers, noted, reviews of recent research, book reviews and software reviews. For empirical studies, the Journal gives preference to papers that compare multiple hypotheses. Papers published in IJF are in the following areas:

Evaluation of forecasting methods, the legal and political aspects; Applications in business, government and military; Implementation research; Judgmental and psychological aspects if forecasting; Impact of uncertainty on decision making; Seasonal adjustments; Marketing forecasting; Time series forecasting; Organizational aspects of forecasting; Financial forecasting and economic analysis; Production and inventory forecasting; Technological forecasting.

Index of People