THE FIFTH INTERNATIONAL SYMPOSIUM ON FORECASTING

Montréal Programme

June 9,10,11,12 1985

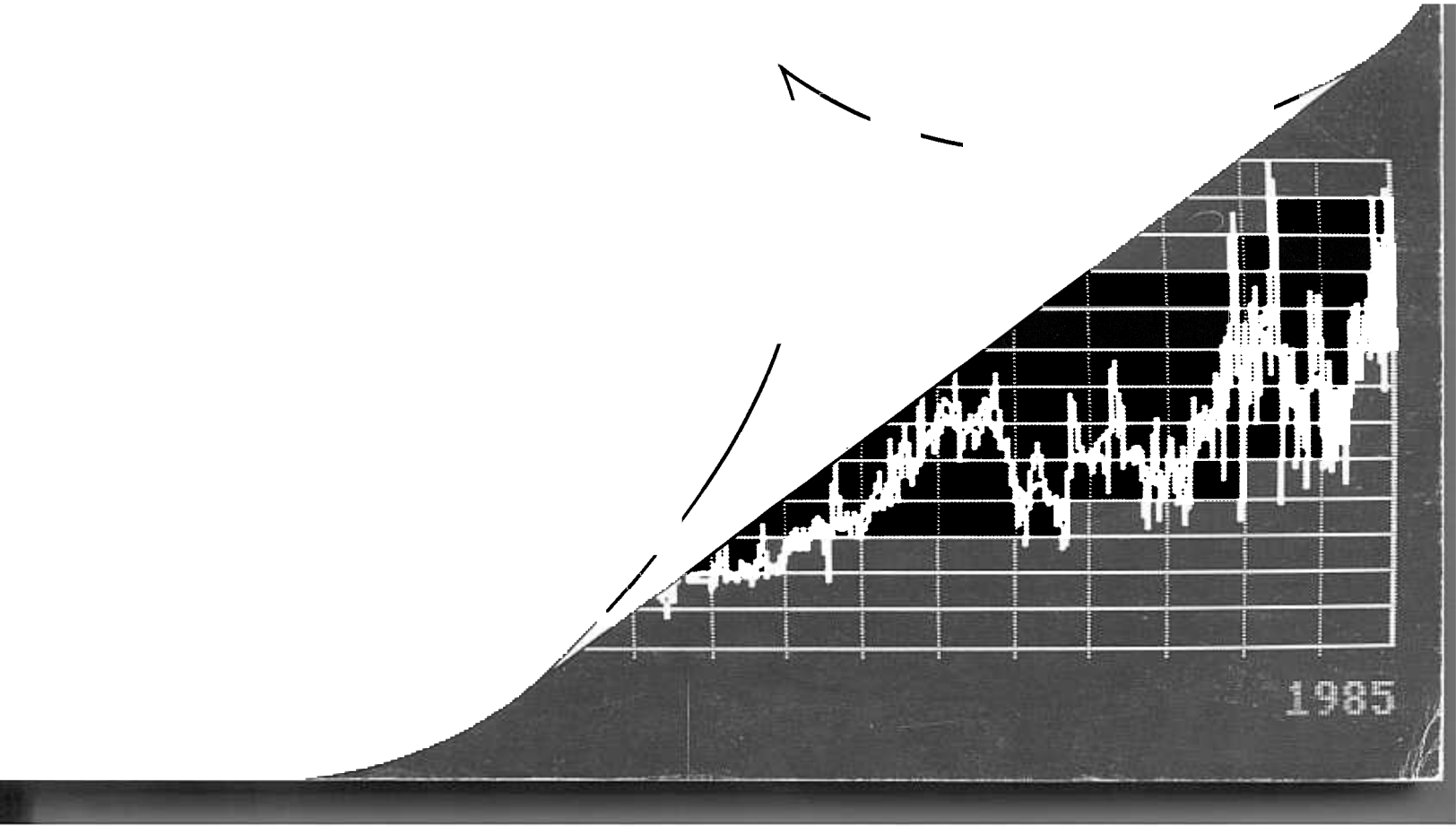
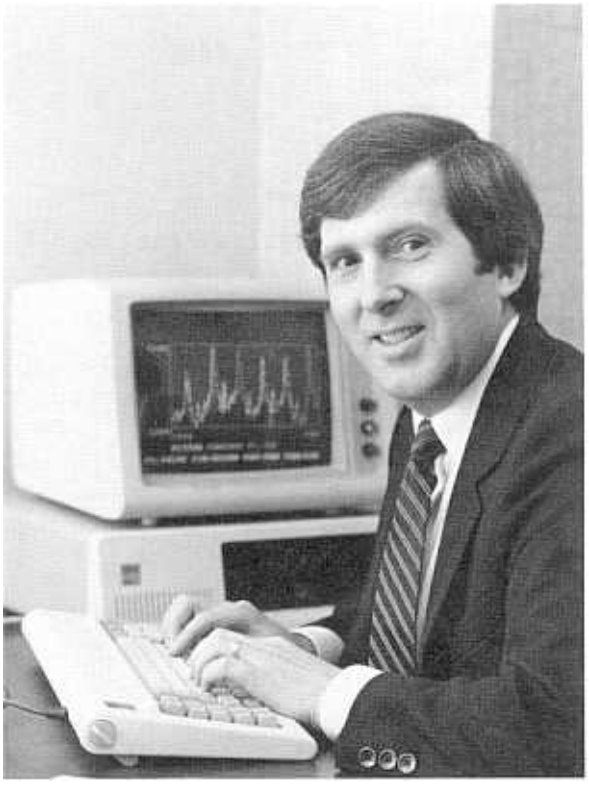


TABLE OF CONTENTS



MESSAGE FROM

DR. ROBERT CARBONE

GENERAL CHAIRPERSON

Forecasting is a new and compelling intellectual industry. It has moved from a crystal ball type of art to a computer science. Today, no organization can afford not to forecast, and no manager can afford to be without an understanding of this complex field. I am proud and honored that the most respected names and brightest minds of this emerging discipline have gathered here in Montreal, for a pragmatic, down-to-earth look, at where forecasting is headed for the 80's.

The Symposium focuses on "learning" how to forecast for real-life situations, using the most recent technologies. The arrival of the desk top computer has made available the most comprehensive of approaches at our fingertips. I am especially pleased that part of the Symposium highlights this revolutionary development.

The organizing committee thanks all the people who have helped us, especially our collaborators, Germain Decelles at Digital and Yvon Bettez at Gandalf who have provided us with state of the art technology, not to forget the support received from the Faculty of Management of McGill University.

I hope you find the Symposium to be a genuinely exciting and very informative experience and that you will leave on Wednesday equipped with at least one new idea. If so, our objective will have been reached.

ROBERT CARBONE

MESSAGE FROM

DR. ESTELA BEE DAGUM

PROGRAM CHAIRPERSON

I am pleased to welcome cordially all who have come to take part in this Fifth International Symposium on Forecasting. For those of you who are newcomers, it follows on from the earlier successful Symposia in Quebec City, Istanbul, Philadelphia and London. This year's program brings together distinguished academicians and practitioners from different countries with the same purpose - to exchange ideas and experiences for improving the quality of forecasting and for stimulating new research.

The Keynote Addresses and Organized Sessions cover a wide range of forecasting topics from both applied and methodological viewpoints mostly related to the impact of new technologies, planning and uncertainties, practical implications in finance, marketing and other business areas, leading indicators and business cycles, population demographic trends, changes in life styles, social and economic environments, and key industries in the future.

I am impressed with the high quality of the papers presented and hope that many of them will be published in the new International Journal of Forecasting of the International Institute of Forecasters.

On behalf of the Organizing Committee, I would like to thank the prestigious Keynote Speakers and Session Chairpersons for their valuable collaboration and support to make this conference a great success.

I am confident that all of us will be very pleased with the outcome of this symposium and hope that this experience will stimulate you to join us next year in Paris.

Estela Bee Dagum

ESTELA BEE DAGUM

MEMBERS

OF

THE ORGANIZING COMMITTEE

EDWARD J. LUSK

ESSAM MAHMOUD

THOMAS CHENG

GUY HUOT

GLEN SIMPSON

MORTY YALOVSKY

IMPORTANT INFORMATION TO ALL DELEGATES

REGISTRATION

The registration desk is located on the Mezzanine level of the Queen Elizabeth Hotel. Desk hours are:

- Sunday, June 9th, 13:00 to 22:00
- Monday, June 10th, 7:30 to 18:00
- Tuesday, June 11th, 7:30 to 18:00,
- Wednesday, June 12th, 7:30 to 12:00

Conference aids will be available throughout the Symposium to provide assistance and to answer your questions.

BADGES

Your Symposium badge serves as a pass for the General Program, Training Sessions, Exhibits, and Special Events. Security personnel will be monitoring admissions so **PLEASE WEAR YOUR BADGE AT ALL TIMES WHILE IN THE CONVENTION AREA.**

Only those enrolled in the Training in Forecasting Workshop are permitted to enter the space set aside for the training and workshop areas.

CHECK-OUT REGULATIONS (PLAN I AND PLAN II)

Before leaving, all delegates registered under Plan I and Plan II (full or modified) must go to the check-out counter of the Hotel where they are staying. You may request a late check-out time at your Hotel.

Delegates are personally responsible for expenses charged to their room which are not covered under Plan I and Plan II. Meals taken at locations other than those designated are not covered.

MESSAGE CENTER

A message center is located near the registration area. A bulletin board will be provided for personal messages.

Announcements or changes in the Program scheduling will be posted at the Message Center.

LEARNING ABOUT THE SESSIONS

An electronic bulletin board system, courtesy of Digital Equipment of Canada is accessible at different locations in the convention area. Learn about what is on by keying in the requested data.

COPYING SERVICES

Copying services are available in the Salon located next to Galerie 4 on the main conference level. Duplicating costs are 10 cents per copy. Most papers presented at the Sympoisum are available at the copying center for those who wish to have a copy made.

ADDITIONAL COPIES OF PROGRAM BOOK

Additional copies of the Program are available at the Conference Office (Salon SAINT MAURICE) for a cost of $10.00. After the Symposium, additional copies may be acquired by writing directly to **The International Institute of Forecasters, P.O. Box 487, Succ. 'H', Montreal, Quebec, H3G 2L5, CANADA.** Please include a cheque of $12.50 payable to The International Institute of Forecasters for the book, postage and handling included.

COFFEE BREAKS

Coffee, tea and soft drinks will be available in the Exhibit Hall (Galerie 1) and other locations in the mid-morning and mid-afternoon breaks on all three days of the Symposium.

MEALS

The following meals are included for all participants:

Lunch, June 10 and 11, 1985
Le Grand Salon at 12:00 at the Queen Elizabeth Hotel

(For those registered under Plan I and Plan II - full or modified)

Breakfast, June 10-11-12, 1985
Le Grand Salon from 7:30 to 8:30 at the Queen Elizabeth Hotel

There is only one breakfast seating

IMPORTANT: REMEMBER TO BRING YOUR MEAL TICKETS

For those registered under Plan III and Plan IV, breakfast tickets may be purchased for $7.50 at the Registration Desk - space permitting.

SOCIAL EVENTS

Welcome To Montreal Cocktail Party - Sunday, June 9th from 20:00 to 22:00 at the Queen Elizabeth Hotel in the Grand Salon. Admission is by badge only. This is an excellent occasion to greet old friends and make new ones. In particular, if you are a speaker on the Program, try to meet your Chairperson and the other speakers in your session. All registrants and exhibitors are invited to attend this Welcoming Reception. The Exhibit Hall will be open at this time.

GUEST TOURS

The following tours are complimentary only for the guest accompanying each delegate registered under Plan II. If space allows, extra guest tickets may be purchased at the registration desk.

Monday, June 10th

Greater Montreal: Lunch included at Le Cafe Alexandre in Old Montreal
Departure: 9:15 (Main Entrance, Dorchester Street
Queen Elizabeth Hotel)
Return : 14:00
(Extra guest charge is $25.00)

Tuesday, June 11th

St-Lawrence Seaway and Montreal's Botanical Gardens:
Lunch included at the Panoramic Restaurant,
L'Escapade of the Chateau Champlain Hotel
Departure: 9:15 (Main Entrance, Dorchester Street
Queen Elizabeth Hotel)
Return : 14:00
(Extra guest charge is $25.00)

ENJOYING YOURSELF IN MONTREAL

Eating out... Montreal is renowned in North America for the quality of its French and Continental restaurants. Included in the registration kit is a "Guide to Good Eating" prepared for the convenience of the delegates.

Night Life... The city is alive until 3:00 every day. There are many discotheques, street side cafes, bars, etc. to cater for all taste.

Need good advice... A hostess of the Montreal Urban Community Tourist Bureau is present at the registration desk during the times indicated to help you in making your plans.

EXHIBIT AREA

The Exhibit Area is located in Galerie 1. Admission is by badge only. Exhibit hours are

- Sunday, June 9th, 20:00 to 22:00
- Monday, June 10th, 10:00 to 18:00
- Tuesday, June 11th, 10:00 to 18:00

Exhibitors are listed in alphabetical order

LIST OF EXHIBITORS

Name of Company	Address & Telephone No
American Software Inc.	433 East Paces Ferry Road Atlanta, GA 30305 USA Tel: (404) 261-4381
Citicorp Information Serv	850 3rd Avenue New York, NY 10017 USA Tel: 212) 572-9632
Digital Equipment of Canada	394 Isabey St-Laurent, Quebec Canada H4T 1V3 Tel: (514) 354-5321
Elsevier Science Publishing Co.	52 V ıderbilt Ave. New ırk, NY 10017 USA Tel: 212) 867-9040
Fortelmetrica Inc	2285 St-Mathieu Suite 103 Montreal, Quebec Canada H3H 2J7 Tel: (514) 934-0993
Futurion Associates Inc	4067 reensburg Pike Pitt urgh, PA 15221 USA Tel: 412) 271-2127
Gwilyn Jenkins & Partners Ltd.	Parkfield, Greaves Road Lancaster, U.K. Tel: (0524) 61831
Lionheart Press	370 Roslyn Avenue Montreal, Quebec Canada H3Z 2L6 Tel: (514) 933-4918
Prediction Systems Inc	P.O. Box 276 Manasquan, NJ 08736 USA Tel: (201) 223-4572

LIST OF EXHIBITORS (Cont'd)

Name of Company	Address & Telephone No.
Scientific Computing Ass.	P.O. Box 625 De Kalb, IL 60115 USA Tel: (815) 758-5884
Scientific Systems Inc.	54 Rindge Ave Extension Cambridge, MA 02410 USA Tel: (617) 246-3645 or 625-2712
Smart Software Inc.	392 Concord Avenue Belmont, MA 02178 USA Tel: (617) 489-2743
Statistical Graphics Corp.	Research Park 2 Wall St. Princeton, NJ 08540 USA Tel: (609) 924-9374
Statistics Canada	8-K Coats Building Ottawa, Ontario Canada K1A 0T6 Tel: (613) 993-7644
Var Econometrics	134 Prospect Ave S. Minneapolis, MN 55419 USA Tel: (612) 822-9690

P L E N A R Y S E S S I O N S

DAY	TIME	SALON	SPEAKER
MONDAY	8:45-9:45	LE GRAND SALON	**Dr. Spyros Makridakis** "The Practice and Theory of Forecasting An Assessment"
MONDAY	12:45-1:45	LE GRAND SALON	**Dr. Allen Sinai** "Forecasting and Analysis with Macroeconomic Models: A Contemporary Perspective
TUESDAY	8:45-9:45	MACKENZIE	**Dr. Robert L. Basmann** "Forethought, Forecast, Foresight"
TUESDAY	8:45-9:45	GALERIE 4	**Dr. Rudolf E. Kalman** "Forecasting: Mathematics or Probability?"
TUESDAY	8:45-9:45	DULUTH	**Dr. Georges C. Tiao** "Multiple Time Series Modelling and Forecasting Techniques"
TUESDAY	12:45-1:45	LE GRAND SALON	**Dr. Janet L. Norwood** "Labor Market Issues for the Future"
WEDNESDAY	8:45-9:45	LE GRAND SALON	**Dr. Martin Wilk** "Prediction Planning & Uncertainty"

LE GRAND SALON

Dr. Spyros Makridakis, Professor, Management Sciences
INSEAD
Fontainebleau, 77305 FRANCE

Dr. Spyros Makridakis is Professor at INSEAD in France. His Ph.D. is from New York University. He has consulted worldwide in the area of forecasting and has held teaching positions with several European and American Institutions, including being a research fellow at IIM in Berlin, an ICAME fellow at Stanford University, and a Visiting Scholar at MIT and Harvard. He has co-authored many books, including Interactive Forecasting, Univariate and Multivariate Methods, 2nd edition (Holden-Day), Forecasting: Methods and Applications, 2nd edition (Wiley-Hamilton), The Handbook of Forecasting: A Manager's Guide (Wiley), and The Forecasting Accuracy of Major Time Series Methods (Wiley). His book Forecasting Methods for Management (Wiley) is now in its 4th edition and has sold more than 60,000 copies. In addition, he has written articles in General Systems, Management Science, Journal of the Royal Statistical Society, American Statistician, International Journal of General Systems, Operational Research Quarterly, Journal of Marketing, Long Range Planning, Journal of Forecasting, Omega, and other journals. He is an associate editor of Management Science and the co-editor of a special issue of Management Science on Forecasting. He is the founding and chief editor of the Journal of Forecasting.

"THE PRACTICE AND THEORY OF FORECASTING: AN ASSESSMENT"

The field of forecasting is entering into a stage of maturity. After several decades of important theoretical developments, practical experience and empirical studies, a solid basis now exists to judge its performance, evaluate its accomplishments and consider ways of improving its use. It is the purpose of this talk to survey available knowledge, perceptions and practices concerning forecasting. The advantages and limitations of forecasting are discussed and evidence about the magnitude of forecasting errors and the uncertainty involved in making future predictions is presented. Furthermore, the practice of forecasting is examined and suggestions for improving the forecasting function within organizations are proposed.

Chair: **Robert Carbone**, Faculte des Sciences de l'Administration, Universite Laval, Ste-Foy, Quebec, CANADA G1K 7P4

MONDAY
12:45-1:45

LE GRAND SALON

Dr. Allen Sinai, Chief Economist and Managing Director
Shearson Lehman/American Express Inc.
55 Water Street, New York, New York 10041 USA

Dr. Allen Sinai is Chief Economist and Managing Director at Shearson Lehman/American Express Inc., responsible for the firm's forecasts of the U.S.A and international economies and its economic research activites. He heads the Economic and Financial Markets Department of Shearson Lehman/American Express, which provides a wide variety of monitoring, forecasts, and analysis for the firms's clients and internal use. He is well-known as an economic forecaster, and particularly as a pioneer in the use of econometric and model-based quantitative methods in forecasting the U.S. economy and financial markets. Prior to joining Lehman Brothers in September 1983, now Shearson Lehman/American Express, Dr. Sinai was a Senior Vice President in the U.S. Economic Service at Data Resources, with responsibilities for DRI's financial forecasts of the U.S. economy, large-scale macroeconometric modelbuilding, financial system modeling, and the creation and supervision of information products for the financial industry. Dr. Sinai was at Data Resources from 1971 to 1983, where he was co-developer (with Otto Eckstein) of the DRI Model of the U.S. Economy; in particular, the financial system and its interactions with the real economy.

"FORECASTING AND ANALYSIS WITH MACROECONOMIC MODELS: A CONTEMPORARY PERSPECTIVE"

Numerous criticisms of macroeconometric model -based forecasts and analyses have been leveled in recent years. The accuracy of macroeconomic forecasts has been under fire. The inability to adequately incorporate expectations is another criticism. And, the difficulties of using econometric models in forecasting and analysis in the face of recent structural changes have been pointed out. These criticisms are examined in a perspective on the use of macroeconomic models in forecasting and analysis. The shortcomings of econometric model-based applications in a contemporary setting are explained and recognized. But it is argued that, properly used and understood, the forecasts and applications of the model-based process have actually improved in usefulness over recent years. The role of expectations in the generating of econometric model forecasts also is examined, with examples of how the econometric model-based process can be enhanced through systems that incorporate expectations into the forecasting process. It is argued that a model-based process which includes scanning for structural change and allowance for new factors through a blending of theory and frequent reestimation offers promise in overcoming the shortcomings of the previous generations of macroeconometric models.

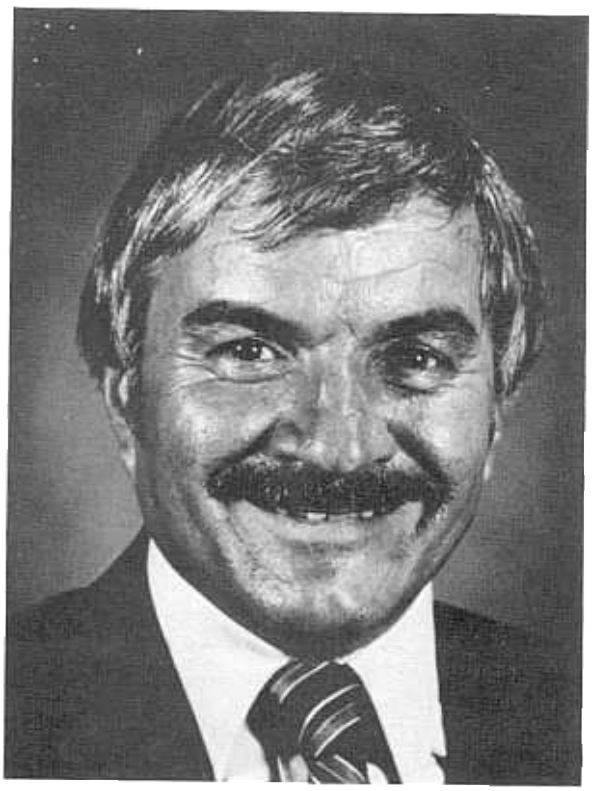
Chair: Estela Bee Dagum, Statistics Canada, Seasonal Adjustment, 13-K R.H. Coats Bldg, Ottawa, Ontario, CANADA K1A

TUESDAY
8:45-9:45

MACKENZIE

Dr. Robert L. Basmann, Professor of Economics
Texas A & M University & Advanced Econometric Inc.
P.O. Box 2700, Bryan, Texas 77805 USA

Dr. Robert L. Basmann is Professor of Economics at Texas A & M University. Professor Basmann's earliest work focused on shifts of demand functions under the influence of stochastic and systematic taste changes. This effort evolved into pioneering of statistical estimation methods for simultaneous equations models and the derivation of exact finite sample distributions for econometric estimators and test statistics for dynamical as well as nondynamical models. Present work on econometric methods is an investigation of some nonparametric cost-of-living indexes where tastes have changed between base and current periods. Professor Basmann is co-editor of the annual Advances in Econometrics, (JAI Press, Inc.) Fellow of the Econometric Society, member of the American Economic Assocation and American Management Association.



"FORETHOUGHT, FORECAST, FORESIGHT"

Forethinking, forecasting and foreseeing are inseparably related activities whose objective is achievement and maintenance of policy-making in the active model. It necessarily involves cure of reactive mode policymaking, which is constantly being surprised by events and consequently being without influence on the events it is concerned with. However "credentializing-adapted" organization of the sciences and professional disciplines around puzzles, unsolved but known to be solvable, rather than "natural" kinds of policy problems, works against active mode policymaking. In spite of expressed disappointment and criticism, the forecasting profession is better situation than others to bring individual incentives into line with the needs of active model policymaking, and to develop subprofessions with permeable and flexible boundaries that reflect the natural boundaries of real policy problems. This talk will review the reason for this and some of the implications for the future.

Chair: Robert Fildes, Manchester Business School, Booth St. West, Manchester M15 6PB, ENGLAND

TUESDAY
8:45-9:45

GALERIE 4

Dr. Rudolf E. Kalman, Professor of Mathematical System Theory
Swiss Federal Institute of Technology
Eth-Zentrum-Hauptge-Baude
CH-8092 Zurich SWITZERLAND

Dr. Rudolf E. Kalman (Ph.D. Columbia University) is a professor of mathematical system theory at the Swiss Federal Institute as well as at the Univeristy of Florida in Gainesville. Among his many awards are the IEE Medal of Honor and the ASME Rufus Oldenburger Medal. He is on the editorial boards of a number of journals and has published over 100 papers. He is a co-author of the book, Topics in Mathematical System Theory.

"FORECASTING: MATHEMATICS OR PROBABILITY?"

Commonly used forecasting models are critically indebted to the standard statistical prejudice; all data is generated by independently sampling a fixed, infinite, well-defined random population. Basic assumptions of this type are almost never tested against real data (since the test, themselves, also depend on the same prejudice) and they are contradicted in many cases by more careful analysis of the data in regard to its statistical stability. In this lecture we shall analyse the question as to what extent results in forecasting (such as Kalman Filtering) depend on the standard statistical prejudice and to what extent they are simply mathematical (logical) consequences of non-probabilistic assumptions. We shall illustrate the conclusions by examining real macro-econometric data.

Chair: Estela Bee Dagum, Statistics Canada, Seasonal Adjustment, 13-K R.H. Coats Bldg, Ottawa, Ontario, CANADA, K1A 0T6

Chair:
Pennsylv

TUESDAY
8:45-9:45

DULUTH

Dr. G.C. Tiao, W. Allan Wallis Professor of Statistics
University of Chicago
Graduate School of Business
1101 East 58th Street
Chicago, Illinois 60637 USA

Dr. George C. Tiao is currently W. Allen Wallis Professor of Statistics, Graduate School of Business, University of Chicago. He has made significant contributions in the areas of Bayesian methods, econometrics and time series analysis. He is a principal developer of a joint business-statistics program at the University of Chicago, and is a consultant in the application of statistical methods to management forecasting and environmental problems. Professor Tiao is a principal investigator of several large research projects in environmental data analysis. He is a fellow of the American Statistical Association, the Institute of Mathematical Statistics and a member of the International Statistical Institute.

"MULTIPLE TIME SERIES MODELLING AND FORECASTING TECHNIQUES"

Data in business, engineering, environment and other areas often occur in the form of multiple time simultaneously observed at equally spaced time intervals. Models which appropriately take into account the interrelationship among these series can greatly improve the efficiency of analysis as well as accuracy of forecasts compared with that using only the history of individual series. Some recent development in model building methods, computation and assessment of joint forecasts, and smoothing and filtering of data will be discussed. Special emphasis will be given to dimension-reduction transformation techniques which enhance understanding of the structure of the series. Illustrations with examples drawn from diverse disciplines will be presented.

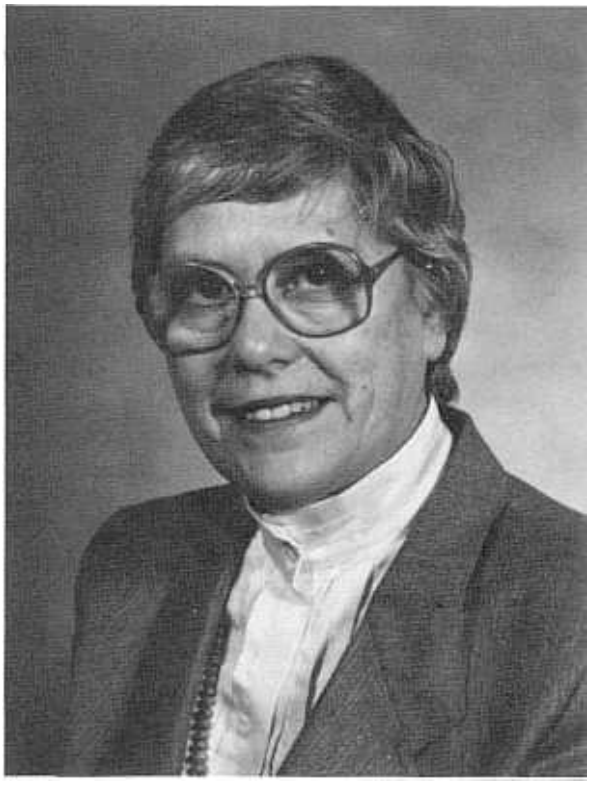
Chair: Edward J. Lusk, The Wharton School, University of Pennsylvania, TRI-NEB Building-SX, Philadelphia, Pennsylvania, USA 19104

TUESDAY
12:45-1:45

LE GRAND SALON

Dr. Janet L. Norwood, Commissioner of Labor Statistics
U.S. Department of Labor
Washington, D.C.

Dr. Janet Norwood is the U.S. Commissioner of Labor Statistics, a member of the Executive Board of the American Economic Association, and vice-president of both the American Statistical Association and the International Statistical Institute. Responsible for the production of statistics on the labor force, prices, wages, and productivity, she is also an analyst of cyclical and structural changes evident in these data and their cyclical and structural changes evident in these data and their signifance to forecasting. Appearing once a month before the Joint Economic Committee of the U.S. Congress, Dr. Norwood discusses changes in the economy with particular attention to their effect on employment. She is the recipient of honorary degrees from Florida State and Carnegie Mellon Universities and numerous awards in recognition of her public service. She is a fellow of the American Statistical Association and of the American Association for the Advancement of Science.



"LABOR MARKET ISSUES FOR THE FUTURE"

Economic and sectoral changes in the United States which provide insight in the restructuring of the U. S. manufacturing industry and job creation in the American service producing sector will be reviewed. Demographic changes suggesting a labor force of the future with an age, skill and minority makeup that is markedly different from the past will be discussed. Some similarities and contrasts between the United States and Canada will also be presented.

Chair: Robert Carbone, Faculte des Science de l'Administration, Universite Laval, Ste-Foy, Quebec, CANADA G1K 7P4

LE GRAND SALON

Dr. Martin Wilk, Chief Statistician of Canada
Statistics Canada, Coats Building 26-A
Ottawa, Ontario, CANADA K1A 0T6

Dr. Martin Wilk is the Chief Statitician of Canada, Statistics Canada. Formerly, he was assistant Vice-President-Director of Corporate Planning of the American Telephone and Telegraph Company and Statistical Director, Management Sciences Research of Bell Telephone Laboratories. Dr. Wilk has made significant contributions in various statistical areas, particulary in non-parametric methods where he has authored and co-authored over 40 papers in scientific journals. He is currently President of the Statistical Society of Canada and was a Vice-President of the American Statistical Association for the Advancement of Science, of the New York Academy of Science and of the Royal Statistical Society; and an elected member of the International Statistical Institute.

"PREDICTION PLANNING & UNCERTAINTY"

Evolutionary survival requires a faculty of knowing how to act in anticipation of future happenings. But the act of planning is a challenge not to forecast the future, but to achieve objectives despite inevitable uncertainties. Several categories of uncertainty of relevance to planning process is described as the combination of defined components: (Purpose, Predictions, Plans). Various aspects of planning are discussed, including speculations on what is needed to increase productivity of planning efforts.

Chair: Robert Winkler, Professor of Statistics, Graduate School of Business, Duke University, Durham, North Carolina, USA 27706

F I N D I N G S E S S I O N S

All sessions are coded for your convenience. The session codes should be interpreted as follows:

First letter gives the day: M=Monday, T=Tuesday, W=Wednesday

Second letter gives the time: M=Morning, A=Afternoon

Third letter gives the time: E=Early, L=Late

Number gives the order of a session at a specific time.

Last letter gives the location of session:

A - Galerie 2

B - Galerie 3

C - Galerie 4

D - Duluth

E - Saint Charles

F - Matapedia

G - Chaudiere

H - Hospitality

K - Grand Salon (Ballroom)

M - MacKenzie

R - Studio

S - Saguenay

T - Etude

V - Ville Marie

Y - Yamaska

SUMMARY OF PROGRAM SESSIONS AND CHAIRPERSONS

MONDAY, JUNE 10 - LATE MORNING SESSIONS - 10:15-11:45

MML1A - Effective Planning Using a Hierarchy of Forecasts, W. Bassin
MML2B - Uses and Abuses of Forecasting I, E. Solem
MML3C - Exchange Rate Forecasting I, D. Alexander, R. Baillie
MML4D - Applied Forecasting in Business and Government, S. McNees
MML5E - Prediction with Symbolic Modeling: Graphics Approach Methods, W. Cave
MML6F - Evaluation and Comparisons of Forecasting Methods 1, G. Brackstone
MML7G - ARIMA Forecasting, D. Reilly
MML8M - Forecasting Telecommunication Services, E. Cozanet
MML9S - Computer Software Support in Forecasting, L. Liu
MML10Y - Judgmental Forecasting, S. Armstrong
MML11R - Applied Forecasting I, R. Winkler
MML12T - Topics in Forecasting, R. Ouellet
MML13V - Applied Forecasting II, N. Gait

MONDAY, JUNE 10 - EARLY AFTERNOON SESSIONS - 2:00-3:30

MAE1B - Uses and Abuses of Forecasting II, E. Solem
MAE2C - Exchange Rate Forecasting II, R. Baillie, D. Alexander
MAE3D - Strategic Management and Forecasting, D. Kratochvil
MAE4E - Forecasting Software and Decision Support Systems, E. Mahmoud
MAE5F - Evaluation and Comparison of Forecasting Methods II, P. Cholette
MAE6G - Dynamic Econometric and Transfer Function Models, W. Fortney
MAE7M - Telecommunications Demand Forecasting, Z. Gilstein
MAE8S - Forecasting for Operations, D. Flowers
MAE9Y - Economic Forecasting I, H. Stekler
MAE10R - Forecasting on Business - Cycle Issues, V. Zarnowitz
MAE11T - Forecasting on Construction Issues, R. Fildes
MAE12V - Long Range Forecasting & Scenario Analysis, G. Huot

Feature Session:

MAE13A Forecasting One's Own Preference, R Dawes

MONDAY, JUNE 10 - LATE AFTERNOON SESSIONS - 4:00-5:30

MAL1A - Technological Forecasting, J. Baal-Schem
MAL2B - Forecasting in Marketing II, S. Armstrong
MAL4D - Frameworks for the Comparison of Econometric Models, M. McCracken
MAL5E - Statistical Models for Technological Forecasting, K. Ord
MAL6F - Evaluation and Comparison of Forecasting Methods III, M. Morry
MAL7G - Forecasting Industrial Competitiveness, M. Oral
MAL8M - Tourism Forecasting, T. Var
MAL9S - Financial Forecasting, L. Brown
MAL10Y - Forecasting Applications I, R. More
MAL11R - Business Forecasting, R. McLaughlin
MAL12T - Forecasting Issues, M. Yalovsky
MAL13V - Topics in Forecasting, G. Huot

Feature Session

MAL3C - Tutorial on Futures and Options Contracts, I Kawaller

TUESDAY, JUNE 11 - LATE MORNING SESSIONS - 10:15-11:45

TML1A - Advanced Economic Methodology, C. Dagum
TML2B - Alternative Model Estimation Strategies ...A. Spivey
TML3C - Uncertainty in Univariate ARIMA Forecasts, D. Pack
TMA4D - High Technology Forecasting, A. Gerstenfeld
TML5E - Forecasting & Decision in Transport, A. Jessop
TML6F - Postal Forecasting, G. Haines and C. Hobbs
TML7G - Forecasting Accuracy, D. Smyth
TML8M - Leading Economic Indicators, G. Moore
TML9S - State Space Forecasting Methods, J. Brownlow
TML10Y - State Revenue and Regional Forecasting, R. Ouellet
TML11R - Financial Forecasting I, T. Cheng
TML12T - Business Strategy, Vision or Manoeuvrability, P. Fitzgerald
TML13V - Demographic and Social Forecasting, M. George
TML14H - Exchange Rate Forecasting III, D. Alexander, R. Baillie

TUESDAY, JUNE 11, EARLY AFTERNOON SESSIONS - 2:00-3:30

TAE1A - Uncertainty in Forecasting with Econometric Models, G. Calzolari
TAE2B - Forecasting Business Failures, J. Betts
TAE3C - Modelling and Prediction of Time Series, G. Ljung
TAE4D - Scenario Analysis as a Forecasting and Planning Tool, S. Schnaars
TAE5E - Travel Demand Forecasting, H. Cheung
TAE6F - Forecasting in Marketing I, R. Darmon
TAE7G - Long-Range National Manpower, A. Reisman
TAE8M - Forecasting with Leading Indicators, R. Holmes
TAE9S - Applications of Kalman Filter, N. Meade
TAE10Y - Advanced Time Series Methodology, P. Lefrancois
TAE11R - Financial Forecasting II, T. Cheng
TAE12T - Multivariate Time Series Forecasting. R. Souza
TAE13V - Forecasting Applications in Finance, G. Huot

TUESDAY, JUNE 11, LATE AFTERNOON SESSIONS - 4:00-5:30

TAL1A - Judgment in Implementation, A. Lockett
TAL2B - Exchange Rate Forecasting IV, D. Alexander, R. Baillie
TAL3C - Univariate and Multivariate Time Series Forecasting, J. de Gooijer
TAL4D - Economic Forecasting Related to Japan's Problems, K. Obi
TAL5E - Electricity Demand Forecasting, K. Peterson
TAL6F - Lifecycle Forecasting of Tourism Sites, R. Calantone
TAL7G - Forecasting Systems for Operations Management, V. Mabert
TAL8M - Seasonality and Seasonal Adjustment Methods, G. Huot
TAL9S - State Space Models, R. Fildes
TAL10Y - Energy Forecasting, K. Hamilton
TAL11R - Issues with Exchange Rate Forecasting, M. Yalovsky
TAL12T - Topics in Forecasting, C. Parkan
TAL13V - Exchange Rate Forecasting V, D. Alexander, R. Baillie

WEDNESDAY, JUNE 12, LATE MORNING SESSIONS - 10:15-11:45

WML1A - Macroeconomic Forecasting, L. Oller
WML2B - Corporate Strategic Planning and Forecasting, R. DeRoeck
WML3C - Forecasting Market Share in the Automotive Industry, M. Stein
WML5E - The Central Role of Sales Forecasting in Manufacturing Planning, T. Davidson
WML6F - Interdependent Systems for Forecasting, J. Marciano
WML7G - Tourism Forecasting Techniques, T. Var
WML8M - Social Forecasting, H. Linstone
WML9S - Forecasting in Hydrology, Oceanoly and Meteorology, I. McLeod
WML10Y - Computer Software in Forecasting, J. Kuiper
WML11R - Long Range Forecasting and Planning in Universities, U. Thomas
WML12T - Financial Forecasting III, T. Cheng
WML13V - Forecasting Topics, R. Ouellet

Feature Session:

WML4D - Gains in Selecting a Univariate Forecasting Model, R. Fildes

PROGRAM SUMMARY

MONDAY, JUNE 10 - LATE MORNING SESSIONS 10:15-11:45

MML1A - Effective Planning Using a Hierarchy of Forecasts, W. Bassin

Bassin, What Makes An Effective Forecast?
Ellis, Local Forecasting: A Modeling Approach
Kendon, et. al., Forecasting Methods in the Petrochemical Industry...
Buckman, Cycles & Forecasting

MML2B - Uses and Abuses of Forecasting I, E. Solem

Demirdache, Technological Forecasting and Planning...
Kettle, Uses and Abuses of Population Forecasting...
Senkiw, Medium-Term Political Forecasting Estimates...

MML3C - Exchange Rate Forecasting I, D. Alexander

Alexander, Exchange Rate Models:How Well Do They Perform...
Lothian, The Behavior of Nominal and Real Exchange Rates
Bilson, Technical Trading Systems in the FX Market...
Gregory, et. al., The Unbiased Hypothesis in the Forward...

MML4D - Applied Forecasting in Business and Government, S. McNees

Kopcke, Effect of ERTA on Investments
Beeman, Economic Assumptions and Budget Estimates
Bremimyer, Calendar Dating and Monetary Measurement
Perna, The 'So Whats' and 'What Ifs' of Business Forecasting

MML5E - Prediction with Symbolic Modeling: Graphics Approach Methods, W. Cave

Cave, Predicting Nonstationary Market Demand Using Symbolic...
Babb, A Forecasting Model for Single-Family Housing Demand
Scacchia, Symbolic Network Modeling of a Consumer Goods Market

MML6F - Evaluation and Comparisons of Forecasting Methods I, G. Brackstone

Texter, et. al., Forecasting Using an Automatic Interaction...
Cartwright, Forecasting Time Series with Seasonalities...
Nathan, A Poisson Winters' Model Update: A Comparison...
Koehler, et al., State Space Forecasting Using the Makridakis...

MML7G - ARIMA Forecasting, D. Reilly

Reilly, Automatic Intervention Detection System
Nash, et. al., Non Homogeneity, Outlier and Intervention Detection...
MacNeil, et. al., Adaptive Forecasting and Estimation...
Wheale, et. al., An Empirical Analysis of the Advertising Sales...

MONDAY, JUNE 10 - LATE MORNING SESSIONS 10:15-11:45 (Continued)

MML8M - Forecasting Telecommunication Services, E. Cozanet

Cozanet, Forecasting Models for Telex Market
Cracknell, et al., Forecasting Demand for New Telecommunication...
Schlegel, Forecasting Models for Telephone Traffic...
Reader, Estimation of the Effects of Price Changes...

MML9S - Computer Software Support in Forecasting, L. Liu

Liu, Considerations in the Improvement of Forecasts
Hudak, The SCA Statistical System: Integrated Software...
Doan, et. al., Rats: Regression Analysis of Time Series

MML10Y - Judgmental Forecasting, S. Armstrong

Thomassen, On Personalizing Forecasts
Sniezek, Judgmental Forecasting by Groups
Fingerman, Merging of Forecasts: Reconciling and Merging Subjective...
Goitein, Behavioral Approaches to Improving the Group Forecast

MML11R - Applied Forecasting I, R. Winkler

Skinner, Small Area Population Projection for Education Planning...
Cullity, Forecasting Industrial Production in Major Industrial...
Chandra, On the Efficiency of Combining Forecasts...
Narayan, et. al., Assessing the Impact of Transit Marketing ...
Sinha, Self-tuning Predictors and their Applications

MML12T - Topics in Forecasting, R. Ouellet

Nihan, Estimating the Impacts of Freeway Ramp Controls
Norcross, et. al., Forecasting Recruitment of Juvenile...
Cieslak, Forecasting by Analogy Using Time Series Data...
Hansmann, A Generalized Logistic Function for Long-Term Forecasting

MML13V - Applied Forecasting II, N. Gait

Sorenson, An Energy Planning Model
Oglesby, Oil Price Changs as a Non-Gausian Stable Process
Mukherjee, A Simple Econometric Model for Forecasting Economic...
Gait, et. al., Insurance Premium: A Case Study of Forecasting

MONDAY, JUNE 10 - EARLY AFTERNOON SESSIONS 2:00-3:30

MAE1B - Uses and Abuses of Forecasting II, E. Solem

Wilde, Uses and Abuses of Forecasting
Simmonds, Forecasting as a Catalyst
DeKlebnikoff, Forecasting in Political Risk Analysis

MAE2C - Exchange Rate Forecasting, R. Baillie

Boothe, et. al., Dynamic Specification and Exchange Rate...
Baillie, News and Efficiency in the Foreign Exchange Market
Copeland, News and the Sterling Exchange Rate
Klienbaum, et. al., Ex Ante Forecasting Performance of Linear...

MAE3D - Strategic Management and Forecasting...D. Kratochvil

Sladden, The Challenge of Forecasting in a Worldwide...
Williams, Regulatory Requirements, Risks, & Strategic Movement...
Scott, STrategic Management in a Public Multilateral Financial...
Pihl, Using Forecasting Techniques to Plan for Long-Term...

MAE4E - Forecasting Software and Decision Support Systems, E. Mahmoud

Beaumont, et. al., Survey of Forecasting Software for Micros
Mahmoud, et. al., Data Bases for Forecasting, Planning and Control
Kaynak, et. al., Data Gathering and Forecasting Difficulties...

MAE5F - Evaluation and Comparison of Forecasting Methods II, P. Cholette

Wright, Forecasting Evaluation Within a Decision Making Environment
Yau, et. al., Forecasting Electricity Consumption in Hong Kong...
Bubnys, Forecasting Sales Volume of Electricity: A Comparison...
Hibshoosh, Alternative Criteria for Accountability of Forecasts...

MAE6G - Dynamic Econometric and Transfer Function Models, W. Fortney

Fortney, Eigenvalue Analysis in Dynamic Economic Models...
Richardson, Simultaneous Equation Transfer Function Models...
Klein, Forecasting the Impact of Revenue Changes on U.S. Public...
Boamah, et. al., An Econometric Model for Short-Term Forecasting...

MAE7M - Telecommunications Demand Forecasting, Z. Gilstein

Pankowski, Price Regression of Demand for Residential...
Wojnar, Forecasting New Telecommunications Services
Tu, An Improved Traffic Forecasting Process Using Kalman Filters
Shimamura, Demand Forecasting for Videotex Telecommunications...

MONDAY, JUNE 10 - EARLY AFTERNOON SESSIONS 2:00-3:30 (Continued)

MAE8S - Forecasting for Operations, D Flowers

Brown, Significant Events in Demand History
Reddy, et. al., The Impact of Product Group Forcing on Individual
Muir, Management a Forecasting System

MAE9Y - Economic Forecasting I, H Stekler

Stollar, et. al., Utilization of Indirect Estimates of Real GOP.
Helkie, A Forecasting Model for the U.S. Merchandise Trade Balance
Stekler, Forecasting Industrial Bottlenecks: An Analysis...
Dunn, et. al., Prediction Model of the Incidence of Interindustry.

MAE10R Forecasting on Business-Cycle Issues V Zarnowitz

Sartorius, Decomposition of Errors in Regression Sales Forecasts
Nash, Biological Clock in the Unicorn Explained:A Case...
Gadberry, Optimizing the Performance of Moving Average...

MAE11T Forecasting on Construction Issues, R Fildes

Reid, Public Housing Forecsting
Ward, Small Area Forecasting to 1990's for Minneapolis St. Paul, MA
Flaschner, et. al., Expected Impact of a Proposed Retail Shopping Complex

MAE12V Long Range Forecasting and Scenario Analysis, G Huot

Gidai, Alternative Ways, Alternative Views of Future...
Curtis, Evolutionary Invariants as a Method of Forecasting
Gappert, Organizational Foresight, Bureaucratic Theory...
Meristo, The Use of Multiple Scenario Approach in European..

Feature Session:

MAE13A Forecasting One's Own Preference, R Dawes

MONDAY, JUNE 10 - LATE AFTERNOON SESSIONS 4:00-5:30

MAL1A - Technological Forecasting, J. Baal-Schem

Raz, et. al., Monitoring a Technological Revolution...
Tomasek, Forecasting of Demand for New Telecommunication Services...
Greis, et. al., Bayesian Approach to Telecommunications...
Bnaya, Technology Forecasting and the Management of Technology

MAL2B - Forecasting in Marketing II, S. Armstrong

Armstrong, Forecasting Methods for Marketing
Petto, Comparative Accuracy of Product Manager's Forecasting...
Brown, Delphi Techniques in Corporate Forecasting
Prasad, Providing Forecasting Resources to Brand Managers...

MAL4D - Frameworks for the Comparison of Econometric Models, M. McCracken

O'Reilly, Model Comparisons as a Tool in Model Evaluation
Bell, et. al., Comparing Macroeconomic Models of the U.K.

MAL5E - Statistical Models for Technological Forecasting, K. Ord

Bozeman, et. al., Adaptive Diffusion Model for the Growth of Robotics...
Ord, et. al., Model Selection for Technological Forecasting
Day, et. al., Experience with New Grocery Product Forecasting

MAL6F - Evaluation and Comparison of Forecasting Methods III, M. Morry

Eerola, Use and Evaluation of Forecast Product Market Forecasts
Lefrancois, et. al., Confidence Limits on Forecasts...
Oliver, An Adaptive Response Rate to Monitor Exponential Smoothing
Murphy, On the Value of Weather Forecasts in Static and ...

MAL7G - Forecasting Industrial Competitiveness, M. Oral

Oral, Forecasting Industrial Competitiveness: A Framework
Garceau, An Empirical Investigation of the Use of PC Based...
Dominique, Industry-Wide Mastery as an Indicator of Market Power
Rahn, A PC-Based DSS for Competitive Strategy Formulation

MAL8M - Tourism Forecasting, T. Var

Var, et. al., Future of Hawaiian Tourism - a Delphi
Baron, Data Requirements and Information System for Forecasting Tourism
Edgell, Projections and Implications of International Tourism...

MAL9S - Financial Forecasting, L. Brown

Easton, Accounting Earnings and Security Valuation: Empirical...
Wilson, The Incremental Information Content of Accruals...
Brown, et. al., The Magnitude of Financial Analyst Forecast...

MAL10Y - Forecasting App ation R More

More, The Impact of Organizational on Behavior on Sales
Foreman, Research by Forecasters
Finney, The Stock Market: How Predi
Milutinovich, et. al., Use of Feedf and Potential...
Gimple, Intolerance of Ambiguity an Need for Forecasts

MAL11R - Business Forecasting, R McLaughlin

Simunek, Fore Markets for C lities: A Walrus-Marsha
VanColler, Pr Experience in s Forecasting...
Suhir, et. al casting New Pr Sales
Price, et. al ntory Forecast Very Low Demand Items

MAL12T Forecasting ssues, M Yalovsky

Thing, The Engineers Role in Deciding the Future
Tonchev, Forecasting Globalistics: Achievement, Diagnosis.
Simmons, Cycle Regression Analysis Simultaneous Estimation
Hoyt, Forecasting China's Foreign Trade

MAL13V - Topi in Foreca ing G Huot

Fingerman rap Techni ues to Obtain Forecast Distribution
Hietikko, , Forecast ng Heating Energy Consumption...
Zimmerman , Fuzzy Ve tor Autoregression Forecasting...
Alt, et. sequence o ARMA Model Misspecifications...
McIntyre, sing the Va ue of Probabilistic Forecasts

Feature Session

MAL3C - Tutorial on Futures and Options Contracts, I. Kawaller

TUESDAY, JUNE 11 - LATE MORNING SESSIONS 10:15-11:45

TML1A - Advanced Economic Methodology, C. Dagum

Voorhoeve, Grecon: A Simultaneous Econometric Model...
Singh, et. al., An Evaluation of Forecasting Performance...
Hwa, A simultaneous Equiation Model of Price and Quantity...
Katz, An Investment Equation with Separate Cost of Capital...

TML2B - Alternative Model Estimation Strategies and...A. Spivey

Machak, et. al., Forecasting Money Supply Aggregates...
Hui, The Use of Multivariate Time Series Techniques...
Acker, Forecasting with Transfer Function Models...

TML3C - Uncertainty in Univariate Arima Forecasts, D. Pack

Nkwuo, Estimation of Jumps in Time Series with Seasonality...
Tashman, et. al., Deterministic vs. Stochastic Seasonality...
Guerts, et. al., Partitioning Time Series into Permanent...

TML4D - High Technology Forecasting, A. Gerstenfeld

Gerstenfeld, Microcomputers for Management; A Technological Forecast
Zwiep, Industrial Robotics: A Forecast
Togai, et. al., Next Generation of Robots: Japanese Approach

TML5E - Forecasting & Decision in Transport, A. Jessop

Polak, Short Term Travel Time Forecasting in Continuous...
Jessop, An Experiment in Air Travel Forecasting
Gilbert, The Utility of Structural Modelling as a Forecasting Tool

TML6F - Postal Forecasting, G. Haines, C. Hobbs

Guy, et. al., The Effects of Technological Change on the Postal ...
Waldau, Forecasting Labor Inputs for the U.S. Postal Service
Floor, The Development of Forecasting Methods in the Dutch Postal...

TML7G - Forecasting Accuracy, D. Smyth

Huth, A Quantatiative Look at the System of Economic Indicators
Smyth, et. al., Multiperiod Macroeconomic Forecasts...
Giannaros, Long Term Real Interest Rate Forecasting

TML8M - Leading Indicators of Inflation, G. Moore

Joyce, Inflation Forecasting with a New Industrial Materials...
Deitch, Anticipating Growth Recessions: A New Sequential...
Maurer, Indicators for the Energy and Minerals Industry
Klein, A New Assessment of the Role of Money in Forecasting...

TUESDAY, JUNE 11 - LATE MORNING SESSIONS 10:15-11:45 (Continued)

TML9S - State Space Forecasting Methods, J. Brownlow

Dutton, Estimation and Prediction Under Structural Instability...
Brownlow, State Space Forecasting and Target Tracking
Aksu, et. al., State Space and Multivariate ARIMA...
Crawford, Random Coefficient Time Series Models of Sea State Variables

TML10Y - State Revenue and Regional Forecasting, R. Ouellet

Brooking, A Simplified State Tax Revenue Forecasting Model
Jones, Forecasting to Control Totals for Variable Economic Sub-Regions
Smith, et. al., Statistical Evaluaion of Response Surfaces...
Helmich, et. al., Fairfax County Revenue Forecasting Program

TML11R - Financial Forecasting I, T. Cheng

O'Brien, A Simulation Case for Education Credit Union Managers...
Simos, et. al., Static and Dynamic Forecasting of Money Balances...
Gillingham, et. al., Forecasting Corporate Performance...
Kawaller, New Tools for Managing Price Risk

TML12T - Business Strategy, Vision or Manoeuvrability, P. Fitzgerald

Fitzgerald, Stream Session: Business Strategy, Vision...
Wilson, Monitoring Financial Results: Vagaries in Internal Funding...
Spain, Consulting to Minority Small Business
O'Clock, et. al., Forecasting New Orders and Profits for High...

TML13V - Demographic and Social Forecasting, M. George

Boshoff, Social Forecasting: Its Importance to Strategic Planning
Pflaumer, Monte Carlo Methods in Population Forecasting
Sulc, System Approach to Continuous Forecasting Activity...
Smith, Cross-Validation Techniques to Establish Extent of...

TML14H - Exchange Rate Forecasting III, D. Alexander, R. Baillie

Adams, et. al., Efficiency Tests in the Foreign Exchange Market
Amsler, The Real Interest Rate Differential Theory Re-examined
Mann, Dollar Depreciation and LDC Term of Trade, Three Scenarios
Ormerod, et. al., Deutschemark-Dollar Exchange Rate: ...

TUESDAY, JUNE 11, EARLY AFTERNOON SESSIONS 2:00-3:30

TAE1A - Uncertainty in Forecasting with Econometric Models, G. Calzolari

Calzolari, et. al., Measuring Forecast Uncertainty in a Macro Model...
Friedman, Multivariate Predictions from Structural Econometric Models...
Naini, On the Predictive Efficiency in Simultaneous...
Schoonbeek, Eigenvalue Analysis in Dynamic Econometric Models

TAE2B - Forecasting Business Failures, J. Betts

Rushinek, Financial Ratios Discriminant Analysis...
Phong, et. al., Corporate Failure Forecast with Singapore Data
Cassidy, et. al., Models of Predicting Failing Savings and Loans...
Betts, et. al., Some Problems in the Behavior of Models...

TAE3C - Modelling and Prediction of Time Series, G. Ljung

Poskitt, et. al., Determining A Model Portfolio in Linear ...
McLeod, et. al., Seasonal Economic Time Series Forecasting...
Pena, et. al., A Factor Analysis for Time Series
Ljung, A Comparative Study of Some Diagnostic Tests

TAE4D - Scenario Analysis as a Forecasting and Planning Tool, S. Schnaars

Schnaars, et. al., An Empirical Test of the Relative Merits...
Schoemaker, Scenario Construction: Behavioral and Methodological...
Klein, et. al., Using Scenarios for Strategic Decision Making...
Klein, Generating Scenario Structures with Direct Relevance...

TAE5E - Travel Demand Forecasting, H. Cheung

Berkowitz, et. al., Forecasting Vehicle Holdings and Usage...
Wills, Intercity Passenger Travel Market Shares
Cheung, A Model for Forecasting Air Passenger Aggregate Demand
Brocklebank, Forecasting the Impact of High Speed Rail Services...

TAE6F - Forecasting in Marketing I, R. Darmon

Laroche, A Simple Approach to Forecasting Market Shares...
Oral, Competitiveness Analysis for Marketing Strategy Formulating
Calantone, Short Term Forecasting of Services Demand
Bourgeois, Forecasting Customer Needs for Telecommunications...

TAE7G - Long Range National Manpower, A. Reisman

Pollack-Johnson, Some Comments on Manpower Forecasting...
Kruss, Scenarios of Ontario's School System Twenty Years Hence
Reisman, et. al., On the Voids in the U.S. National Eduction...
Reisman, et. al., Forecasting Flows in an Educational Network...

TAE8M - Forecasting with Leading Indicators, R. Holmes

Holmes, Six and Twelve Month Forecasts of British Columbia...
Defris, et. al., A Planning Strategy for Telecommunications...
Layton, A Cross Spectral and Causality Analysis of Australia's.

TAE9S - Applications of Kalman Filter, N Meade

Meade, Forecasting an Irregularly Observed Flow Series...
Sastri, A Stochastic Filtering Approach for Seasonal Time Series...
Crawford, Detection of Epidemics and Estimation on the Impact...
Goldberg, Selection of Forecasting Models for a Military Enlistment

TAE10Y - Advanced Time Series Methodology, P. Lefrancois

Hsu, Some Issues of Structural Shifts in Time Series and Their...
McDonald, ARIMA Time Series Models: Some Alternative Estimators
Bordignon, et. al., Optimal Use of Provisional Data in Forecasting.

TAE11R - Financial Forecasting II, T. Cheng

Burnie, et. al., Forecasting Expected Returns of Canadaian Corporate
Nguyen, A Statistical Analysis of Mortgage Prepayment Rate...
Bahmani, et. al., Investment Selection Using the Analytical...
Geva, Forecasting with Biplot - A Statistical Tool to Describe...

TAE12T - Multivariate Time Series Forecasting, R. Souza

Souza, Slow Moving Items Demand Forecasting Via Bef Method
Kling, Forecasting Vector Autoregressions with Bayesian Priors
Ramirez, The Integration of Forecasting Techniques to Managerial...
Neto, Forecasting Via Singular Pencil Models

TAE13V - Forecasting Applications in Finance, G. Huot

Triantis, et. al., Comparison of Deutsche Mark Exchange Rate Forecas
El-Sheshai, The Predictive Accuracy of Analysts vs. Time Series...
Oakford, Uncertainty in Forecasting Extends to Financial Statements
Fried, Further Evidence on the Difficulty of Forecasting Earnings..

TUESDAY, JUNE 11, LATE AFTERNOON SESSIONS 4:00-5:30

TAL1A - Judgement in Implementation, A. Lockett

Lockett, Forecasting and the Use of Models
Parkinson, Forecasting in its Organisational Setting
Thomas, Subjectivity in Decision Analysis

TAL2B - Exchange Rate Forecasting II, D. Alexander & R. Baillie

Garman, The Uses of Perpetual Currency Options
Edison, Optimal Currency Baskets - A Theoretical Analysis
Jones, Concurrent and Lagged Relationships among Foreign...
Gregory, et. al., Testing the Independence of Foreign Error...

TAL3C - Univariate and Multivariate Time Series Forecasting, J. de Gooijer

Jensen, et. al., Forecasting Methods for Heavy-Tailed Processes
de Gooijer, A Specification Strategy for Order Determination...
Mahmoud, et. al., Loss-Cost Functions for Measuring the Accuracy...
Chen, Econometric Methods in Micro Forecasting: Problems and Traps

TAL4D - Economic Forecasting Related to Japan's Problems, K. Obi

Tsuzuki, Economic Forecasting and the Theory...
Tsuruoka, International Policy Coordination in 1985-86...
Obi, Prediction of Labor Participation Ratios-An Experiment...
Matsuno, Analysis of a Model for the Labor Supply of Married Females...

TAL5E - Electricity Demand Forecasting, W.L. Barron

Heraud, The Long Term Forecast Methods for Electricity Demand in France
Roux, Energy Competition and Demand Forecasting Model M.E.R...
Cody, et. al., A Cross Sectional Approach to Forecasting...
Goh, et. al., Forecasting of Daily Peak Substation Loads in a Power...

TAL6F - Lifecycle Forecasting of Tourism Sites, R. Calantone

Calantone, A Review of Tourism Forecasting with Attention to the Lifecycle
Fritz, Dynamic Model of Regional Tourism Site Development
DiBenedetto, Tracing A Product Life Cycle Extension: Cypress Gardens

TAL7G - Forecasting Systems for Operations Management, V. Mabert

Nathan, et. al., The Use of Rolling Forecasts in the Aggregate...
Flores, The Use of Cost Functions in the Measurement of Forecasting...
McLeavey, et. al., A Comparison of Two Complete Forecasting Systems...
Mabert, Short Interval Forecasting of Emergency Phone Call Work Loads

TUESDAY, JUNE 11, LATE AFTERNOON SESSIONS 4:00-5:30 (Continued)

TAL8M - Seasonality and Seasonal Adjustment Methods, G. Huot

Huot, et. al., Analysis of Revisions in the Seasonal Adjustment...
Nazem, Some Practical Considerations in Identification of Seasonal...
Stier, Seasonal Adjustment by Using Recursive Fitlers
McLeod, et. al., Using Monitoring Models to Detect the Timing...

TAL9G - State Space Models, R. Fildes

Waage, A New Class of State Space Filter Fore[illegible]g Models...
Vishwakarma, Dynamic Regression Analysis and [illegible]sting with.
Zehnwirth, A Generalization of the Kalman Fil[illegible]sed on...
Aksu, et. al., Forecasting Stock Prices

TAL10Y - Energy Forecasting, R Hoffman

Paik, Forecasting Methods for Energy Development Projects...
Holtberg, The Relationship Between Commercial Sector Energy Demand...
Santini, Unbalanced Recovery in Energy Related Markets...
Huff, A Framework for Forecasting Energy Policy

TAL11R - Issues with Exchange Rate Forecasting, M Yalovsky

Richardson, et. al., Testing the Stability of Monetary Exchange Rate...
Wharton, et. al., A Forecasting Model for Exchange Rates
Hseih, A Methodological Comparison of Forecasts on Foreign Exchange...
Townsend, The New International Monetary System: Mechanics and...
Lothian, et. al., Review of Performance Criteria for Exchange Rate...

TAL12T - Topics in Forecasting, C. Parkan

Braithwait, Forecasting Residential Electricity Demand...
Ou, Determination of Trend, A Comparison of the Least Square...
Benson, Assessing the Reliability of Long-Range Highway Load Forecasts
Li, et. al., The Application of Monte Carlo Techniques in a Fuzzy...

WEDNESDAY, JUNE 12, LATE MORNING - 10:15-11:45

WML1A - Macroeconomic Forecasting, L. Oller

Cholette, et. al., A Multivariate Approach to Forecasting...
Eero, et. al., Some Comments on the Fine-Runign of Econometric...
Koreisha, et. al., Fast Linear Estimation Methods for Vector...
Weaver, Integrated, Interconnected Models for More Effective...

WML2B - Corporate Strategic Planning and Forecasting, R. DeRoeck

Klein, When and Why Environmental Analysis/Forecasting
Jones, The Use of Multiple Scenario Planning in an Uncertain...
Gerra, Integrating the International Environment into Corporate...

WML3C - Forecasting Market Share in the Automotive Industry, M. Stein

Beauregard, et. al., Comparison of Econometric and Cohort-Based...
Sullivan, Removal of Japan's Auto Restraints: Estimating the Market...
Luckey, Analyzing the U.S. Luxury Car Segment

WML5E - The Central Role of Sales Forecsting in Manufacturing... T. Davidson

Jacobson, Business Planning for Manufacturers
Davidson, Manufacturing Decision Support Systems
Fagan, Forecasting Experience in Business

WML6F - Interdependent Systems for Forecasting, J. Marciano

Marciano, Elements for Building an Expert System in Linear Modelisation
Tschetter, Factors Influencing Occupational Employment Patterns
Weinberg, Systems Synthesis Analysis: Examination and Analysis...
Perryman, A Multi-Dimensional Integrated Econometric Modeling...

WML7G - Tourism Forecasting Techniques, T. Var

Chau, Application of the Box-Jenkins Transfer Functions to Forecasting...
Fagence, Land Use Forecasting and Tourism
Beaman, Park Use Forecasting Procedure
Jugii, et. al., Forecasting Vacation Travel Demand: A Richer Model

WML8M - Social Forecasting, H. Linstone

Linstone, Forecasting: Not Always the Right Goal
Kasper, Unfit 'Miscasts' and What Can be Done
Boshoff, Social Forecasting: Its Importance to Strategic Planning
Afheldt, The World in the Nineties

WML9S - Forecasting in Hydrology, Oceanology and Meteorology, P. Morettin

Camacho, et. al., Contemporaneous ARMA Modelling with Applications...
Gait, et. al., Analysis of Causality between the Rainfall at...
Mesquita, et. al., Forecasting the Rainfall Series at...

WEDNE DAY JUNE 2, LATE MORNING - 10:15-11:45 (Continued)

WM Software in Forecasting, J. Kuiper

An Evaluatino of Micro-Computer Software for Forecasting...
Forecasting Simulator - A Computer Model
Forecasting with a Modelling Language
mputer Graphics: Basic Concepts Applied to Business and...

WM ge Forecasting and Planning in Universities, U. Thomas

The Concordia University Mission Study
Toward a Strategy for Long Range Forecasting and Planning..
et. al., Strategic Planning Program for Entrepreneurs
Forecasting Demand for University Computer Systems

IML l Forecasting III, T. Cheng

Forecasting Interest Rates: An Introduction to the...
ng Term Persistence in Gold Prices
Dynamic Exchange Rate Model
et. al., A Structural Forecasting Model of Exchange Rates

ing Topics, R. Ouellet

orecasting Revenue for a Radiology Lab
, et. al., Critical Issues in Forecasting in the...
gl Forecasting Canadian Industrial Energy Demand Including...
erived Reduced Form Forecasts

IML Selecting a Univariate Forecasting Model, R. Fildes

D E T A I L S

O F

E A C H S E S S I O N

GALERIE 2

EFFECTIVE PLANNING USING A HIERARCHY OF FORECASTS

Chair: Bassin, William M., Sage Data Inc., 104 Carnegie Center, Princeton, N.J., 08540, USA

"WHAT MAKES AN EFFECTIVE FORECAST?"

Bassin, William M., Sage Data Inc., 104 Carnegie Center, Princeton, N.J., 08540 ,USA

This paper illustrates the qualities which make an effective forecast. To be effective, a forecast should: 1) identify and follow stable economic trends 2) adjust for seasonal patterns 3) anticipate cyclical turning points 4) account for unusual events such as strikes and material shortages 5) adapt to economic and technical changes 6) assess correctly the impact of individual causal variables 7) involve readily forecasted independent variables 8) avoid "overfitting" the historical data 9) forecast its own error to allow for margins of safety 10) be developed at reasonable cost 11) allow for modification by expert judgement and "market intelligence".

"LOCAL FORECASTING: A MODELING APPROACH"

Ellis, Dennis F., The University of Michigan-Flint, School of Management, Flint, Michigan, 48503, USA

The recession of 1974-75 hit the Flint area extremely hard. As part of a push for economic development and diversification the business community, governmental units, and non-profit organizations requested some short-term projections of economic activity. I took an interest in making the economic forecasts for the area, and my methods and model will be described in this paper. I will describe data used and problems associated with data collection for a regional area. My method of forecasting is basically an econometric one. I will also discuss how my local model uses forecasts from larger macro models.

"FORECASTING METHODS IN THE PETROCHEMICAL INDUSTRY: LIMITATIONS AND ALTERNATIVES"

Kendon, Richard, Novacor Chemicals, Ltd., Suite 1600, 734 Sevenths Ave., Calgary, Alberta, T2P 3P9, CANADA
Kerr, William, Cullen, Susan, University of Calgary, Calgary, Alberta, CANADA

Economic forecasting can take many forms, from casual empiricism to large scale disaggregate computerized econometric models. Formal econometric modeling has received the lion's share of forecasting effort over the last decade. Many industries, however, do not lend themselves easily to the assumptions of econometric modeling. Petrochemicals is one such industry. The industry is characterized by non-symmetry in supply functions, discrete production units, input and output switching, chronic excess capacity, multiple technologies, long term contractual agreements, non-separable intra and extra firm decision-making and considerable government intervention. In addition, the market is global, thus information and data acquisition requires considerable resources but results in limited accuracy. Within this market and industrial structure, forecasting methods and problems for medium-sized and limited-resources companies are discussed.

"CYCLES & FORECASTING"

Buckman, David, C-I-L Ltd., Agricultural Chemical Division, P.O. Box 5201, London, Ontario, N6A 4L6, CANADA

This paper is a case study showing how the forecasting of a cyclical business itself goes through cycles. The nitrogen chemicals business is both seasonal and cyclical. It is driven by agriculture, which is also both seasonal and cyclical. It is also responsive to energy costs, forecasts for which have ranged very widely over the past 5-10 years. Strategic decision making in this context must clearly focus on essentials. Forecasting for capital projects is hazardous, but must be done. The paper shows how the understanding of the issues evolved, and how the focus changed with the cycle.

GALERIE 3

USES AND ABUSES OF FORECASTING I

Chair: **Solem, Erik**, Dept. of External Affairs, Political & Strategic Analysis Division, Lester B. Pearson Bldg, 125 Sussex Street, Ottawa, Ontario, K1A 0G2, CANADA

"TECHNOLOGICAL FORECASTING AND PLANNING - SOME RECENT FEDERAL GOVERNMENT EXPERIENCE"
Demirdache, Abdul, Strategic Technologies, Policy & Strategy Branch, Science & Technology, Ottawa, Ontario, CANADA

The role of technological forecasting in the planning of federal science and technology policies will be discussed. A process of policy preparation includes examination of the policy environment. In the case of technological development, this has been taken to mean that sectoral and regional forecasts have an important part to play. A brief review of the history of these developments will be followed by comments and assessment of the state-of-the-art in the Federal Government.

"USES AND ABUSES OF POPULATION FORECASTING"
Kettle, John, John Kettle Incorporated, 135 MacLean Avenue, Toronto, Ontario, M4E 3A5, CANADA

Some failures of nerve and failures of imagination that have clouded the practice of population forecasting will be considered. Among other problems, there is a gap between forecasters and planners that is not narrowing and may be widening. Population forecasters have one idea of what kind of forecasts their clients want, and the clients have quite a different idea of what the forecasters are doing. Some key factors in this situation will be considered.

"MEDIUM-TERM POLITICAL FORECAST ESTIMATES IN AN INTERNATIONAL BANKING ENVIRONMENT"
Senkiw, Roman I., Chief Advisor, International Affairs, International Information & Assessment, Country Assessment Committee, Bank of Montreal, CANADA

This presentation describes the medium-term political forecast approach used by a large bank for its international operations. It outlines the reasons for using this particular approach due to the needs of the Bank, and discusses the constraints which exist. Finally, the presentation reviews how well the Bank has done using this approach based on a standard set of criteria which is used to track the quality of work.

GALERIE 4

EXCHANGE RATE FORECASTING I

Chair: Alexander, Don, Citibank, N.A., 399 Park Avenue, New York, New York, 10043, USA
Baille, Richard T., Univ. of Birmingham, Dept. of Economics, P.O. Box 363, Birmingham, UK B15 2TT

"EXCHANGE RATE MODELS: HOW WELL DO THEY PERFORM IN THE 1980'S?"

Alexander, Don, Thomas Lee,, Citibank, N.A., 399 Park Avenue, New York, New York, 10043, USA

This study compares the performance of various structural exchange rate models based on methodology developed by Meese and Rogoff (1983a and b). The first part of the study updates the models used in their study through 1984. The structural models include recent variations of the monetary/asset exchange rate model. These models use actual realized values of future explanatory variables in their forecasts. The forecasts are point forecasts over different time horizons. A second part of the study will look at non-linear estimation, cross-sectional time series estimation and the use of time-varying parameters in a Kalman filter as a means to improve forecast performance.

"THE BEHAVIOR OF NOMINAL AND REAL EXCHANGE RATES"

Lothian, James R., Citibank, N.A., 399 Park Avenue, New York, New York, 10043, USA

The focus of the paper is on nominal and real rates of exchange between the dollar and other major currencies during the period 1955-83. In it I chorincle the movements in both types of rates over these years, comparing their behaviors both across countries and over time periods classified according to apparent differences in policy regimes. I then go to contrast this behavior with the predictions of competing theories of exchange rate determination. Preliminary results to date indicate surprising within-country similarities in the levels of most real exchange rates during the Bretton Woods era and the early 1980s and marked divergences of the levels during both of these periods from those that prevailed during the period of floating rates in the 70s. This analysis indicates that as much as 80% of the variance of real exchange rates over these 29 years is ascribable to differences in the between period averages. This, in turn, suggests that the current emphasis on transitory shocks as a major determinant of real rate movements may be largely misplaced.

"TECHNICAL TRADING SYSTEMS IN THE FX MARKET - A REGRESSION APPROACH"

Bilson, John F.O., Grad. School of Business, Univ. of Chicago, 1101 East 58th St, Chicago, Illinois, 60637, USA

One of the puzzling characteristics of the foreign exchange market during the past decade has been the success of technical trading systems. Simple trend following models appear to generate positive returns despite the finding that exchange rates tend to evolve as a random walk. In this paper, I will demonstrate that the strong kurtosis in the distribution of the rate of change in the exchange rate is responsible for the apparent lack of autocorrelation in the time series. Specifically, the paper presents evidence that small changes (-+2 standard deviations) are positively correlated while large changes are negatively correlated. This finding leads to a regression based technical model which may be suitable for corporate FX management.

"THE UNBIASEDNESS HYPOTHESIS IN THE FORWARD FOREIGN EXCHANGE: A CROSS-COUNTRY"

Gregory, Allan W., Dept. of Economics, University of Western Ontario, London, Ontario, N6A 5C2, CANADA
McCurdy, Thomas H., Dept. of Economics, Queen's University, Kingston, Ontario, K7L 3N6, Canada

The purpose of this paper is to carry out a specification analysis of a test relation for the unibasedness hypothesis using thirty-day forward foreign exchange data from France, Italy, Japan, the U.K. and West Germany. The results indicate that econometric probelsm do exist for each country's test equation over the entire sample. Explaining the source and resolving the econometric deficiences will probably require explicit modelling of market fundamentals and attention to country-specific institutional details. For each country, there is at least one period which admits a statistically adequate regression equation. Results for these periods show that the null hypothesis of the unbiasedness of the forward rate is rejected for some countries but is retained for others.

DULUTH

APPLIED FORECASTING IN BUSINESS AND GOVERNMENT

Chair: **Stephen K. McKnees**, Federal Reserve Bank of Boston, 600 Atlantic Ave., Boston, MA, 02106, U.S.A.

"EFFECT OF ERTA ON INVESTMENTS"

Richard W. **Kopcke**, Federal Reserve Bank of Boston, 600 Atlantic Ave., Boston, MA, 02106, USA

This paper will review some common models of business investment spending to explain the causes of the recent surge in capital spending, assessing the effects of the growth in aggregate demand, falling inflation, changes in interest rates, the drop in the relative prices of capital goods, the increase in business profitability and cash flow, as well as the contribution of the investment tax incentives introduced with the Economic Recovery Tax Act of 1981. The analysis also will assess the likely consequences of altering ERTA"s tax incentives according to current proposals for tax reform.

"ECONOMIC ASSUMPTIONS AND BUDGET ESTIMATES"

Beeman, W.J., Room 456, Congressional Budget Office, Annexe 2, 2nd & D Street S.W., Washington, D.C. 20515, USA

Economic assumptions play an important role in budget estimates and, in theory, budget policies have important impacts on the economy. While forecasters attempt to take into account budget policies when preparing short- and long-run economic projections, it is questionable whether information on budget policies does improve economic projections. Economic theory has challenged the capability of conventional models to produce forecasts. Even if such models have captured historical relationships correctly, several institutional developments appear to have greatly reduced the applicability of historical experience. This paper explores past practices employed by CBO and Council of Economic Advisers and alternative techniques for generating conditional economic projections.

"CALENDAR DATING AND MONETARY MEASUREMENT"

Frederick S. **Bremmyer**, Chief Economist, State Street Bank & Trust Co., 225 Francis, Boston, MA, 02101, USA

This paper examines the monetary aggregate, M1, in the content of seasonal variations that are determined primarily by calendar dating. The hypothesis is presented that the generating mechanisms contributing to seasonal variations are linked to monthly and weekly events. Accordingly, the alignment of weeks within months becomes critical when analyzing an forecasting monetary behavior. The paper reviews the current practice of the Federal Reserve in deriving seasonal factors for M1 components and compares the practice to an alternative calendar analysis. The results of the State Street Bank monetary model are cited, and suggestions supplied for further testing and research regarding the calendar dating hypothesis.

"THE 'SO WHATS?' AND 'WHAT IFS?' OF BUSINESS FORECASTING"

Perna, Nicholas S., General Electric, 3135 Easton Turnpike, Fairfield, CT, 06431, USA

Simple, single-equation models using annual data are a useful tool for business economists. Annual percent change equations reduce autocorrelation problems and seem quite sensitive to business cycle developments. In addition, they tie in nicely with the annual focus of the business budgeting process. REasonably good models of sales, costs and pricing can be developed for specific product lines, business divisions and overall company aggregations. Simplicity is essential. Degrees of freedom are usually quite limited: organizational and product changes limit the length of available times series. The whole process requires considerable judgement. Sometimes a seemingly less accurate equation is preferable to a statistically superior one because the independent variables are easier to forecast. While such models are high-risk activities for economists if business decisions are actually based on the forecasts, they do provide the economist with the ability to translate the macroeconomic environment into its "top line" (sales) and "bottom line" (profits) implications for business. In essence, the models permit the economist (or maybe forece is the better word), to respond to the "So what?" and "What if?" questions that businessmen expect them to be able to answer.

SAINT-CHARLES

PREDICTION WITH SYMBOLIC MODELING: GRAPHICS APPROACH METHODS

Chair: Cave, William C., Prediction Systems Inc., P.O. Box 276, Manasquan, New Jersey, 08736, USA

"PREDICTING NONSTATIONARY MARKET DEMAND USING SYMBOLIC NETWORK MODELS"

Cave, William C., Prediction Systems Inc., P.O. Box 276, Manasquan, New Jersey, 08736, USA

This paper addresses the general problem of improving prediction accuracy in market demand characterized by nonstationary and nonlinear behavior. Solutions to the basic problems of forecasting are proposed. A framework is developed wherein conceptual and structural knowledge of market mechanics can be incorporated into model construction. Within this framework, models are developed using symbolic networks whereby modelers can readily express their knowledge of market mechanics, incorporate information not found in data, and thus gain prediction accuracy. Computer aided graphical tools for constructing symbolic network models are described, along with examples of market demand prediction models developed using this approach.

"A FORECASTING MODEL FOR SINGLE-FAMILY HOUSING DEMAND"

Babb, Christopher T., Raytheon Company, 141 Spring Street, Lexington, Massachusetts, 02173, USA

Forecasts of monthly single-family housing sales by state of construction are developed using an adaptive State-Space model, employing data on permits, starts, completions, and sales. The model systematically accounts for the interactions between the volume of "physical" housing production and the level of "market" sales activity. The model is structured to track both market flows and inventory stocks. Both the sizes and vintage distributions of inventories are allowed to affect housing sales volumes. The Kalman Filter is applied to a subset of model variables and parameters, inclusive of seasonal factors.

"SYMBOLIC NETWORK MODELING OF A CONSUMER GOODS MARKET"

Scacchia, John H., Prediction Systems Inc., 200 Atlantic Avenue, Manasquan, New Jersey, 08736, USA

Market share predictions are developed for the dominant brands in a consumer goods product category by means of symbolic modeling. The model consists of two integrated networks describing the generation of total category demand and product demand within the overall category. The demand generation networks are developed structurally on the basis of key marketing mix variables and competition. Optimal control techniques are applied to determine improved pricing and advertising spending policies. The power and flexibility of the symbolic network modeling approach in improving prediction accuracy will be illustrated.

MATAPEDIA

EVALUATION AND COMPARISONS OF FORECASTING METHODS I

Chair: Brackstone, Gordon, Methodology Branch, Statistics Canada, Ottawa, Ontario, K1A 0T6, CANADA

"FORECASTING USING AN AUTOMATIC INTERACTION DETECTION SYSTEM: A COMPARATIVE ANALYSIS"
Texter, Pam, Ord, Keith, The Pennsylvania State University, University Park, Pennsylvania, 16802, USA

This paper examines situations in which a large number of short series must be forecast. The goal is to produce forecasts which are at least as accurate as those generated by competent modellers. In these situations, an automatic forecasting procedure may greatly facilitate the task. An automatic intervention detection technique is contrasted both to "expert" modelling and to an automatic technique without interaction analysis. Selected time series from the M-competition are used to evaluate the forecasting performance of each method.

"FORECASTING TIME SERIES WITH SEASONALITIES USING STATE DEPENDENT MODELS
Cartwright, Phillip University of Georgia College of Business Administration, Athens, Georgia, 30602, USA

This paper discusses the application of non-linear state dependent models to time series data with seasonal components. First, the state dependent model and the extensions for modelling seasonal data are described. Second, the model is applied to time series with seasonality and forecasts are generated. Third, the forecasting performance of the state dependent models is compared with that of models from the linear ARIMA class.

"A POISSON WINTERS' MODEL UPDATE: A COMPARISON WITH THE EXPONENTIAL MODEL"
Nathan, Jay, University of Scranton, School of Management, Scranton, Pennsylvania, 18510, USA

A revised Poisson Winters' model is presented. Initial conditions and the choice of model parameters are discussed with examples. In addition, a comparison of properties between exponential and Poisson smoothing processes, and the potential uses of Poisson weights are provided. Finally, the Poisson Winters' model is compared to the exponential model using the time series analyzed in the M-competition. The results are summarized and their implications outlined.

"STATE SPACE FORECASTING USING THE MAKRIDAKIS FORECASTING DATA"
Koehler, Anne B., Murphree, Emily S. Miami University, Dept. of Decision Sciences, Oxford, Ohio, 45056, USA

State space techniques are used to model monthly time series data above the micro level from the Makridakis Competition. The state space approach and the SSI/SSF program from Scientific Systems are reviewed briefly. The SSI/SSF program is used to fit the models and produce forecasts on the IBM personal computer. The state space forecasts are then compared to the corresponding Box/Jenkins forecasts from the Makridakis Forecasting Competition. In addition, the results for this data are compared to the findings of a previous study by the authors on state space forecasting for monthly micro time series from the Makridakis Competition.

CHAUDIERE

ARIMA FORECASTING

Chair: Reilly, David P., Automatic Forecasting Systems Inc., Statistical Consultants, P.O. Box 563, Hatboro, Pennsylvania 19040, USA

AUTOMATIC INTERVENTION DETECTION SYSTEM

Reilly, David P., Automatic Forecasting Systems Inc., Statistical Consultants, P.O. Box 563, Hatboro, Pennsylvania, 19040, USA

This paper presents a computer-based procedure that routinely identifies the form and characteristics of outliers of intervention. An important statistical problem is the identification of Box-Jenkins classes of models when intervention has occurred in the data. Examples of interventions could be strikes, war time, employee pilferage or special promotional sales. Combining univariate Box-Jenkins with outlier detection methods have allowed the analyst to significantly enhance his ability to construct powerful models for the analysis and forecasting of time series data.

"NON-HOMOGENEITY, OUTLIER AND INTERVENTION DETECTION IN AUTOMOTIVE TIME SERIES"

Nash, David H., Mathematics and Computer Science Dept. Drexel University, Philadelphia, Pennsylvania, 19104, USA
Hagerty, Stephen, Automotive Services, Chase Econometrics, 150 Monument Road, Bala Cynwyd, Pennsylvania, 19004, USA

Many automotive time series, e.g. monthly deliveries by vehicle line and total deliveries, exhibit behavior that may not be captured adequately by ARIMA models alone, outliers, interventions largely unique to particular months (model-year changeover) and non-periodic interventions (energy shocks, strikes, recalls, special introductions) can adversely affect the type of statistical homogeneity amenable to ARIMA modeling. Several automotive time series are exhaustively analyzed for outliers, periodic outliers and step (level change) interventions using recently developed software. Effects of such non-homogeneities are handled by regressions on dummy variables, and univariate ARIMA models obtained for remaining adequately homogeneous data.

"ADAPTIVE FORECASTING AND ESTIMATION OF SEASONAL PARAMETERS USING CHANGE-DETECTION"

MacNeil, Ian B., Kember, Guy, Dept. of Statistical and Actuarial Sciences, the University of Western Ontario, London, Ontario, CANADA

A change in the parameters characterizing a time series discounts the value of past data. To accomodate possible parameter changes at times not specified in advance, we propose an adaptive procedure for estimating parameters and for forecasting. This procedure, entitled Adaptive Forecasting and Estimation by Change-Detection AFECD for short, is modified for use with seasonal data. The procedure computes successivly up-dated change-detection statistics, and discounts past data when changes are detected. An example is given of its use with the Holt-Winters model.

"AN EMPIRICAL ANALYSIS OF THE ADVERTISING SALES RELATIONSHIP IN THE BRITISH RTE BREAKFAST CEREALS INDUSTRY"

Wheale, Peter, Senior Lecturer, Oxford Polytechnic, Lady Spencer Churchill College, Wheatley Oxford, OX9 1HX
Sturgess, Brian, City University, Business School in London

This study investigates ways of estimating the relationship between advertising expenditure and company sales in the British ready-to-eat breakfast cereals industry using Box-Jenkins modelling technique on time-series data. No a priori restrictions are placed on the possible interactions and cross-effects between companies and through time. The method of detecting causal relationships follows the notion by Granger and is then operationalised using an asymptotically valid test for the absence of causal ordering.

FORECASTING TELECOMMUNICATION SERVICES

MACKENZIE

Chair: Cozanet, Eric, Direction Generale des Telecommunications SBFP/F3, Tour Maine Montparnasse, 75755 PARIS, Cedex 15

"FORECASTING MODELS FOR TELEX MARKET"
Cozenet, Eric, Direction Generale des Telecommunications SBFP/F3, Tour Maine Montparnasse, PARIS, Cedex 15

The steady level of demand for telex connections in the past years has set the problem of telex market future. To answer this question, the paper, in the first place, brings up the relation between telex demand and traffic through a bi-monthly time-series analysis which also takes account of the economic and tariff factors. In the second place, we present a long term telex forecasting model which combines the previous approach with the future development of new services and the partial substitution of teletex for telex.

"FORECASTING DEMAND FOR NEW TELECOMMUNICATIONS SERVICE"
Cracknell, David, Wheatley, Jeffrey, British Telecom, C686 BT Center, 81 Newgate St., London EC1A 7AJ ENGLAND

The development of communication technology such as Cellular Radio and UK Government's iniatives designed to increase competition and the range of customer choice have led to increase competition and the range of customer choice have led to an increasing need to forecast demand for new services, and to assess their likely price elasticities, and share of increasingly competitive markets. This paper reviews, in general terms, some of the methods which have been used with a greater or lesser degree of success and attempts to offer a prescription for those involved in forecasting. Issues covered are: 1) dimensions against which to assess new products, 2) characteristics of business and domestic markets, 3) international comparison of product demand, 4) methods of selling.

"FORECASTING MODELS FOR TELEPHONE TRAFFIC WITH MARKET SEGMENTATION"
Schlegel, Klaus, Federal Ministry of Posts Telecommunications, Postfach 80 01, D-5300 Bonn 1, Federal Republic of Germany

The forecasts for the telephone service are based on models for (main) stations, number of calls, telephone traffic (in terms of erlangs) and revenues. The market for telphone main stations is approaching saturation, in the future, growth will be observed above all in the more frequent use of the telephone. This has great influence both on the dimensioning of the telephone network and on the development of the revenues. Therefore, the models describing this development were improved and extended. First of all, the paper gives a survey on the forecasting models used in the telphone sector, then the most important advancements are described emphasizing the models used for the number of calls.

"ESTIMATION OF THE EFFECTS OF PRICE CHANGES ON BELL CANADA REVENUES"
Reader, Geraldine M., Demand Analysis, Bell Canada, Revenue Estimates, Floor 5, 25 Eddy St., Hull, Quebec J8Y 6N4, CANADA

This paper describes the process used by Bell Canada to estimate and forecast the revenue impacts of price changes. Over the last several years, Bell Canada has developed econometric models in which demand for its services is related to factors such as price, income and market size. After rigorous statistical and economic evaluation, the estimated models are then simulated under various rating scenarios in order to produce estimates of effect on revenues. A description of the models and underlying econometric methodology will be provided. The emphasis on methodological soundness, in light of the use of these models in a regulatory context, will also be discussed.

SAGUENAY

COMPUTER SOFTWARE SUPPORT IN FORECASTING

Chair: Lui, Lon-Mu, Dept. of Quantitative Methods, College of Business Administration, University of Illinois at Chicago, 601 South Morgan, 2400 University Hall, Chicago, Illinois, 60680, USA

"CONSIDERATIONS IN THE IMPROVEMENT OF FORECASTS"

Liu, Lon-Mu, Dept. of Quantitative Methods, College of Business Administration, University of Illinois at Chicago, 601 South Morgan, 2400 University Hall, Chicago, Illinois, 60680, USA

This paper discusses elements that are important in the improvement of time series forecasting. Such elements include trading-day effects, holiday effects, aggregation, outliers, seasonal adjustment, combined forecasting and multi-variable models. Model building and software availability will be discussed.

"THE SCA STATISTICAL SYSTEM: INTEGRATED SOFTWARE FOR FORECASTING AND TIME SERIES ANALYSIS"

Hudak, Gregory, Scientific Computing Associates, P.O. Box 625, DeKalb, Illinois, 60115, USA

This paper briefly describes the SCA Statistical System, a tool for both routine data analysis and forecasting as well as statistical research. The system's time series analysis capabilities encompass both the time and frequency domains. Time domain analysis includes univariate ARIMA, transfer function, intervention, vector ARMA and simultaneous transfer function models. Forecasting capabilities are provided within an integrated software system having a powerful interactive and compatible batch processing mode. System capabilities also include regression analysis, descriptive statistics, data plotting, data manipulation and editing, matrix operations and the generation of pseudo observations for specified distributions or models.

"RATS: REGRESSION ANALYSIS OF TIME SERIES"

Doan, Thomas, Var Econometrics, 134 Prospect Avenue So. Minneapolis, Minnesota, 55419, USA
Litterman, Robert, Var Econometrics, 134 Prospect Avenue So. Minneapolis, Minnesota, 55419, USA

Regression Analysis of Time Series (RATS) is a comprehensive, state-of-the-art, software package for use in forecasting an econometric analysis. RATS is by far the most sophisticated microcomputer software currently available for forecasting time series. RATS includes not only regression techniques for structural equation modeling and ARIMA analysis for univariate time series, but also powerful Bayesian Vector Autoregressive (BVAR) techniques for multivariate forecasting.

YAMASKA

JUDGMENTAL FORECASTING

Chair: Armstrong, Scott J., University of Pennsylvania, Dept. of Marketing, Philadelphia, Pennsylvania, 19104, USA

"ON PERSONALIZING FORECASTS"
Thomassen, Henry, Economic Advisor to the Governor, State of Georgia, 2709 Sudbury Ct., Atlanta, Georgia, 30360, USA

Although man-model interaction improves macro-economic forecasts, the injection of a forecaster's personality into micro-economic forecasts has been shown sometimes to be counterproductive. This paper investigates the basis for and the consequences of a personalization of the forecasts of the revenues of an American state government. A simple conceptual model of forecast personalization is first developed. Then, it is used to test the hypothesis that a forecaster who "internalizes" a government's cost-and-benefit function for prediction will be lead to offer forecasts more likely to err than if he could function "independently".

"JUDGMENTAL FORECASTING BY GROUPS"
Sniezek, Janet A., Johnson Graduate School of Management, 523 Malott Hall, Cornell University, Ithaca, New York, 14853, USA

Forty groups of size five made judgmental forecasts of five United States financial variables-consumer installment credit, outstanding retail sales, 3 month CD interest rates, exports, federal reserve banking reserves for December 1984. All judges received historical data for each variable in the form of a graph and numerical listing of monthly values from July 1981 through June 1984. Each judge first produced individual forecasts, then was assigned to one of four Group Strategy conditions: Statistical, Delphi, Consensus, and Best Member. Data are being examined to ascertain 1) the relative accuracy of group 2) confidence level differences across strategy conditions 3) the nature of the transformation of individual forecasts into Delphi and Consensus group forecasts 4) the ability of groups to identify their best member, and 5) the relationship of member expertise to forecast accuracy and confidence.

"MERGING OF FORECASTS: RECONCILING AND MERGING SUBJECTIVE FORECASTS WITH QUANTITATIVE MODELS FORECASTS"
Fingerman, Joel, Roosevelt University, 430 South Michigan Avenue, Chicago, Illinois, 60605, USA

A forecaster who uses a quantitative forecasting model to provide a forecast to, for example, upper level management is often placed in the awkward position of being asked to change or adjust the forecast so as to conform more with the subjective judgemental forecast of the users of the forecast. The problem for the forecaster than is how to merge the quantitative model's forecast with the informed subjective judgement of the users. This paper presents techniques by which the users informed, subjective judgement may be rationally and defendably merged with the quantitative forecasting model.

"BEHAVIORAL APPROACHES TO IMPROVING THE GROUP FORECAST"
Goitein, Bernard, Bradley University, Peoria, Illinois, USA

Statistical reasoning should be employed in the generation of judgemental forecasts. Cognitive heuristics bearing little relationship to statistical reasoning are frequently employed instead. Recent research indicates that judgemental forecasting tasks may be a type of problem-solving task. As such, techniques for improving problem solving could improve judgemental forecasts. "Discussion leaders" and "consensus instructions" are known to improve group problem solving. The results of two experiments in which these behavioral techniques are applied to group forecasts are discussed. The range of group forecasting situations for which group problem solving techniques are useful is briefly addressed.

STUDIO

APPLIED FORECASTING I

Chair: Robert Winkler, Professor of Statistics, Graduate School of Business, Duke University, Durham, North Carolina, USA 27706

"SMALL AREA POPULATION PROJECTION FOR EDUCATION PLANNING: USES AND ABUSES"
Skinner, James L., University of Queensland, Dept. of Geography, St-Lucia, Brisbane, Australia

Abstract to be supplied.

"FORECASTING INDUSTRIAL PRODUCTION IN MAJOR INDUSTRIAL COUNTRIES"
Cullity, John. P., Rutgers State University, Newark, New Jersey, USA 07102

Abstract to be supplied

"ON THE EFFICIENCY OF COMBINING FORECASTS"
Chandra, B., Graduate School of Business, University of Pittsburgh, Pittsburgh, Pennsylvania, USA 15260

The paper presents the advantages and disadvantages of combining the forecasts obtained using different forecasting techniques. The procedures for combining the forecasts have been illustrated on two sets of time series data.

"ASSESSING THE IMPACT OF TRANSIT MARKETING CHANGES USING INTERVENTION ANALYSIS IN A QUASI EXPERIMENTAL DESIGN"
(2) * Narayan, Jack, Graduate School of Management, Syracuse University, Syracuse, New York, 13210, USA
Considine, John J., Business Administration Dept., LeMoyne College, Syracuse, New York, 13214, USA

One of the main problems currently facing the mass transit industry is its inability to assess the impact of their marketing changes. In particular, no one has systematically assessed the impact of changes (e.g. fare changes, route structure changes, special information changes) in operating transit systems. The authors show how the effect of such a marketing change can be measured by using an interrupted time series quasi-experimental design. The authors also show how a control series is used as a covariate in a transfer-function intervention model to account for changes which are independent of the intervention (marketing change).

"SELF-TUNING PREDICTORS AND THEIR APPLICATIONS"
Sinha, A.K., Applied Systems Research Programme, Dept of Electrical Engineering, Indian Institute of Technology Delhi, New Delhi, 110016

The paper describes different kinds of self-tuning predictors and their applications to weather prediction, prediction of river flow discharge, power load demand and such other variables. The self-tuning predictor is defined as a set of recursive algorithms for making simultaneous estimation of predictor parameters and prediction of output variables. One such self-tuning predictor for a linear time invariant process is that of Wittemark. Some other predictors for simpler cases are described in this paper. These are based on least squares, minimum variance, stochastic approximation and two stage bootstrap estimation methods. Case of nonlinear and time varying processes have also been considered. Case studies of daily maximum temperature, humidity, rainfall and riverflow discharge are presented.

MONDAY
10:15-11:45

ETUDE

TOPICS IN FORECASTING

Chair: Ouellet, Roch, Ecole des H.E.C., 5255 Decelles, Montreal, Quebec, H3T 1V6, CANADA

"TRAVELLER RESPONSE TO FREEWAY RAMP CONTROLS"

Mihan, Nancy L., University of Washington, Seattle, Washington, 98195, USA

Time series analysis was used to assess the impacts on travel behavior of a new freeway ramp control system in Seattle. The data set included volume data for a section of freeway that was to be affected by ramp controls once the system was in operation. Volume data for a section of freeway further downstream where ramp controls should not have an impact was chosen as a control data set. This covariable volume data was expected to account for variations over time caused by factors other than the ramp controls. Preliminary results indicate that trips diverted from the control period shifted to other times rather than to alternative routes.

"FORECASTING RECRUITMENT OF JUVENILE ATLANTIC CROAKER"

Norcross, Brenda L., Austin, Herbert M., Virginia Institute of Marine Science, School of Marine Science, College of William and Mary, Gloucester Point, Virginia, 23062, USA
Leduc, Sharon K., Assessment Information Service Center, National Environmental Satellite Data Information Service, NOAA, Columbia, Missouri, 65201, USA

Juvenile recruitment of the Atlantic croaker, to the Chesapeake Bay fluctuates yearly. There is a need to be able to forecast this recruitment, which is vital to the commercial fishery. These fluctuations are caused by interannual variability of fall wind fields in the Mid-Atlantic Bight and winter temperatures in the Chesapeake Bay. Their major effects have been investigated and quantified. The multi-disciplinary model is divided into three submodels, each representing a major component affecting juvenile recruitment.

"FORECASTING BY ANALOGY USING TIME-SERIES DATA FOR SOME OBJECTS"

Cieslak, Maria, Academy of Economics, Wroclaw, Komandorska 118 190

In this paper I propose a method of determining the similarity of objects using their time-series models and a method of constructing a prognosis for given object.

"A GENERALIZED LOGISTIC FUNCTION FOR LONG-TERM FORECASTING"

Hansmann, Karl Werner, Hochschule der Bundeswehr Hamburg, Postfach 700822 D 2000 Hamburg 70, GERMANY

A computer implemented model is used to forecast the future development of the industrial robots in Germany. The forecasting system is found on a generalized logistic function. It is possible to include an exogenous factor (e.g. macroeconomic time series) as independent variable. As the time series of the industrial robots in Germany is very small (1974-1984) we extend it by forecasting a few values in the new future with the Box-Jenkins method. Our experience shows that the combined application of the two forecasting methods results in a better forecast of short time series.

VILLE MARIE

APPLIED FORECASTING II

Chair: Gait, Nazira, Dept. of Statistics, University of Sao Paulo, P.O. Box 20,570, Sao Paulo, BRAZIL

"AN ENERGY PLANNING MODEL"

Sorenson, Bent, Roskilde Universitetscenter, Institut for Studient af Matematik Og Fysik, Samt Deres, Postbox 260, DK-4000 Roskilde, Denmark

The possibility of future energy systems based entirely on renewable energy have led energy planning analysts to consider a new breed of planning model. On the technical side, the models employ free energy (exergy) in order to be able to add different qualities of energy, and they usually work backwards from end-use to primary energy sources, rather than the other way round.

"OIL PRICE CHANGES AS A NON-GAUSIAN STABLE PROCESS"

Oglesby, R.N., Energy & Advanced Product Economics, General Motors Corporation, 3044 West Grand Blvd, Detroit Michigan, 48202, USA

Oil prices (real) for the period 1960-1984 are analyzed. It is found that the price action does not support the turn-of-the-century Bachelier view of a Gausian random walk with finite variance, but rather the more recent Mandelbrot idea of a stable Paretian process with infinite variance. Also, no evidence is found for the existence of a penumbra effect. Implications are described. An original regression approach is presented applicable to the non-Gausian case, but sufficiently robust to also be effective for the Gausian distribution.

"A SIMPLE ECONOMETRIC MODEL FOR FORECASTING ECONOMIC GROWTH AND ENERGY CONSUMPTION IN DEVELOPING COUNTRIES"

Mukherjee, Shishir K., Electric Power Research Institute, 1800 Massachusetts Ave N.W., Washington, D.C. 20036, USA

A simple econometric model has been developed for energy policy studies in the developing countries. The major purpose of the model is to represent energy-economic interactions for analyzing the effects of increasing petroleum prices, availability of foreign aid, and domestic energy investment and pricing policies in the developing countries. The model does not take the usual approach where energy prices could be used as instrument variables for influencing demand. The econometric model estimated on time series data can be used to simultaneously forecast economic growth and energy consumption in the future.

"INSURANCE PREMIUM: A CASE STUDY OF FORECASTING"

Gait, Nazira, Antunes, Ruy D., Dept. of Statistics, University of Sao Paulo, P.O. Box 20,570, Sao Paulo, BRAZIL

Our purpose is to estimate monthly premium to be earned by State of Sao Paulo Insurance Company, to be included in its budget, based on monthly data registered from January 1980 to December 1984. Since the inflation in Brazil has had high rates, the nominal values were deflated by using the General Price Index computed by Getulio Vargas Foundation and by taking January 1980 as basis of the variation. Our study includes autocorrelation and spectral analysis, and the use of ARIMA models. We were faced with some problems which are: a) the length of the series and b) the strength of the irregular component.

GALERIE 3

USES AND ABUSES OF FORECASTING II

Chair: Solem, Erik, Dept. of External Affairs, Political & Strategic Analysis Division, Lester B. Pearson Bldg., 125 Sussex Street, Ottawa, Ontario, K1A 0G2, CANADA

"USES AND ABUSES OF FORECASTING"

Wilde, Keith, Strategic Planning Division, Canada Department of Agriculture, Ottawa, Ontario, CANADA

Forecasts should signal the timing and direction of changes to organizational operations, and even to their purposes. If forecast changes to the environment imply changes that are too fundamental and painful for decision-makers to contemplate, reinforcement of gloomy forecasts is not effective. Instead, management thinking must be led to focus on carefully constructed alternative opportunities. Navel-gazing (where we have been and where are we now) and fantasies then are more usefual than forecasts.

"FORECASTING AS A CATALYST"

Simmonds, W.H. Clive, Consultant, Integrative Studies, 66 Lyttleton Gardens, Ottawa, Ontario, K1L 5A6, CANADA

Forecasting is mainly used for the known. This presentation will show how forecasting can also be used to discover the new using international trade between two countries as the example.

"FORECASTING IN POLITICAL RISK ANALYSIS"

deKlebnikoff, Serge, Vice President of French Association of Country Risk Analysts, Paris, FRANCE

More and more, political risk analysis is used to assess international issues that may affect a company's market. Unfortunately, current methods of analysis (qualitative as well as quantitative) are not yet satisfactory, leaving the decision maker with a broad scope of uncertainty about the future. However, there are still basic requirements that must be met by the political analyst in order either to eliminate or, at least, to reduce, to transfer, and finally to prevent this kind of risk.

Session MAE2C

MONDAY
2:00-3:30

GALERIE 4

EXCHANGE RATE FORECASTING II

Chair: **Richard T. Baillie**, University of Birmingham, Department of Economics, Faculty of Commerce and Social Science, PO Box 363, Birmingham, UK, B15 2TT
Don Alexander, Citibank, N.A. 399 Park Avenue, New York, NY, 10043, USA

"DYNAMIC SPECIFICATION AND EXCHANGE RATE FORECASTING"

Boothe, Paul,University of Alberta, Edmonton, Alberta, T6J 2E1, CANADA
Glassman, Debra, University of British Columbia, British Columbia, CANADA

In this paper, we examine the forecasting performance of a dynamic version of the monetary model of exchange rate determination. Using data for the period 1974;7 to 1984;3, we reject the restrictions on exchange rate dynamics that are implicit in the conventional, static specification of the model and variations such as AR(1) or first-difference estimation. This rejection leads us to consider a more general, dynamic specification. We compare the forecasting performances of the static and dynamic models with each other and also with the forward rate and random walk forecasts.

"NEWS AND EFFICIENCY IN THE FOREIGN EXCHANGE MARKET"

Baillie, Richard T., Department of Economics, University of Birmingham, Birmingham B15 2TT, UK

Work by Hansen and Hodrick (JPE 1980), Hakkio (IER 1981) and Baillie, Lippens and McMahon (Econometrica 1983) have found the forward exchange rate to be a biased predictor of the future spot exchange rate. This paper extends the modelling approach presented in the Baillie, Lippens and McMahon article to more general multi equation vector autoregressive models with further exogenous variables to account for seasonality and trend terms. Models formulated in levels and differences are generally found to still give rise to rejection of the rational expectation/market efficiency hypothesis.
Some results are obtained for the case when x is an interest rate differential. For most cases considered, the coefficient y is positive and sometimes significant, lending credence to the inflationary expectations story of news on the interest rate differential.

"NEWS AND THE STERLING EXCHANGE RATE"

Copeland, Laurence S., University of Manchester Institute of Science and Technology, Manchester, U.K

The method of generating residuals from ARIMA time series models and using in regression models relating the spot exchange rate to past forward exchange rate has been utilised by Frenkel (JPE 1981), Edwards (Economic Letters 1983), Copeland (Economic Letters 1984) et al. This paper extends the technique to residuals from VAR systems and uses the appropriate adjustment of the resulting parameter estimates of standard errors.
The paper relates the technique to forecasting future spot exchange rates.

"EX ANTE FORECASTING PERFORMANCE OF LINEAR AND NONLINEAR TIME-SERIES MODELS OF EXCHANGE RATES"

Klienbaum, R.M., General Motors Research Labs, General Motors Technical Center, 12 Mile & Mound Roads, Warren, Michigan 48090,
Lippens, R.E., Economics Staff, General Motors Corporation, 767 Fifth Avenue, New York, New York 10153 USA

Meese and Rogoff have demonstrated that structural and reduced forms of linear models of exchange rate determination generally fail to improve on the random walk model of the exchange rate over short-run forecast horizons. However, they only considered linear models with monthly data and their sample period ended in mid-1981. In this paper, using daily data on major exchange rates over selected subperiods, we investigate the compatative out-of-sample properties of unconstrained and constrained vector ARMA and bilinear models while continuing the practice of using random walk and univariate ARMA models as benchmarks for the analysis.

DULUTH

STRATEGIC MANAGEMENT AND FORECASTING: WHAT IS HAPPENING IN THE BANKING INDUSTRY?

Chair: Kratochvil, Dan W., 6928 Wemberly Way, McLean, Virginia, 22101, USA

"THE CHALLENGE OF FORECASTING IN A WORLDWIDE FINANCIAL SERVICES BUSINESS"
Sladden, Michael, Vice-President, CSG-International Group, Citicorp, New York, New York, USA

The CSG-International Group of Citicorp has developed procedures and techniques that help it meet the challenge of forecasting and planning financial services for the some forty international markets, many of them imperfect. The process of setting ground rules, establishing goals, developing and reviewing forecasts, assessing risks, and analyzing options will be discussed. Examples of efforts minimize exposure in various markets around the world will be used to explain the planning and forecasting program. In addition, lessons learned and future plans will be presented.

"REGULATORY REQUIREMENTS, RISKS, AND STRATEGIC MOVEMENT IN THE FINANCIAL SERVICES BUSINESS"
Williams, Mark, Senior Financial Consultant, Financial Analysis and Planning Division, Bank America, San Francisco, California, USA

Recent changes in regulatory requirements and in the perceptions of risks are having important impacts on the management of assets in the financial services business. In this presentation current regulatory requirements and the perceptions of risks will be summarized and their implications for the management of assets will be discussed. Specific examples of Bank America's forecasting and planning activities will be described to indicate how it is planning for the future.

STRATEGIC MANAGEMENT IN A PUBLIC MULTILATERAL FINANCIAL ORGANIZATION
Scott, Ian, Chief-Institutional Planning, The World Bank, Washington, D.C., USA

This paper will examine the relevance of strategic management concepts developed by private corporations to the work of public financial institutions. It will stress similarities and differences between private and public sector environments and suggest how adaptation from one to the other can be conceived and executed, why there may be limits to adaptation, how these limits can be identified and what can be done.

"USING FORECASTING TECHNIQUES TO PLAN FOR LONG-TERM COMPETITIVE ADVANTAGE IN BANKING"
Pihl, Waino, Senior Manager, Management Consulting Division, Arthur Andersen & Co., Chicago, Illinois, USA

When providing strategic planning services, Arthur Andersen & Co. has applied a variety of techniques to forecast environmental issues. The techniques, especially the Delphi procedure, have been adapted to meet the unique needs of clients and have been used to forecast changes in the e.g. technology, regulations, competitive strategy, and market share. How specific techniques were adapted and used in strategic management in banking, the advantages and disadvantages of each, and examples of actual forecasts will be discussed.

SAINT CHARLES

FORECASTING SOFTWARE AND DECISION SUPPORT SYSTEMS

Chair: Mahmoud, Essam, Dept. of Management, College of Business and Economics, West Virginia University, P.O. Box 6025, Morgantown, West Virginia, 26505, USA

"SURVEY OF FORECASTING SOFTWARE FOR MICROS"

Beaumont, Chris, London Business School, Sussex Place, Regent Park, London, NW1 4SA, England
Mahmoud, Essam, Dept. of Management, College of Business and Economics, West Virginia University, P.O. Box 6025, Morgantown, West Virginia, 26505, USA
McGee, Victor E., The Amos Tuck School of Business Administration, Dartmouth College, Hanover, New Hampshire 03755, USA

In this paper the authors provide a list of software for micros. The list includes the name of software, the vendor's name and his address, main features and the price. The survey also addresses criteria to be considered in selecting forecasting software.

"DATA BASES FOR FORECASTING, PLANNING AND CONTROL"

Mahmoud, Essam, Dept. of Management, College of Business and Economics, West Virginia University, P.O. Box 6025, Morgantown, West Virginia, 26505, USA
Rice, Gillian, Dept. of Marketing, College of Business and Economics, West Virginia University, P.O. Box 6025, Morgantown, West Virginia, 26505, USA

This paper categorizes and evaluates data bases for forecasting. Included is a discussion of the availability and reliability of data bases and their incorporation in the forecasting, planning and control process.

"DATA GATHERING AND FORECASTING DIFFICULTIES IN THE DEVELOPING COUNTRIES"

Kaynak, Erdener, Mount Saint Vincent University, 166 Bedford Highway, Halifax, Nova Scotia, B3M 2J6, CANADA
Rice, Gillian, Dept. of Marketing, School of Business and Economics, West Virginia University, P.O. Box 6025, Morgantown, West Virginia, 26505, USA

This paper considers the problems of collecting data for sales forecasting in the developing countries. Included in the discussion is an evaluation of the sales forecasting experience of a small number of Canadian firms in North Africa. The paper suggests ways in which the forecasting process in developing countries can be improved.

MATAPEDIA

EVALUATION AND COMPARISON OF FORECASTING METHODS II

Chair: **Cholette, Pierre A.**, Time Series Research and Analysis Division Statistics Canada, 13-I, R.H Coats Building, Tunney's Pasture, Ottawa, Ontario, K1A 0T6, CANADA

"FORECASTING EVALUATION WITHIN A DECISION MAKING ENVIRONMENT"

Wright, David J., Faculty of Administration, University of Ottawa, Ottawa, Ontario, CANADA

The choice between alternative forecasting methods is often made in terms of forecast accuracy and discussion centres on which measure of accuracy to use as a criterion: MSE, MAPE etc. The present paper shows that, in many cases, none of these measures is appropriate, and indeed forecast accuracy is not in itself an important discriminator between forecasting methods. Examples are given of the use of the forecast in Decision Making, where the method which is optimal is terms of decision effectiveness is different from the method which is best in terms of forecast accuracy.

"FORECASTING ELECTRICITY CONSUMPTION IN HONG KONG: A COMPARISON OF THREE METHODS"

Yau, Hon-ming, Lo, Hin-fai, University of Hong Kong, Li Dak Sum Building, Hong Kong, Shatin, HONG KONG

Modeled econometric forecasts are widely used in past electricty demand studies. From a practical point of view, if modeled and non-modeled forecasts of electricity demand are generally similar and consistent, the less costly non-modeled approach would be preferable. Hence the main purpose of this research is to evaluate the forecasting performance of three non-modeled methods: Box-Jenkins method, Census II method, and Winters' method. Six evaluative criteria were used 1) mean error, 2) mean absolute error, 3) mean percentage error, 4) mean absolute percentage error, 5) mean square error, 6) Theil's U Statistic. To ensure that valid results were obtained, a hold-out sample of 12, 24 and 36 periods was used respectively. It was found that the Box Jenkins method behaved better than the other two in most of the evaluative criteria in short-range forecasts when the Winters' method was found to be more stable and consistent throughout the three samples.

"FORECASTING SALES VOLUME OF ELECTRICITY: A COMPARISON OF SEVERAL MODELS"

Bubnys, Edward, University of Illinois, Dept. of Finance, Urbana, Illinois, 60801, USA

The multi-variate Box-Jenkins transfer function forecasting method has drawn increased academic and practical interest in the last few years. This paper reports the results of a forecasting competition among several explanatory (regression), time series and composite models for the quarterly sales volume of a major midwestern electric utility company. The results show that the more time-consuming Box-Jenkins methods do not forecast sales more effectively than the explanatory or composite methods, over either short-term or long-term periods.

"ALTERNATIVE CRITERIA FOR ACCOUNTABILITY OF FORECASTS BASED ON MULTIVARIATE LINEAR REGRESSION"

Hibshoosh, Aharon, School of Business, San Jose State University, San Jose, California, 95192, USA

As a sequel to an earlier study this paper reports further progress in the study of forecast accountability. It provides a complete classification of forecasts to accountability categories based on alternative criteria linking the categories with the regression statistics and the shape of the forecast tolerance limit. Consider a central result; A forecast is everywhere accountable (not everywhere accountable) if the matrix is not negative (is negative or semi-negative) definite. (Where b is the vector of regression coefficients, S the estimated variance covariance matrix of the coefficients estimators and t the t-statistics corresponding to the required assurance level).

CHAUDIERE

DYNAMIC ECONOMETRIC AND TRANSFER FUNCTION MODELS

Chair: **Fortney, William**, Statistical Applications & Computing Group, Boeing Computer Services, Tukwila, Washington, D.C., 98188, USA

"EIGENVALUE ANALYSIS IN DYNAMIC ECONOMIC MODELS WITH AN APPLICATION TO A DUTCH FORECASTING MODEL"

Fortney, William, Statistical Applications & Computing Group, Boeing Computer Services, Tukwila, Washington, D.C., 98188, USA

In this paper we examine techniques which can be helpful in the evaluation of the inherent dynamic properties of a simultaneous dynamic econometric model. As is now, such dynamics depend on the solution of an eigenvalue problem associated to the model. Particularly, we discuss the related questions whether we can (i) attach an economically meaningful interpretation to essential eigenvalues and eigenvectors (ii) simplify a model dynamically by deleting a number of variables. As an example we evaluate the Grecon-model, a Dutch forecasting model. We succeed in identifying a submodel, pertaining to essential eigenvalues, that can be interpreted in terms of a price-wage spiral.

"SIMULTANEOUS EQUATION TRANSFER FUNCTION MODELS: ESTIMATION AND SIMULATION OF KLEIN'S MODEL I"

Richardson, David H., Great Falls Analytics, 10211 Brunswick Avenue, Silver Spring, Maryland, 20902, USA

Forecasting on the basis of time series analysis has often been viewed as an alternative to forecasting on the basis of simultaneous equation econometric models. There is, however, nothing in principle to prevent the estimation of the SETF model and its use in forecasting. Klein's Model I, the first simultaneous econometric model of the U.S., is estimated using transfer functions for each of the endogenous variables. There is a discussion of the problem of simultaneous equation bias in the transfer function context. All calculations are carried out using a COMPAQ+ microcomputer. A forecasting experiment is conducted which demonstrates the viability of the SETF model.

"FORECASTING THE IMPACT OF REVENUE CHANGES ON U.S. PUBLIC TELEVISION STATIONS"

Klein, Michael, President, Michael Klein Econometrics, 1305 N. Fifth Terrace, Blue Springs, MO 64015, USA

U.S. public television, having prospered through the 1970's, has come upon challenging times. During the period 1978-1982, total public television revenue, in constant (1972) dollars, actually declined three percent, Of the various sources of revenue available to public television stations, the most dramatic decline occurred in federal revenue, which fell 24 per cent during this period. This paper presents an econometric model that forecasts the impact of changes in federal and private funding on U.S. public television station programming, personnel, and time on-the-air. Federal funding changes appear to have a disproportionately large impact on public television station programming.

"AN ECONOMETRIC MODEL FOR SHORT-TERM FORECASTING IN BARBADOS"

Boamah, Daniel, Holder, Carlos, Mascoll, Clyde, DeLisle, Worrell, Research Department, Central Bank of Barbados, P.O. Box 1016, Treasury Building, Bridgetown, Barbados, W.I.

The paper discusses a macroeconomic model of the Barbadian economy. The economy is described by a system of simultaneous equations consisting of 13 endogenous (5 identities) and about 17 pre-determined variables. The product market approach is adopted to explain real output determination; and this is discussed under two main sectors - tradables and non-tradables. Real output in the former sector is endogenously determined but the product price is considered exogenous. In the non-tradable sector, price and real output are determined by the interaction of domestic market conditions. In addition to the price-output relationships, wages, employment and balance of payments functions are also postulated; and an interest rate equation summarises conditions in the financial sector. The model has been estimated with annual data, and is ultimately intended for short to medium term forecasts. Exploratory ex-post and ex-ante forecasts of the key endogenous variables are undertaken and the results are discussed.

Session MAE7M

MONDAY
2:00-3:30

MACKENZIE

TELECOMMUNICATIONS DEMAND FORECASTING

Chair: **Gilstein, Zachary C.**, Special Services Forecasting, Research and Analysis, Bell Communications Research, 331 Newman Springs Road, Room 1H-350, Red Bank, New Jersey, 07701, USA

"PRICE REPRESSION OF DEMAND FOR RESIDENTIAL TELEPHONE SERVICE"

Pankowski, Joe, Chesapeake and Potomac Telephone Company, 13100 Columbia Pike, Silver Spring, Maryland, 20904, USA

Due to a flow of cross-subsidies from long-distance services, price has not been a major factor in the growth of residential telephone service in the United States. This situation changed with the break-up of the Bell System in 1984. Telephone Forecasters were forced to deal with a new factor in estimating future growth. Their response was; isolate the impact of the price factor through data analysis, develop a method for immediately modifying their forecasts, and devise a long term strategy to integrate price repression into the forecasting process.

"FORECASTING NEW TELECOMMUNICATIONS SERVICES"

Wojnar, Janice, Bell Communications Research, Livingston Corporate Center, Room 1B113, 290 W. Mt. Pleasant Avenue, Livingston, New Jersey, 07039, USA

The pace of technology and its potential applications in the telecommunications industry keep accelerating. This phenomenon, coupled with the impact of the divestiture of AT&T, results in a whole host of exciting (to some) and frustrating (to others) issues which must be considered by a forecaster in a "spun-off" local exchange company. Following a brief description of a state of the art telecommunications service, the forecasting of the demand for that service will be discussed. Topics include target market, life cycle, and elasticities. On going work in forecasting methodology will be presented.

"AN IMPROVED TRAFFIC FORECASTING PROCESS USING KALMAN FILTERS"

Tu, Martin, Bell Communications Research, 331 Newman Springs Road, NVC-1F255, Red Bank, New Jersey, 07701, USA

This paper describes how a new and improved process for forecasting the traffic load from one point in a network to another. The process includes the construction of a base-year traffic matrix and the use of Kalman filter algorithms. In both components of the process we make use of more base-year network information than is employed in the existing systems. The Kalman filter models used build on the notion of the "robust" sequential projection algorithm (SPA) described elsewhere. However, we use multiple Kalman filter models which, together with the additional network information, are expected to reduce the average forecast error significantly.

"DEMAND FORECASTING FOR VIDEOTEX TELECOMMUNICATION SERVICES"

Shimamura, Shinichiro, Deputy Director of Local Network Planning Section, Planning Bureau, Neppon Telegraph & Telephone, Public Corporation, 1/6 Uchisaiwai/Cho, 1 Chome, Tokyo 100, JAPAN

The CAPTAIN (Character and Pattern Telephone Access Information Network) videotex system began full-scale commercial services in November, 1984. N.T.T. is now in the process of constructing the INS (Information Network System) to provide subscribers with a variety of new services including data, facsimile and visual communications. Videotex services are expected to become widely-used, leading services in the near future. Demand forecasting for new services is always difficult, but decision making for a facilities plan such as INS should nevertheless be based on these forecasts. The basic problems entailed by new services forecasting are discussed by introducing recent demand trends and the concrete forecasting method used for videotex services.

SAGUENAY

FORECASTING FOR OPERATIONS

Chair: Flowers, Dale, Dept. of Operational Research, Weatherhead School of Management, Case Western Reserve University, Cleveland, Ohio, 44106, USA

"SIGNIFICANT EVENTS IN DEMAND HISTORY"

Brown, Robert G., Materials Management Systems Inc., P.O. Box 239, Thetford Center, Vermont, 05075, USA

By significant events we mean anomalities in the time series history for a product which may occur as either outliers or changes in the demand pattern itself. Detection and treatment of outliers is reasonably straightforward, whereas shifts of the second kind are more difficult to deal with. We will present a method based on the cumulative sum of the forecast errors for detecting shifts in demand patterns, and the cumulative sum of the cumulative sums for deciding which part of the time series history to ignore for accurate model fitting purposes.

"THE IMPACT OF PRODUCT GROUP FORCING ON INDIVIDUAL ITEM FORECAST ACCURACY"

Reddy, C.S., Flowers, Dale, Dept. of Operations Research, Weatherhead School of Management, Case Western Reserve University, Cleveland, Ohio, 44106, USA

Product group forcing begins with a forecast for the aggregate sum of the products in the group. Forecasts are also prepared for each item in the group independently of the group forecasts. Then the item forecasts are "forced" to sum to the aggregate forecast by scaling up or down. Computer simulation experiments were performed for a company data base of approximately 5000 sku's over a five year history to determine if such forcing would have improved individual item forecast accuracy as compared to the independent forecasts.

"MANAGING A FORECASTING SYSTEM"

Muir, James, American Software, 443 East Paces Ferry Road, Atlanta, Georgia, 30305, USA

Having a good forecasting system without managing it is like having a car without a driver. This presentation addresses the major issues involved in managing a forecasting system: (1) what are the objectives of forecasting (2) who is responsible for the forecast quality, (3) who is responsible for management input, (4) where should personnel report, (5) what resources are required, (6) what skills should personnel have, (7) does the forecast meet the needs of management.

YAMASKA

ECONOMIC FORECASTING I

Chair: Stekler, H.O., Industrial College of the Armed Forces, Fort McNair, Washington, D.C. 20319, USA

"UTILIZATION OF INDIRECT ESTIMATES OF REAL GDP PER CAPITA: FORECASTING IMPLICATIONS OF THE ERRORS IN THE VARIABLES MODEL"

Stollar, Andrew J., Grubaugh, Stephen G., Bentley College, Economics Department G310, Waltham, Massachusetts 02254, USA
Thompson, G.R., Virginia Polytechnical and State University, USA

This paper contributes to the burgeoning literature pertaining to the usefulness of indirect estimates of real gross domestic product per capita which have been generated by I. Kravis, A. Heston and R. Summers. They have generated both direct and indirect estimates of real income per capita. This paper addresses several statistical concerns which pertain to the potential usefulness of the indirect estimates in international models. In particular, the theoretical and empirical efficacy of employing an errors in the variables model approach to international model estimation is explored (as an alternative to the use of the indirect estimates vector).

"A FORECASTING MODEL FOR THE UNITED STATES MERCHANDISE TRADE BALANCE"

Helkie, William L., Senior Economist, Board of Governors of the Federal Reserve, Washington, D.C., 20551, USA

The paper develops a small econometric forecasting model of the U.S. merchandise trade balance. The paper first develops the theoretical model and then presents econometric estimates of the model's key parameters. The paper then evaluates the forecasting ability of the model. It evaluates the ability of the model to make conditional projection of the components of the merchandise trade balance and the trade balance itself. Finally, the paper presents the ability of the model to forecast the sharp deterioration of the merchandise trade balance in 1983 and 1984. It then allocates the change in the trade balance among the model's key predetermined variables - U.S. and foreign GNP, oil prices, and the U.S. dollar prices relative to foreign prices - the real exchange rate.

"FORECASTING INDUSTRIAL BOTTLENECKS: AN ANALYSIS OF ALTERNATIVE APPROACHES"

Stekler, H.O., Industrial College of the Armed Forces, Fort McNair, Washington, D.C., 20319, USA

This study examines alternative techniques for identifying industrial bottlenecks, which might occur when high levels of defense expenditures stimulate the U.S. economy. The first approach uses an input-output system to compare required industrial growth rates with the historical growth rates of those industries. The other approaches utilize new DRI models to estimate supply-side variables which might directly indicate the presence of bottlenecks. These include measures of capacity utilization, changes in delivery lead times and indicators of sectors where cost pressures originate

"PREDICTION MODEL OF THE INCIDENCE OF INTERINDUSTRY MERGERS"

Dunn, James R., Dept. of Economics and Business, Edinboro University, Edinboro, Pennsylvania, 16444, USA
Wellington, John F., MBA Program Gannon University, Erie, Pennsylvania, 16541, USA

The paper presents a single equation model for predicting the occurrence of mergers among firms in different four-digit STC industries. The attractive features of the paper are the inclusion of both small and large firms in the analysis and the identification of the characteristics of those industries in which merger activity is relatively high. A display of some prediction results from the model is given.

STUDIO

FORECASTING ON BUSINESS - CYCLE ISSUES

Chair: Zarnowitz, Victor, University of Chicago, 1101 East 58 St., Chicago, Illinois, 60637, USA

"DECOMPOSITION OF ERROR COMPONENTS IN REGRESSION SALES FORECASTS"

Sartorius, Lester, University of Houston at Clear Lake, 2700 Bay Area Blvd., Houston, Texas, 77058, USA

Total error in regression sales forecasts has three parts. The mean absolute total error (MAPE) was 9.73% of actual sales in 22 cases with 650 quarterly forecasts. The error was reduced to 6.71 or by 31% of total error, by using later actual values of the independent variables. The MAPE was further reduced to 4.92% or by 19.4% of total error, by using both actual variables and later revised regression coefficients. The remaining MAPE of 4.92% of actual sales was due to a wide variety of causes. The total MAPE was highest at 14.2% for cases with string business cycles.

"BIOLOGICAL CLOCK IN THE UNICORN" EXPLAINED: A CASE OF A SPURIOUS CYCLE

Nash, David H., Mathematics and Computer Science Dept., Drexel University, Philadelphia, Pennsylvania, 19104, USA

In the 1957 Science article "Biological Clock in the Unicorn" L.C. Cole, using an apparently reasonable averaging method, "uncovered" a connection between lunar cycles and a random walk, the latter being identified as readings of the metabolic rate of a unicorn. This was intended as a serious lesson to some cycle finders. Heusner asked for the probability that Cole's method would yield (spurious) cycles. Correspondence with Cole before his death allows an answer: The probability of finding a cycle is quite high. Cole's method also gives a relatively high probability for detecting spurious cycles in certain stationary time series, even in white noise.

"OPTIMIZING THE PERFORMANCE OF MOVING AVERAGE AND VELOCITY FILTERS TO SIGNAL TURNING POINTS"

Gadberry, Howard M., Midwest Research Institute, 425 Volker Blvd., Kansas City, Missouri, 64110, USA

Empirical results are presented for optimizing the sensitivity and overall performance of 8 different forms of series tracking algorithms for 30 representative weekly series. The parameters varied included: a) the type of tracking signal used b) the length of the moving average (or smoothing coefficient) c) the presence or absence of velocity filters intended to reduce false signals. Relative performance was quantitatively evaluated over test periods of 160 weeks. Results indicate that several relatively simple moving average systems can provide adequate indicators for turning points. More elaborate methods perform only marginally better, and may not always be worth the added complexity. The use of confirming signals or velocity filters provides limited reduction in unwanted false signals. The sensitivity of moving average systems can be adjusted through choice of smoothing length but this choice must be related to the variance of individual series, or to the "beta" of any series within a larger set of series being monitored.

ETUDE

FORECASTING ON CONSTRUCTION ISSUES

Chair: Fildes, Robert, Bell Communications Research, Research & Engineering Center, 331 Newman Springs Road, Red Bank, New Jersey, 07701, USA

"PUBLIC HOUSING FORECASTING"

Reid, George W., Bureau of Water and Environmental Resources Research, University of Oklahama, Norman, Oklahoma, 73019, USA

Housing forecasting models generally compare households and housing stock. The driving force for households comes from a population model including growth, migration and aging. The stock replenishment includes new, renovated, retrofit, subdividing, etc. Housing is thought of as a response to the needs of those directly or indirectly involved in the urban activities. On the other hand, public housing is for those that basically are not part of the basic production unit of the urban area. The author develops these concepts in terms of the need for public housing. The ideas developed are tested against statistics for Norman, Oklahoma.

"SMALL AREA FORECASTING TO 1990'S FOR MINNEAPOLIS ST. PAUL, MINNESOTA"

Ward, Victor, Metropolitan Council, Suite 300, Metro Square Building, Saint Paul, Minnesota, 55101, USA

The Metropolitan Council of Minneapolis St. Paul Minnesota forecast population, housing and employment for all cities and townships in the region. Regional 1990 population and household forecasts used cohert survival methods. Regional employment forecasts were based on Bureau of Labor Statistics 1990 national forecasts. The regional forecasts were compared to the total city forecasts. The region's 190 city and township forecasts used Census data, building permits and covered employment (Unemployment Insurance Program). Each method and Jata has its benefits.

"EXPECTED IMPACT OF A PROPOSED RETAIL SHOPPING COMPLEX"

Flaschner, Alan B., Klein, Thomas A., College of Business Administration, The University of Toledo, Toledo, Ohio, 43606, USA

Zoning boards, in reviewing developer's plans for new shopping centers, increasingly require market and economic impact studies as well as information on traffic, parking and draining. This is particularly true in mature communities where vacant land is scarce and real economic growth is negligible. Issues on which decisions may be based include job creation, competitive impact on existing retailers, and tax base effects. Approval is likely to depend on comparisons of these variables with existing or specific site utilization alternatives rather than simple physical acceptability. This paper presents a comprehensive methodology for estimating market potential, sales, employment, competitive effects, and incremental taxes and community costs associated with a shopping centre proposal. Such estimates provide communities with a more objective basis for evaluating proposals where community with a more objective basis for evaluating proposals where community interests and political pressures derived from economic and market rather than physical conditions conflict.

VILLE MARIE

LONG RANGE FORECASTING AND SCENARIO ANALYSIS

Chair: Huot, Guy, Statistics Canada, Time Series Research and Analysis Division, 13-K, RH Coats Bldg., Ottawa, Ont. K1A 0T6 CANADA

"ALTERNATIVE WAYS, ALTERNATIVE VIEWS OF FUTURE - POSSIBILITIES AND LIMITS -"

Gidai, Erzebet, Institute for Social Research, Budapest IX, Haman, Fszt. 1.1096, HUNGRY

The description of future possibilities - based on different ways of investigation - serves as a help in forming the strategic decisions/strategic plans. This paper deals with the different ways of prediction of development possibilities of complex, macro-level socio-economics tendencies.

"EVOLUTIONARY INVARIANTS AS A METHOD OF FORECASTING"

Curtis, Richard K., Indiana University, 925 W. Michigan St., Indianapolis, Indiana 46202, USA

With the advent of modern biology certain invariants - or virtual invariants - of evolution have been rather clearly identified. That these concomitants of evolution, developing over a period of more than three billion years, should continue in the foreseeable future can be posited as a given. That they should provide a framework within which projections can be reliably made and within which scenarios can be reliably constructed, would also appear a given. If we substitute for evolution simply change in living systems, we can identify both the nature of change and the direction of that change.

"ORGANIZATIONAL FORESIGHT, BUREAUCRATIC THEORY AND STRATEGIC PLANNING: SOME INITIAL FORMULATIONS"

Gappert, Gary, Institute for Future Studies, University of Akron, Akron, Ohio, 44325, USA

This paper is an initial attempt to use the bureaucratic theory of Elliot Jaques in formulating an approach to strategic planning. Jaques has a unique time-span perspective of complex organizations. Based upon over 100 studies in 15 different countries. Jaques concludes that there appears to be a regularity in bureaucratic work, each with a distinct time-span responsibility. Other social and cultural definitions of time provided by Earl Joseph and Abraham Moles are also cited, with the conclusion that time, in a planning sense, needs to be viewed as profoundly segmented and discontinuous.

"THE USE OF MULTIPLE SCENARIO APPROACH IN EUROPEAN COMPANIES: A COMPARISON STUDY, 1981-85"

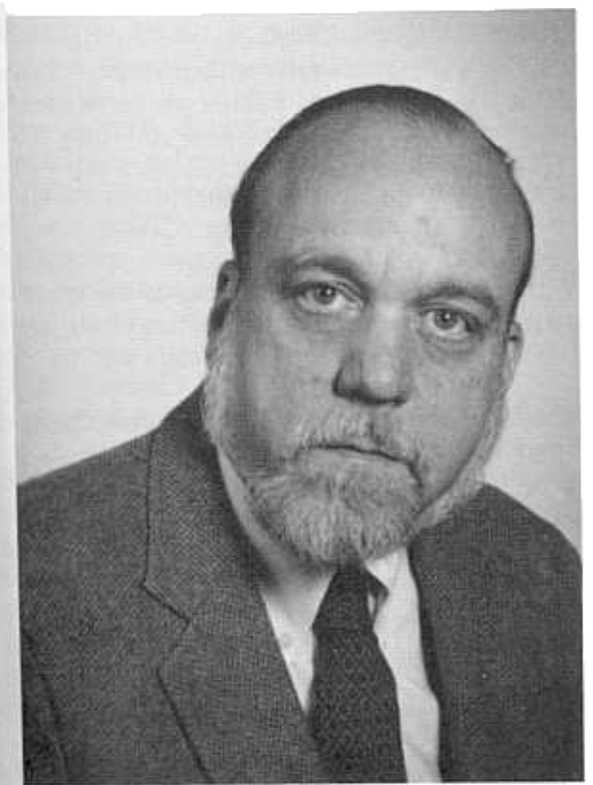
Meristo, Tarja, Turka School of Economics and Business Administration, Rehtorinpellontie 3, SF-20500 Turku 50, FINLAND

The systematic use of scenarios in strategic management is a relatively new phenomenon. Scenarios are rather of an ad hoc nature than an integrated part of the planning process. In this paper, we will discuss the differences between scenario users and non-users especially the differences in their strategic behaviour. We will also compare how the use of scenarios has changed since 1981, in which year the first survey on scenarios for the 1100 largest European companies was made, to 1985, which is the point for the follow-up survey on the same companies.

GALERIE 2

Dr. Robyn M. Dawes, University of Oregon,
Psychology Department,
Eugene, Oregon, 97403, USA

Dr. Robyn M. Dawes is Head of the Psychology Department at the University of Oregon. He is a recognized Reader in the field of mathematical psychology, in particular as applied to the social area, judgment and choice. He is the author of "Fundamentals of Attitude Measurement" (Wiley), and "Mathematical Psychology: An Elementary Introduction" (Englewood Cliffs).



"FORECASTING ONE'S OWN PREFERENCE"

Reasons for adopting a course of action are often psychologically incomparable, and research in the last 30 years has indicated that people are poor at making intuitive global judgements based on incomparable factors. By 'poor' I mean they are inferior to those based on intuitive weighting - and nowhere near as good as the judge believes themselves to be. People have misplaced faith in their global intuitive judgements. We are grossly over-confident when we make them, and selective memory for our successes (a mentally healthy trait) feeds this overconfidence. But there is also a structural reason for doubting the inferiorty of global judgement. It has to do with feedback. When we construct a linear model in a prediction situation, we know exactly how poorly it predicts. Our feedback about our global judgements is, in contrast, flawed. Not only do we selectively remember successes, but we often have no knowledge of our failures - or what knowledge we have may serve to "explain" them (away). The answer to the realted characteristics questions may be found in a distinction made by Professor Wendell Garner of John Hopkin's University. The fact that two dimensions are correlated in nature (e.g. height and weight) does not imply that they are not psychologically independent and distinct for the perceiver or judge. If they are, use them.

Chair: J. Scott Armstrong, The Wharton School, University of Pennsylvania, Philadelphia, Pennsylvania, USA 19104

GALERIE 2

TECHNOLOGICAL FORECASTING

Chair: Jacob Baal-Schem, Interdisciplinary Center for Technological Analysis & Forecasting at Tel-Aviv University, Tel Aviv, ISRAEL

"MONITORING A TECHNOLOGICAL REVOLUTION: THE CASE OF TELEPHONY"

Raz, Baruch, Baal-Schem, Jacob, Interdisciplinary Center for Technological Analysis and Forecasting, Tel Aviv University, ISREAL

The prevailing general concept of forecasting by monitoring is based on a regular sequence of technological development, and on relatively large time gaps between different stages of development. Telephone technology, on the contrary, throughout its 109 years of existence, has been characterized by a fascinatingly rapid development. These high rates of technological growth make telecommunications an exception to the rule in the methodology of techology monitoring.
The pattern has implications on methodological requirements for forecasting incorporating technological revolutions into the general framework of monitoring technological evolution. In this paper we consider the correlation between historic events and the conceptual model, and forecast possible future developments.

"FORECASTING OF DEMAND FOR NEW TELECOMMUNICATION SERVICES PROVIDED BY HONG KONG TELEPONE CO."

Tomasek, O., Hong Kong Telephone Co., PO Box 497, Hong Kong

Telecommunication plays a very important role in the distribution of information. Information in the form of voice, data, text, graphics and video signals are the main components. The impact of the introduction of the computer as part of telecommunications equipment, which made it possible in the last few years to introduce many new services for residential and business customers, is discussed.
This paper focuses on the introduction of new services in the near future by the Hong Kong Telephone Company in the Territory. Forecasting of the demand for such new services is also discussed.

"BAYESIAN APPROACH TO TELECOMMUNICATIONS SERVICES FORECASTING"

Greis, Noel P., Gilstein, Zachary C., Bell Communication Research, Navesink Res. & Eng. Center, NVC IF-363, 331 Newman Springs Rd., Red Bank, New Jersey, USA 07701

In order to meet the increasing demand for special telecommunications services, forecasts are required for particluar communications services as a function of location. The available time series are frequently too short or unstable to provide good forecasts. A Bayesian approach is presented which combines information along the margins, i.e., service type or locations, in order to provide improved forecasts for the crossproducts of the margins. In addition, the use of cross-sectional methods is shown to provide improved forecasts for individual forecasts along the margin.

"TECHNOLOGY FORECASTING AND THE MANAGEMENT OF TECHNOLOGY"

Bnaya, David, Massachusetts Institute of Technology, Center For International Studies, Cambridge, Massachusetts, USA 02139

The paper presents an approach to incorporate technology forecasting into the management of High-Tech companies at two levels. At the corporate strategic planning level in the form of a technological impact statement and investment priorities. For mid-level management in the form of standartized forecasts, one per each technology the firms develops/discards. The formula used for these forecasts is also discussed.

GALERIE 3

FORECASTING IN MARKETING II

Chair: **Armstrong, Scott J.**, Dept. of Marketing, The Wharton School, University of Pennsylvania, Philadelphia, Pennsylvania, 19104, USA

"FORECASTING METHODS FOR MARKETING"

Armstrong, Scott J., Dept. of Marketing, The Wharton School, University of Pennsylvania, Philadelphia, Pennsylvania, 19104, USA

This paper addresses the following questions. First, how do marketing managers make forecasts? Second, how should they make forecasts? This assessment will point out ways in which current practice can be improved. It will also indicate those areas in need of further research.

"COMPARATIVE ACCURACY OF PRODUCT MANAGER'S FORECASTS WITH QUANTITATIVE METHODS"

Petto, **Anthony**, DePaul University, 25 East Jackson Blvd, Chicago, Illinois, 60604, USA

Using quarterly data from 1978 to 1984, this study compares the relative accuracy of the best of several extrapolation methods versus judgemental forecasts by product managers for seven product lines within a large midwestern manufacturing company. Results show that judgemental sales forecasts for the first two quarters of fiscal 1985 were generally more accurate than extrapolation methods. Combining product lines for an overall company level forecast also showed similar results even when monthly sales were used. These results are not considered surprising since product managers had the benefit of observing extrapolation forecasts before making their predictions.

"DELPHI TECHNIQUES IN CORPORATE FORECASTING"

Brown, W.J., Management Economics Inc., 125 Terrace, DeKalb, Illinois, 60115, USA

Efficient business forecasting of sales and other values requires that the firm accurately predict external events and any firm responses to those events. The Delphi Technique, originally designed for forecasting events important to national policy and national defense, provides a highly useful forecasting technique for businesses. Properly employed, using rigid controls and careful adherence to the sequence of forecasting steps, the Delphi Technique is very efficient. It is not, however, a simple consensus. This article describes the procedures which have yielded excellent results in many businesses, and discusses the recommended techniques in light of the extensive literature on the subject.

"PROVIDING FORECASTING RESOURCES TO BRAND MANAGERS - AN EXPERIENCE"

Prasad, Krishna, Market Research Manager, Warner Lambert, 201 Tabor Road, Morris Plains, New Jersey, 07950, USA

This paper will describe the things that have worked for us in making forecasting a valuable function in our company. It will concentrate on the evolution of the forecasting function and the role it plays in decision making now. It will point out the many diverse but strategic actions that we have taken to make forecasting a useful, practical and effective service to brand management. Further this paper will describe the way the tools and techniques are assembled together to provide ongoing forecasting service.

DULUTH

FRAMEWORK FOR THE COMPARISON OF ECONOMETRIC MODELS

Chair: McCracken, M.C., Informetrica Limited, Box 828, Stat B, Ottawa, Ontario, K1P 5P9, CANADA

"MODEL COMPARISONS AS A TOOL IN MODEL EVALUATION"
O'Reilly, Brian, Asst. Chief, Research Dept., Bank of Canada, 234 Wellington St, Ottawa, Ontario, K1A 0G9, CANADA

Macroeconomic models are used to produce consistent projections of economic activity and to trace the possible implications of alternative policies (shocks). Although some models emphasize only one use, other models are required to perform both functions on a regular basis. The focus of this paper is on the use of model comparisons to evaluate and assess the ability of particular models to fulfill these objectives. Two approaches a comparison of ex post forecasting records and a comparison of responses to selected policy shocks, are outlined and discussed. The emphasis is on the practical difficulties that arise in these types of exercise. Where relevant to the exposition, developments in the Staff Projection Exercise at the Bank of Canada are drawn upon.

"COMPARING MACROECONOMIC MODELS OF THE U.K."
Bell, D.N.F., Wallis, K.F., Whitley, J.D., ESRC Macroeconomic Modelling Bureau, University of Warwick, Coventry, CV4 7AL, ENGLAND

This paper compares the main publicly-financed models of the U.K. economy. These models (which include the U.K. Government's own macroeconomic model) have all been set up at the University of Warwick by the ESRC Macroeconomic Modelling Bureau in order to facilitate comparative research by the Bureau itself and by other members of the academic community. The main characteristics of the models are described and simulation properties discussed. These simulation properties illustrate the wide spectrum of views embodied in the different models and their implications for economic policy. The paper examines the role of the models in explaining differences in ex-ante model-based forecasts and discusses some general issues in the area of comparative assessment of models and forecasts.

Discussants and Commentators:

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USA

SAINT-CHARLES

STATISTICAL MODELS FOR TECHNOLOGICAL FORECASTING

Chair: Ord, Keith, Pennsylvania State University, Dept. of Management Science, 310 Business Administration Building, University Park, Pennsylvania, 16802, USA

"ADAPTIVE DIFFUSION MODEL FOR THE GROWTH OF ROBOTICS IN NEW YORK STATE"

Bozeman, Barry, Dept. of Public Administration and the Technology Information Policy Program, Maxwell School of Citizenship and Public Affairs, Syracuse University, Syracuse, New York, 13210, USA
Bretschneider, Stuart, Dept. of Public Administration and the Technology Information Policy Program, Maxwell School of Citizenship and Public Affairs, Syracuse University, Syracuse, New York, 13210, USA

This paper expands the Manfield-Bass diffusion model to account for changes over time in the coefficient of innovation, and the coefficient of imitation. The authors apply both the Kalman Filter (weighted least squares) and the heuristic Carbone-Longini Adaptive Estimation Procedure to estimating a time-varying parameter version of the diffusion model. The model is applied to forecasting the growth of industrial robotics in New York state and is used to determine the effect this technological substitution will have on labor patterns through the year 2000. The results are contrasted with those obtained by traditional constant parameter models.

"MODEL SELECTION FOR TECHNOLOGICAL FORECASTING"

Ord, Keith, Division of Management Science, the Pennsylvania State University, 310 Business Administration Building, University Park, Pennsylvania, 16802, USA
Young, Peg, Division of Management Science, The Pennsylvania State University, 310 Business Administration Building, University Park, Pennsylvania, 16802, USA

The paper is concerned with the selection of the appropriate form of growth model for technological forecasting. Included in the model selection process are the determination of the degree of symmetry of the growth curve (logistic or Gompertz) and the type of error structure underlying the model. The selection of the underlying error structure is aided by plots of the residuals following different transformations of the data. Simulated data are initially used to provide known populations to test the accuracy of the selection process. Actual time series are employed to illustrate the applicability of the selection technique.

"EXPERIENCE WITH NEW GROCERY PRODUCT FORECASTING"

Heeler, Roger M. Day, Robert, York University, 313 Administrative Studies Building, Downsview, Ontario CANADA

New product assessment models have become a sizeable industry in packaged goods marketing. Several proprietory models exhibit excellent prediction records, but are costly to buy. Can a marketer develop a successful in-house forecasting model? What are the pitfalls for the unwary?

MATAPEDIA

EVALUATION AND COMPARISON OF FORECASTING METHODS III

Chair: Morry, Marietta, Time Series Research and Analysis Division, Statistics Canada, Ottawa, Ontario, K1A 0T6, CANADA

"USE AND EVALUATION OF FORECAST PRODUCT MARKET FORECASTS"

Eerola, Annele, Helsinki University of Technology, Institute of Math. Otakaari M, 02150, Espoo 15, FINLAND

The paper examines the results of an empirical study on the use and evaluation of long range forecasts of forest product markets. An enquiry was posted to organizations who had ordered a specific forecast report published by a leading consulting company. Individual readers' and users' experience of the report were further examined by personal interviews and questionnaires. The analysis of the results is based on answers of 21 companies from 10 countries. Among the most interesting results are notions on factors affecting the evaluation of forecasts. The interdependence of use and evaluation of forecasts is also examined in the paper.

"CONFIDENCE LIMITS ON FORECASTS: AN EMPIRICAL STUDY"

Lefrancois, Pierre, Lapointe, Bruno,, Dept. des Sciences Economiques et Administratives, Universite du Quebec a Chicoutimi, 555, boul. de l'Universite, Chicoutimi, Quebec, G7H 2B1, CANADA

The purpose of the paper is to evaluate approaches to setting confidence limits on forecasts. Four forecasting methods: Box-Jenkins, Deseasonalized AEP, Single Exponential smoothing, and Holt-Winters are applied on a set of 111 time series. Confidence limits based on MSE's, MAD's and the mean deviations of positive and negative forecasting errors are computed and then compared with one another.

"AN ADAPTIVE RESPONSE RATE TO MONITOR EXPONENTIAL SMOOTHING"

Oliver, Robert M., University of California, 232 Berkeley, California, 94730, USA

In this paper the author proposes an adaptive non-linear error tracking algorithm to detect level changes in time-series data. The underlying forecasts are based on exponential smoothing with the proportionality constant being reset to high sensitivity whenever unusual events occur. The performance of this algorithm is compared with the Trigg and Leach formula and other models for tracking signals.

"ON THE VALUE OF WEATHER FORECASTS IN STATIC AND DYNAMIC DECISION-MAKING PROBLEMS"

Murphy, Allan H., Dept. of Atmospheric Sciences, Oregon State University, Corvallis, Oregon, 97331, USA

The purpose of this paper is to describe some results of recent case studies concerning the economic value of weather forecasts. A decision-analytic approach has been taken, and static and/or dynamic models of the relevant decision-making problems have been formulated. Forecasts involving various lead times, formats (e.g. nonprobabilistic, probabilistic), and levels of quality have been considered. Results consist of optimal strategies, value-of-forecast estimates, and quality/value relationships. Case studies conducted to date include the fruit frost problem, the fallowing/planting problem, the haying/pasturing problem, and the irrigation scheduling problem. Some comments will be made regarding the benefits of such forecast-value studies.

MACKENZIE

TOURISM FORECASTING

Chair: Var, Turgut, School of Travel Industry Management, University of Hawaii, 2404 Maile Way, Honolulu, Hawaii 96822

"FUTURE OF HAWAIIAN TOURISM-A DELPHI"

Var, Turgut, Liu, Juanita, School of Travel Industry Management, University of Hawaii, 2404 Maile Way, Honolulu, Hawaii, 96822

This paper attempts to complement the already existing statistical projections concerning the Hawaiin tourism. Two groups of panelists were chosen. The first group consisted basically of people who are in key decision making positions. After two rounds consensus about future growth of visitors and their composition was obtained. In additional to the first group, a second group consisting of travel agencies that supply tourists to Hawaii was contacted and their opinion obtained. The results are then compared between these groups. Finally, a comparison of statistical projections with the results of the Delphi was made.

"DATA REQUIREMENTS AND INFORMATION SYSTEM FOR FORECASTING TOURISM"

Baron, Raymond R., Ministry of Tourism, P.O. Box 1018, Jerusalem 91009, ISRAEL

This paper discusses the basic data requirement for planning and developing tourism. It stresses the need of short and long range forecasting of tourist and revenue flows. It introduces an information system that would make timely and relevant forecasting possible in tourism.

"PROJECTIONS AND IMPLICATIONS OF INTERNATIONAL TOURISM THROUGH THE YEAR 2000"

Edgell, David, Office of Policy and Planning, Travel and Tourism Administration, Dept. of Commerce, Washington, D.C. 20230, USA

This paper forecasts foreign tourism arrivals to the United States and foreign tourism receipts throught the year 2000 and then suggests what will be the implications for the growth and development of tourism.

SAGUENAY

FINANCIAL FORECASTING

Chair: Brown, Lawrence, University of Buffalo, School of Management, Jacobs Management Center, Buffalo, New York, 14250, USA

"ACCOUNTING EARNINGS AND SECURITY VALUATION: EMPIRICAL EVIDENCE OF THE FUNDAMENTAL LINKS"

Easton, Peter D., University of Chicago, Graduate School of Business, Chicago, Illinois, 60637, USA

The extant empirical accounting research that provides evidence of the information content of accounting earnings has analyzed the relationship between accounting earnings (or surprise in the announcement of accounting earnings) and contemporaneous security prices (or abnormal security returns). The analysis in this paper views the information content of accounting earnings in terms of how they relate to future dividend realization. The empirical results show that accounting earnings is a good predictor of the future stream of dividends. The paper also demonstrates that there is a strong valuation link between security prices and future dividend streams and that this link is well described by the risk adjusted dividend capitalization formula. These results provide evidence that the framework that explains the contemporaneous association between accounting earnings and security price includes two key links; an information link between accounting earnings and future dividends and a valuation link between future dividends and security prices.

"THE INCREMENTAL INFORMATION CONTENT OF ACCRUALS AND CASH FLOWS AFTER CONTROLLING FOR EARNINGS"

Wilson, G.P., Stanford University, Graduate School of Business, Standford, California, 94305, USA

While there is general agreement that firm value is related to expected future cash flows, the importance of earnings, accruals, and cash flows in forming these expectations remains an open question. This study addresses this issue by investigating the incremental information content of the accrual and cash components of income. Two accrual variables are used; the difference between net income and working capital from operations; and between net income and cash from operations. This study differs from previous work in that separate market reactions are measured for different information releases. The models are motivated by the insight that earnings and revenues are announced in the Wall Street Journal before the annual report, which contains both accruals and cash flows, is released. This allows a separation of the incremental effects of earnings and cash flows that is not possible when treating their releases as contemporaneous events.

"THE MAGNITUDE OF FINANCIAL ANALYST FORECAST ERRORS: IS THERE AN INFORMATION INTERPRETATION?"

Brown, L.D., University of Buffalo, School of Management, Jacobs Management Center, Buffalo, New York, 14260, USA
Richardson, G.A., University of British Columbia, Fac. of Commerce and Business Administration, Vancouver, British Columbia, V6T 1Y8, CANADA
Schwager, S., Biometric Unit, Cornell University, Ithaca, New York, 14850, USA

A Bayesian model is developed to explore theoretical determinants of the magnitude of financial analyst forecast (FAF) errors involving a firm's reported earnings. The magnitude of FAF errors is shown to be negatively related to the dimensionality of (that, is the number of information observations in) the information set underlying an analyst's forecast. Further attributes of the information set which are of importance are the variance of and covariance between information observations, which are both shown to be positively related to FAF errors magnitude. Empirical surrogates for the theoretical factors are used in order
to explain the cross-sectional magnitude of Value Line quarterly forecast errors for a sample of firms. The selected surrogates (with the hypothesize sign of association shown in brackets) are firm size (-), the dispersion in prior earnings forecasts across other analysts (+), the number of lines of business (-) and the variability of past quarterly earnings (+). The empirical tests address the disentanglement of effects using a multivariate approach, recognizing the overlaps in the explanatory variable make interpretations of observed univariate associations highly suspect.

YAMASKA

FORECASTING APPLICATIONS I

Chair: More, Roger A., The University of Western Ontario, School of Business Administration, London, Ontario, N6A 3K7, CANADA

"THE IMPACT OF ORGANIZATIONAL ADOPTION BEHAVIOR ON SALES FORECASTING FOR NEW INDUSTRIAL PRODUCTS"
More, Roger A., The University of Western Ontario, School of Bus. Admin. London, Ontario, N6A 3K7 CANADA

The development of new industrial products frequently represents major risks to the company involved. One major and little-recognized reason for inaccurate forecasts is managers' misunderstanding of the complex inter-organizational buying process that governs the adoption rate for new industrial products, and thus has a major impact on the magnitude and timing of actual product sales. This paper decomposes the organizational adoption process into its important structural features and analyzes how each can influence the adoption rate and therefore it's impact on forecasting.

"RESEARCH BY FORECASTERS"
Foreman, Joshua, Asst. Professor of Economics, Wichita State University, Wichita, Kansas, 67208, USA

Who is the best forecaster? How should the user evaluate forecasts? What is the optimal contract between user and forecaster? This paper generalizes "Optimal Scoring Rules" , which employed the microeconomic tools of principal/ agent theory to answer these questions for the case where there is one, probabilistic forecasters, and the user had a diffuse prior over the future.

"THE STOCK MARKET: HOW PREDICTABLE?"
Finney, Joseph C., 304 Metz Road, Fort Ord, California, 93941, USA

This essay reports some preliminary findings in an exploration of the predictability of the stock market. Specifically, it was decided to test the success of investment advisory services in predicting major swings of the stock market. Data were collected beginning with the week ending September 19, 1980. An advisory service was included if 1) it makes its predictions in a quantitative form, 2) the prediction number is nationally availble to the public 3) the prediction number is updated at regular intervals, 4) the prediction number is claimed to be derived scientifically.

"USE OF FEEDFORWARD AND POTENTIAL PROBLEM ANALYSIS IN JUDGEMENTAL FORECASTING"
Milutinovich, Jugoslav, Mankelwicz, John M., School of Business Administration, Temple University, Philadelphia Pennsylvania, 19122, USA
Vlahovich, Vladimir, School of Management, Widener University, Chester, Pennsylvania, 19013, USA

Risk is inherent in all decisions based on forecasts. Problems may arise even after a best judgmental forecast. In order to avoid blame for a wrong forecast, judgmental forecasters should use feedforward and potential problem analysis (PPA) to identify future problems which may be caused by incorrect forecast. This paper will review the feedforward literature and present a feedforward framework useful potential problem identification.

"INTOLERANCE OF AMBIGUITY AND THE NEED FOR FORECASTS"
Gimple, Martin L., University of Canterbury, Christchurch 1, NEW ZEALAND

Ambiguous situations are characterized by a lack of understanding of the desired goals and objectives. Tolerance for ambiguity as a learned behavior varies amongst managers. Western management thought is intolerant of ambiguity and teaches the necessity of being able to predict the future so that firm objectives may be set. The demand for credible forecasts in ambiguous situations introduces a series bias into the forecasts and subsequent objectives of the organization.

STUDIO

BUSINESS FORECASING

Chair: McLaughlin, Robert, Micro-Metrics, Box H, 450 Riverside Drive, Cheschire, Connecticut, 06410, USA

"FORECASTING MARKETS FOR COMMODITIES: A WALRAS-MARSHALL SYNTHESIS"

Simunek, Vladimir, St. John's University, College of Business Administration, Dept. of Economics & Finance, Grand Central & Utopia Parkways, Jamaica, New York, 11439, USA

The two-stage method of forecasting quantities and prices on commodity markets is described in this paper. In the first stage, buyers' and sellers' intentions are forecast. In the second stage, differing plans of buyers and sellers are brought together by an interacting process that allows instantaneous and also bargaining adjustments of prices and quantities depending on the type of market. The market simulation mechanism is based on the synthesis of Walrasian and Marshallian approaches. This paper discusses the theory of the synthesis and demonstrates practical examples of forecasting the U.S. automobile market.

"PRACTICAL EXPERIENCE IN SALES FORECASTING, USING MCLAUGHLIN'S FORAN SYSTEM"

Van Coller, Jon E.M., Romatex Ltd., Economics and Marketing, P.O. Box 12222, Jacobs 4026, SOUTH AFRICA

For the past eight years the writer has made use of McLaughlin's FORAN system as an aid to short term forecasting of product sales (semi-durables). He has saved the forecast results for the last four years. The paper describes the forecasting procedures used, discussing the forecasting procedure through all stages, from data collection through to the practical application of the forecast. The forecast results are analyzed, the FORAN program evaluated, and a number of suggestions for enhancement of the program are made. Several practical forecasting experiences are described.

"FORECASTING NEW PRODUCT SALES"

Suhir, Raisa, Subba-Rao, U.V., MIS, Warner-Lambert Co., Morris Plains, New Jersey, 07950, USA

The paper describes a scenario based methodology developed to forecast sales for a new product in a pharmaceutical market. The forecasting system is based on a dynamic simulation of an econometric model and a group of supplemental models. Multiple scenario approach adds flexibility to the forecasting system by allowing simulation of different "what-if" situations for the competitive environment as well as for the company's marketing policies.

"INVENTORY FORECASTS FOR VERY LOW DEMAND ITEMS"

Price, Barbara, Haynsworth, H.C., Winthrop College, Rock Hill, South Carolina, 29733, USA

In the typical inventory of independent demand items, a number of items have a low periodic rate of demand over their known lead time. A decision to stock these items, with a minimum quantity of one, constitutes a decision to invest in safety stock. Forecasting demand for this sort of item is often difficult. Thus, the stocking criteria used in these cases is often arbitrary, resulting in either an excessive inventory investment or a reduction in service. This paper presents a method designed to assist in this type of decision making problem.

ETUDE

FORECASTING ISSUES

Chair: Morty Yalovsky, McGill University, Faculty of Management, 1001 Sherbrooke St. West, Montreal, Quebec H3A 1G5, CANADA

"THE ENGINEERS ROLE IN DECIDING THE FUTURE"

Thing, Meredith W., University of London, Bell Farm Brundish, Woodbridge, Suffolk IP13 8BL, ENGLAND

Five problems menace our future: 1) arms escalation, 2) the gap between living standards, 3) extravagant use of limited resources, 4) pollution and destruction of wild life, 5) replacement of men by machines causing unemployment. A society in which man lives in dynamic equilibrium with the environment (the creative society) can be developed if the mainspring of human activity becomes creative self-fulfilment. The engineers contribution could solve all these problems.

"FORECASTING GLOBALISTICS: ACHIEVEMENTS, DIAGNOSIS AND TRENDS IN ITS DEVELOPMENT"

Tonchev, Luben, Academy for Social Sciences, Sofia, Pionerski Pat 21, BULGARIA

The global research works recently have reached a high level. At the same time globalistics differentiates itself as a theory of the macroplanet processes with its own objects, subject, multilateral base (conotations, methods, personnel, organization, information, programmes, etc.). Globalistic cover its subject in the past, at present and in the future (global history, diagnosis and forecasting). Initially the global research works were of a sporadic character; during the past 150 years they were to be met with more often and now they are a necessity for each developed country or international organization and an important direction for international cooperation.

"CYCLE REGRESSION ANALYSIS SIMULTANEOUS ESTIMATION"

Simmons, LeRoy, Co-ordinator of Research & Grad. Studies, Dept. of Computer Science, Commerce, Texas, 75428, USA

Cycle regression analysis is a continuously evolving family of algorithms that provide the simultaneous estimation of all paramters of a sinusoidal model. The newest members of the family, which add spectral analysis to the non-linear regression methodology, are introduced in this paper. Several common time series are analyzed using cycle regression analysis and the results are compared to those obtained from the Stepwise Estimation Procedure of Damsleth and Spjotvoll (1982). The comparison demonstrates the inherent advantage of the simultaneous estimation of parameters.

"FORECASTING CHINA'S FOREIGN TRADE"

Hoyt, Ronald E., University of Ottawa, Faculty of Administration, Ottawa, Ontario, CANADA

Recent estimates of China's $19,000,000,000 of foreign currency reserves suggests a strong upswing in foreign trade is probable. This paper addresses the problems associated with forecasting foreign trade trends in a centrally planned economy and suggests areas of major growth potential for international trade in the next three to five years.

Session MAL13V

MONDAY
4:00-5:30

VILLE MARIE

TOPICS IN FORECASTING

Chair: Huot, Guy, Statistics Canada, Ottawa, Ontario, K1A 0T6, CANADA

"BOOTSTRAP TECHNIQUES TO OBTAIN FORECAST DISTRIBUTIONS"

Fingerman, Joel, Roosevelt University, 430 South Michigan Avenue, Chicago, Illinois 60605, USA

In most quantitative forecasting models the determination of forecast distributions and confidence intervals is dependent on the assumptions regarding the disturbance distribution. However, there are many cases, such as where the exogenous variables are stochastic in regression models, or when a time series forecast is based on short data series with non-normal residual distribution, when the usual assumptions about the error disturbances do not hold. Hence, the forecast distribution is unknown. This paper presents methods using the bootstrap technique to determine 'empirical' forecast distributions for both regression and time series forecast models. Once the 'empirical' forecast distribution is estimated, conclusions about forecast confidence intervals and probabilities can be made.

"FORECASTING HEATING ENERGY CONSUMPTION IN BLOCKS OF FLATS"

Hietikko, Harri K., Liski, Erkki P., Dept. of Mathematical Sciences, University of Tempere, FINLAND

Data on heating energy consumption in blocks of flats in two cities in Finland were analysed to study the energy consumption. The main objective of our study was to forecast monthly energy consumption in blocks of flats and to find factors affecting energy consumption. Specific technical features of a building, such as building material, the number of floors, the number of flats, the volume of the building, etc. and climatic factors wre used as explanatory variables.

"FUZZY INFORMATION AND VECTOR AUTOREGRESSIVE FORECASTING: AN APPLICATION TO THE SWISS TIMBER MARKET"

Zimmermann, A., Kofler, E., Zwiefil, P. Institute for Empirical Research in Economics, University of Zurich, 137 CH-8008 Zurich, SWITZERLAND

In this paper, a vector autoregression model under LPI fuzziness (FUZZY-VAF) is considered. LPI fuzziness implies that we have only linear partial information (LPI) about the inclusion of variables in a classical regression and/or other linear restrictions. The results are applied to the Swiss Timber Market, where special attention is devoted to the problems of structural changes induced by increased timber supply due to environment pollution.

"CONSEQUENCE OF ARMA MODEL MISSPECIFICATION ON PROCESS MEAN"

Alt, Frank, University of Maryland, College of Business Management, College Park, MD, 20742, USA
Wun, Lap-Ming, Internal Revenue Service, 1111 Constitution Ave, Washington, D.C. 20224, USA

Because policy analysis is concerned with the series level and because forecasts from an ARMA process approach the process mean, the effect of model misspecification on the mean's estimate is of interest. Several scenarios are considered. For example, for MA(1), MA(2) and AR(1) processes, suppose the process mean has shifted "midway" through the realization and this shift has not been incorporated into the postulated model. Thus, there is bias in the estimated mean and an investigation of the alias structure (Draper & Smith) reveals that it depends upon the values of the ARMA parameters and the point at which the process changes.

"INCREASING THE VALUE OF PROBABILISTIC FORECASTS"

McIntrye, Shelby, University of Santa Clara, Santa Clara, California, 95053, USA

Forecasting should be considered from a cost/benefit perspective. This paper addresses the USE of probabilistic forecasting in a marketing context and touches on the variety f ways in which the value of such forecasts might be increased. Particular focus is placed on the interaction between the producer of the forecast and the user (s) of the forecast.

GALERIE 2

ADVANCED ECONOMETRIC METHODOLOGY

Chair: **Dagum, Camilo**, Dept. of Economics, University of Ottawa, Ottawa, Ontario, CANADA

"GRECON: A SIMULTANEOUS ECONOMETRIC MODEL FOR THE DUTCH ECONOMY: EX ANTE AND EX POST FORECASTING RESULTS"
Voorhoeve, W., University of Groningen, Econometric Institute of the State University of Groningen, P.O. Box 800, 9700 AV Groningen, The Netherlands

In 1976 the GRECON model has been constructed on purpose to calculate annual predictions of the main Dutch macroeconomic variables. Every year the model has been updated and modified. In the paper the basic underlying assumptions of the GRECON model will be treated. Using Theil's inequality coefficient forecasts of the GRECON model will be judged for the period 1977-1981. Results are given for the ex ante annual, the ex post annual and the ex post long-term predictions, using the successive specifications of the model.

"AN EVALUATION OF FORECASTING PERFORMANCE OF AN ECONOMETRIC MODEL OF AN OPEN REGIONAL ECONOMY (BRITISH COLUMBIA)
Singh, H., Barnett, D., Johnson, J., Reynolds, M.C., Central Statistics Bureau, Ministry of Industry and Small Business Development, Victoria, British Columbia, CANADA

The British Columbia Econometric model consists of 325 equations of which approximately 150 are behaviourial with extensive linkages to external markets. The model incorporates a wide range of B.C. economic indicators and concepts of the system of national accounts. In aggregate terms, the sectors of the model include, industrial production, labour market, incomes, prices, and final demand and population.

"A SIMULTANEOUS EQUATION MODEL OF PRICE AND QUANTITY ADJUSTMENTS IN WORLD PRIMARY COMMODITY MARKETS"
Hwa, Erh-Cheng, Country Analysis and Projection Division, Econ. Analysis & Projection Dept, 1818 H. Street N.W., Washington, D.C. 20433, USA

A typical feature of competitive primary commodity markets is that short-run price fluctuations are generally much more pronounced than quantity fluctuations. Quantity adjustments are stickier mainly because the production of many primary commodities involve rather long supply lags. Prices rather than quantities, then, assume the major burden of adjustment for restoring market equilibrium. The purpose of this paper is to formulate a competitive disequilibrium model of price and quantity adjustments in world primary commodity markets, emphasizing particularly the role of price adjustment. The model is cast in a disequilibrium framework in the sense that it does not assume instanteous market clearing. The dynamics of price adjustment is explicitly modeled.

"AN INVESTMENT EQUATION WITH SEPARATE COST OF CAPITAL COMPONENTS"
Katz, Arnold J., Econometrics Staff, BE-52, U.S. Dept. of Commerce, Bureau of Economic Analysis, Washington, D.C. 20230, USA

This paper presents an equation for purchases of producers' durable equipment that uses separate variables to measure the effects of changes in output, and rates of interest, inflation, and taxes. The contributions of these factors are, therefore freely estimated rather than constrained as in equations that use the traditional user cost of capital expression. The properties of this equation, both by itself and in a full-model context are compared with constrained versions of it and with several equations based on the conventional putty-clay model. The comparative accuracy in post-sample predictions of these equations is also examined.

GALERIE 3

ALTERNATIVE MODEL ESTIMATION STRATEGIES AND THEIR IMPLICATIONS FOR FORECASTING

Chair: Spivey, Allen, The University of Michigan. Ann Arbor, Michigan, USA, 48109

"FORECASTING MONEY SUPPLY AGGREGATES WITH MULTIPLE TIME SERIES MODELS"

Machak, Joseph A., Spivey, Allen W., he University of Michigan, Graduate School of Business Administration, Ann Arbor, Michigan 48109, USA

A widely followed practice in many countries is to forecast the major monetary aggregates by using some variation on the conventional money demand equation. Such equations are essentially reduced form equations from an econometric model. However, the models have had a relatively poor forecasting record, as has been observed by different researchers. In this paper a multiple time series model is developed for jointly forecasting the major monetary aggregates of selected countries. This model exploits the variance-covariance structure of the relevant aggregates for each country through a state-space formulation. Estimation and forecast results are presented.

"THE USE OF MULTIVARIATE TIME SERIES TECHNIQUES IN HIGH FREQUENCY COMMODITIES TRADING SYSTEMS"

Hui, Bladwin., Transworld Oil, Ltd., Hamilton, Burmuda.

With instant transactions and price quotes available through the latest innovations in telecommunications systems, financial arbitragers are discovering that inefficiences in the market can be corrected within minutes. Therefore, traders are looking beyond the traditional analyses of daily closing prices to give them an "extra edge" in the markets. In this paper, we explore the use of vector autoregression to forecast the day"s high and low prices after the opening. Rules for intraday trading are then developed using these forecasts as guidelines. Both simulated results aand actual trading experiences are discussed.

"FORECASTING WITH TRANSFER FUNCTION MODELS IN PRODUCTION PLANNING SUPPORT"

Acker, William D., Owens-Corning Fiberglas Corporation, Fiberglas Tower, Toledo, Ohio, 43659, USA

The use of single-output transfer function models is discussed in developing forecasts for diverse products in a market-oriented firm. Alternate representations of the general model are considered with the aim of developing a useful perspective of the noise component and avoiding poor end results. An application is presented which illustrates changes in the noise model as unexpected variation in the output is imposed by the onset of a decline in market share.

GALERIE 4

UNCERTAINTY IN UNIVARIATE ARIMA FORECASTS

Chair: Pack, David J., Oak Ridge National Laboratory, P.O. Box X. 2029 Oak Ridge, Oak Ridge, Tennessee, 37830, USA

"ESTIMATION OF JUMPS IN TIME SERIES WITH SEASONALITY AND LINEAR TREND"

Nkwuo, J. Emeka, Bell Communications Research, Red Bank, New Jersey, 07701, USA

Many time series are prone to permanent or temporary abrupt level changes. For example regulated public utility revenue series often exhibit such changes as a result of rate increases (permanent) or one time pay backs (temporary). Accurate forecasting of such series requires a facility to measure and adjust for these discontinuities. This paper presents a method for estimating the magnitude and adjusting for these discontinuities in time series with seasonality and linear trend. It is assumed that the location and type of the discontinuity is known. The utility of the methodology is illustrated by applying it to some actual time series.

"DETERMINISTIC VS. STOCHASTIC SEASONALITY IN THE CONTEXT OF A STRUCTURAL MODEL"

Tashman, Leonard J., Business Admin., University of Vermont, Mansfield House, Burlington, Vermont, 05405, USA
Bundy, John R., Univ. of Vermont, Bus. Admin, Mansfield House, Burlington, Vermont, 05405, USA

Harrison and Stevens and, more recently, A.C. Harvey advocate a "basic structural model" (BSM) for time series forecasting. A special case of component-ARIMA models, the BSM permits explicit estimation of stochastic trend and seasonal components without recourse to correlograms for model identification. A problem, however, is how to deal with very smooth seasonals that characterize some important economic series. On practical grounds, a choice probably has to be made between two extremes: completely stochastic or deterministic specifications. In this paper, we compare specifications for seasonality using quarterly and monthly time series of sales tax revenues in Vermont 1969-1982 (a remarkably uninterrupted series).

"PARTITIONING TIME SERIES INTO PERMANENT AND TEMPORARY COMPONENTS"

Guerts, Michael, Brigham Young University, Graduate School of Management, Provo, Utah, 84602, USA
Lawrence, Ken, Strategic Planning & Financial Analysis, AT&T, Bedminster, New Jersey, 07921, USA

Time series research in marketing has had two thrusts: 1) looking at the effects of advertising and prices on sales and 2) forecasting sales. Research on advertising and sales, a problem of the effects being confounded is often present. One way of dealing with this problem is to partition the time series into a permanent and temporary component. Recently methods of partitioning a Box-Jenkins (1,1,1) time series into both a permanent and temporary time series have been developed. This paper looks at the method and the application of partitioning a time series.

DULUTH

HIGH TECHNOLOGY FORECASTING

Chair: Gerstenfeld, Arthur, Worcester Polytechnic Institute, Worcester, Massachusetts, 01609, USA

"MICROCOMPUTERS FOR MANAGEMENT: A TECHNOLOGICAL FORECAST"

Gerstenfeld, Arthur, Worcester Polytechnic Institute, Worcester, Massachusetts, 02609, USA

This paper focuses on those aspects of microcomputers that will be most important in future years. For example, communication, computational power, display characteristics, speed, and memory are ranked in terms of future applications. Similarly the linkages between micro to micro, micro to mainframe, are also analyzed. Issues of work-selected computer usage performed at home (as opposed to the office) is discussed both in terms of the present and the future. The results are based on a user survey and in depth interviews with a sample size of more than thirty users in four different organizations.

"INDUSTRIAL ROBOTICS: A FORECAST"

Zwiep, Donald N., Worcester Polytechnic Institute, Worcester, Massachusetts, 01609, USA

By the end of 1981, 4700 industrial robots were in use in the United States and 14,200 in Japan. Although the U.S. had a ten year start over Japan, Japan is now the world leader in both production and the use of robots. The Japanese Industrial Robot Association (JIRA) forecasted an output of about 3200 units in 1980, 32,000 in 1985 and 57,500 in 1990. Tentative growth in the robotics industry after about 1985 is expected to shift to the more intelligent models. For the present one observes that market penetration has been limited but improving. Industrial robots are not yet sufficiently sophisticated to demonstrate cost effectiveness in most jobs. Where robots are clearly superior, as in spot welding and in other similar processes, the degree of superiority is still not overwhelming.

"NEXT GENERATION OF ROBOTS: JAPANESE APPROACH"

Togai, Masaki, AT&T, Bell Laboratories, Holmdel, New Jersey, 07733, USA
Ishikawa, Akira, Graduate School of Management, Rutgers University, Newark, New Jersey, 07102, USA

The Japanese government has started a new project to develop advanced robots capable of operating in harsh environments, for disaster relief, equipment maintenance and advanced assembling. In the United States, various research institutions are conducting research on intelligent robots. However, none of them seems to have a project to develop an advanced robot as a total system like Japan's. The paper describes the Japanese next generation robots by presenting overall plan and concept of the intelligent robot systems and by outlining the various subsidiary research projects currently being undertaken.

SAINT-CHARLES

FORECASTING & DECISION IN TRANSPORT

Chair: **Jessop, Alan**, Transport Studies Group, The Polytechnic of Central London, School of the Environment, 35 Marylebone Road, London, NW1 5LS, ENGLAND

"SHORT TERM TRAVEL TIME FORECASTING IN CONTINUOUS REPRESENTATIONS OF TRANSPORT SYSTEMS"

Polak, John, Transport Studies Group, Polytechnic of Central London, London, England NW1 5LS

In the field of transport, a common problem concerns the production of short term forecast of travel times on networks. Typically, the information available in such situations is partial and uncertain. Moreover, it can be of two distinct types, historical or contemporary. Historical information will tend to be more extensive but also more uncertain than contemporary information. This paper considers an approach to this problem based on a continuous representation of the transport network in which Bayesian techniques are used to integrate historical and contemporary information. Applications to area traffic control and route guidance are discussed.

"AN EXPERIMENT IN AIR TRAVEL FORECASTING"

Jessop, Alan, Transport Studies Group, The Polytechnic of Central London, London, England, NW1 5LS

Forecasts of air transport movements are required at many levels from planning an individual route to deciding the size of an airport. They have typically been the output of formal models and have been subject to frequent revisions Shortcomings in the forecasts are supposed to be due in part to the absence of the judgement of professionals from the formal model. This paper describes the results of an experiment to compare forecasts made on the basis of judgement with those based on time-series models and to identify the effect of different levels of expertise.

"THE UTILITY OF STRUCTURAL MODELLING AS A FORECASTING TOOL"

Gilbert, Denis, Transport Section, Dept. of Civil Engineering, Imperial College, London, England

Transport forecasting has concentrated on finding ways of improving the precision of its estimates by appeals to increase data and better analytical procedures. Much less attention has been paid to systematically investigating the underlying alternative structures of the problems studied. There is an increase awareness that a fuller exploration of underlying structures will be helpful both in understanding existing systems and in describing likely future system states. Structural Modelling provides a methodology for doing this. Its use in transport will be discussed using case studies concerned with car ownership forecasting and with Brazil's Gasohol project.

Session TML6F

TUESDAY
10:15-11:45

MATAPEDIA

POSTAL FORECASTING

Chair: Haines, George H. Jr., Carleton University, Arts Tower, Ottawa, Ontario, K1S 5B6, CANADA
Hobbs, Clem, Carleton University, Arts Tower, Ottawa, Ontario, K1S 5B6, CANADA

"THE EFFECTS OF TECHNICAL CHANGE ON POSTAL DEMAND"

Guy, Charles E., O'Hara, Donald J., U.S. Postal Service, Planning Dept., Washington, D.C., 20260, USA

The Postal Service Interindustry Demand System (PSIDS) models demand via a 15 industry translog-based input/output structure. This structure explicitly models technology, such that the input/output coefficients vary in response to relative input price changes and technical change. The recent history of rapid change in the telecommunications industry permits an analysis of one of the most important questions in postal forecasting, namely, the degree to which technical change in telecommunications can be expected to affect future postal demand.

"FORECASTING LABOR INPUTS FOR THE U.S. POSTAL SERVICE"

Waldau, Geoffrey, U.S. Planning Dept., Postal Service, Washington, D.C., 20260, USA

Labor is the largest factor input in the provision of postal services. Delivery services accounts for 39% of all workhours used followed by mail processing (29%), customer services (16%), and other (16%). Statistical cost models are developed to forecast workhour requirements from workload, i.e. mail volume, delivery points and the number of workdays in an accounting period. Model R-squares are above .9. These models are used to forecast ex-ante and ex-post workhour requirements into the budget year. A separate model is estimated for each postal region and for every district within a region. The forecasts are used for budget planning and performance measurement.

"THE DEVELOPMENT OF FORECASTING METHODS IN THE DUTCH POSTAL SERVICE - SOME ASPECTS OF THE INCORPORATION OF MARKET INFORMATION"

Floor, R., Deputy Head of the Central Postal Marketing Dept. of the Netherlands Postal Service, THE NETHERLANDS

Up to a few years ago, traffic forecasts in the Dutch Postal Service were made almost exclusively by the financial control department. Efforts to increase the reliability of the forecasts led to incorporation of data on market developments, and consequently to incrasing involvement of central and regional commercial departments. A computerized marketing information system is now being developed in which the forecasting activities will be integrated. In the future, the forecasts will not only be used for budgeting purposes, but also in working out marketing plans.

CHAUDIERE

FORECASTING ACCURACY

Chair: Smyth, David J., Dept. of Economics, Wayne State University, College of Liberal Arts, Detroit, Michigan 48202, USA

"A QUANTITATIVE LOOK AT THE SYSTEM OF ECONOMIC INDICATORS"
Huth, William, Northeast Louisiana University, USA

The Bureau of Economic Analysis (BEA) regularly publishes data on the current state and anticipated future of the domestic economy. This information is frequently used, mainly in a qualitative sense, by policymakers and other economic agents to assess the direction of economic activity. This paper examines the quantitative time inter-relationships between the composite economic indicators. Specifically, cross-correlations were computed from the white noise innovations from univariate ARIMA models and used to isolate the delay behavior and directional relation between the series pairs. The correlations were also used to specify a multivariate time series model connecting the coincident and leading indexes of economic activity.

"MULTIPERIOD MACROECONOMIC FORECASTS AND THE VARIABILITY OF PREDICTED AND ACTUAL CHANGES"
Smyth, David, Dept. of Economics, Wayne State University, College of Liberal Arts, Detroit, Michigan, 48202, USA
Ash, Colin, University of Reading, Dept. of Economics, Reading, England

This paper examines the relationship between the variability of predicted and actual changes for multiperiod forecasts. It tests the hypothesis (advanced by Herman Stekler at ISF 84) that the ratio of the variability of predicted changes to the variability of the actual changes will decline the further ahead the time period for which forecasts are made. Using a variety of data sets we find that the evidence provides considerable support for the hypothesis; thus longer term forecasts are smoother than shorter term forecasts.

"LONG-TERM REAL INTEREST RATE FORECASTING AND THE ROLE OF UNCERTAINTY AND DEFICITS"
Giannaros, Demetrois S., Schhol of Bus. & Public Admin, University of Hartford, West Hartford, Connecticut, 06117, USA

This paper proposes that the long-term real interest rate is not constant and that a number of variables (including expected inflation, inflation uncertainty and budget deficits) are the principal causes of its variation. A Fisherian reduced-form equation is derived and estimated using four different types of long-term interest rates. Selected model(s), once the stability of the equations is established and forecasting validation simulations are carried out, are used to perform forecasts of the long-term real interest rates. The purpose is to determine the best possible forecasting model.

MACKENZIE

LEADING ECONOMIC INDICATORS

Chair: Moore, Geoffrey H., Graduate School of Business, Columbia University Room 808 Uris Hall, New York, New York, 10027, USA

"INFLATION FORECASTING WITH A NEW INDUSTRIAL MATERIALS PRICE INDEX"

Joyce, Geoffrey, Center for International Business Cycle Research, Columbia Business School, New York, New York, USA

A new daily price index covering 18 industrial materials has been constructed which has superior properties as a leading index of inflation. Weights are based on each commodity's economic importance and its demonstrated ability to anticipate cyclical changes in the CPI. The methodology used to construct the index is similar to that employed by the Department of Commerce in its composite leading index of business cycles. This involves a standardization procedure that gives each commodity price the same average volatility, resulting in a smoother index less liable to produce false or misleading signals of future inflation.

"ANTICIPATING GROWTH RECESSIONS: A NEW SEQUENTIAL SIGNALING SYSTEM"

Deitch, Robert F., Center for International Business Cycle Research, Columbia Business School, New York, New York, USA

A new solution to the problem of predicting cyclical highs and lows in the economy enables one to gauge whether an incipient economic downswing will turn out to be a slowdown in economic growth or a real recession. The new signaling system is based upon previous work at the Center for International Business Cycle Research, but uses, in addition, the growth rate in a long leading index for the economy. The resulting signals are shown to be dependable in distinguishing and anticipating growth cycles in the United States, Canada, the United Kingdom, West Germany and Japan. The current signals have potential applications in analysis of financial markets.

"INDICATORS FOR THE ENERGY AND MINERALS INDUSTRIES"

Maurer, Ruth, Assoc. Professor of Mineral Economics, Colorado School of Mines, P.O. Box 736, Golden, Colorado 80402, USA

In order to improve the ability of oil and gas drilling firms, rig contractors, rig service companies, and producers to forecast turns in the drilling cycle, a search for a set of leading and coincident indicators of the rig count was conducted. Composite leading and coincident indexes were then constructed. A similar study has been made of economic series for the U.S. aluminum industry, where the aim was to identify leading and coincident indicators of aluminum scrap prices. A composite leading index was constructed and evaluated for the period 1948-1983.

"A NEW ASSESSMENT OF THE ROLE OF MONEY IN FORECASTING INFLATION"

Klein, Philip A., 516 Kern Graduate Building, Dept. of Economics, Pennsylvania State University, University Park, Pennsylvania 16802 USA

At the London Conference, we tested the ability of a leading index based on employment, total credit, and industrial materials prices to forecast inflation cycles in seven countries. Here we compare the earlier results to those obtained by using M1 instead of credit in the index. In half of the countries, the correlation coefficients are higher with the new index. Similarly, the longest average leads at peaks and troughs are divided by country betweeen the new index and the original index.

TUESDAY
10:15-11:45

SAGUENAY

STATE SPACE FORECASTING METHODS

Chair: Brownlow, James D., University of Southern California, Dept. of Systems Science, Los Angeles, California 90007, USA

"ESTIMATION AND PREDICTION UNDER STRUCTURAL INSTABILITY: A SECOND LOOK"

Dutton, Richard H., Lockheed California Company, Burbank, California, USA

In a recent paper by Anders Baudin an attempt is made to 1) demonstrate empirically the advantages of adaptive estimation techniques over more traditional estimation approaches when economic systems are believed to be structurally unstable over time, and 2) compare in an empirical framework two adaptive estimation techniques: Kalman Filtering and the Carbone-Longini filter. The results of that investigation are extended in this paper to include an adaptive Extended Kalman Filter and it is further demonstrated using the same data set the Extended Kalman Filter with an adaptive estimate of the state-vector covariance matrix does a significantly better job of forecasting than the procedures considered in the Baudin et al paper.

"STATE SPACE FORECASTING AND TARGET TRACKING"

Brownlow, James D., University of Southern California, Dept. of Systems Science, Los Angeles, California, 90007 USA

The problem of tracking a target with one or more sensors is considered. State space forecasting methods are used to estimate target location when both maneuvering and non-maneuvering target models are assumed. In addition the problem of correlating inputs from multiple sensors is considered and the two-sensor situation where one sensor performs better at long ranges and the other at short is analyzed and simulated. A variety of State-Space methods are presented: Extended Kalman Filtering, Constant Gain Filters, Adaptive State Estimation Techniques and an augmented State Method.

"STATE SPACE AND MULTIVARIATE ARIMA: A COMPARISON OF TWO MULTIVARIATE PROCEDURES"

Aksu, Celal, Dept. of Accounting, School of Management, Syracuse University, Syracuse, New York, 13210, USA
Narayan, Jack Y., Dept. of Mathematics, State University of New York at Oswego, Oswego, New York, 13126, USA

Two procedures for doing multivariate time series analysis are compared with respect to model identification, estimation, forecasting, diagnostic checking, stability and ease of use. One of them is the state space procedure from SAS and the other is the multivariate ARIMA procedure from Scientific Computing Associates (SCA). The theoretical equivalence between the two formulations is reviewed and this equivalence is checked experimentally. The application of these methods to transfer function modeling is also discussed with illustrative examples.

"RANDOM COEFFICIENT TIME SERIES MODELS OF SEA STATE VARIABLES"

Crawford, Melba, University of Texas, Dept. of M.E., Etc 11 5.114, Austin, Texas, 78746, USA

A simulation model driven by a time series model of sea states has been developed to aid in selecting the most appropriate vessel for drilling exploratory wells at specific offshore sites. Random coefficient time series models of wave height, wave period, and wind speed are developed for two sites. Results are compared to those four Box-Jenkins time series models. Computational requirements for the linear and nonlinear models are discussed.

YAMASKA

STATE REVENUE AND REGIONAL FORECASTING

Chair: Ouellet, Roch, Ecole des H.E.C., 5255 Decelles, Montreal, Quebec, H3T 1V6, CANADA

"A SIMPLIFIED STATE TAX REVENUE FORECASTING MODEL"

Brooking, Carl G., Millisaps College, P.O. Box 15412, Jackson, Mississippi, 39210, USA

Over the last decade, the trend in forecasting state tax revenues has been to develop a large scale statewide econometric model that includes a number of tax revenue equations. The development of the models has been quite successful and well accepted, but the cost of development and maintenance of the models is quite high. This paper presents a viable alternative to the large state models useful for revenue forecasting (not policy simulation). The proposed model is structured as a set of linking equations that results in projections of state personal income upon which most tax revenue forecasts are based. The actual model is estimated for the State of Mississippi. The equations of the model are presented and a number of simulations are generated.

"FORECASTING TO CONTROL TOTALS FOR VARIABLE ECONOMIC SUB-REGIONS"

Jones, Joe. H., Data Processing and Quantitative Analysis, University of Arkansas, Fayetteville, 72702, USA

Additive sub-state models have been designed as a set of discrete models of employment and income for each county in Arkansas. Each model defines an export base driven by employment series from a state econometric model with county income measures derived from county employment and state personal income series. On execution, the individual county employment and income series are adjusted proportionally to state control totals. For regions designated by the analyst at execution time, model routines aggregate the county forecasts into regional forecasts by variable planning districts. The aggregation algorithm is adaptive to any level of detail available for any combination of counties and preserves the maximum information for each region uniquely.

"STATISTICAL EVALUATION OF RESPONSE SURFACES IN THE CHARACTERIZATION OF TARIFF-DERIVED COSTS TO DESTINATION POINTS IN THE STATE OF MICHIGAN: A CASE STUDY"

Smith, Alan D., Robert Morris College, Corapolis, PA, 15108, USA

The present study is based on three-dimensional modeling, spatial or geographic analysis, via hypothesis testing and model comparisons of polynomial trend-surfaces, of costs in dollars for 100 pound shipments in commodity clases 77.5 and 100, and the differences between them. The origin or plant location is Richmond, Kentucky for illustrative purposes, to selected destination or warehouse points in the state of Michigan. Statistically significant and predictive trends were established on the geographic coordinates, with explained variances (R2s) of spatial-oriented transportation costs in Michigan over 97 percent.

"FAIRFAX COUNTY REVENUE FORECASTING PROGRAM"

Helmich, Judith F., Von Kahle, Anne-Marie, G., Fairfax County Office of Research and Statistics, Fairfax, Virginia, USA

Fairfax County has developed an interagency approach to revenue forecasting which integrates statistical analysis data on economic trends, and expert judgment to forecast tax revenue. The hallmark of the approach used by Fairfax County is its combination of the objective results of statistical models with the subjective judgment of senior County officials. This paper focuses on the development of revenue forecasting committee which evaluates ARIMA and multiple regression models in light of changing economic and demographic trends.

STUDIO

FINANCIAL FORECASTING I

Chair: Cheng, Thomas, McGill University, Faculty of Management, 1001 Sherbrooke St. West, Montreal, Quebec, H3A 1G5, CANADA

"A SIMULATION CASE FOR EDUCATING CREDIT UNION MANAGERS IN THE USE OF FINANCIAL FORECASTS"

O'Brien, J.A., Olson Research Associates, Inc., 6305 Ivy Lane, Greenbelt, Maryland, 20770, USA

The paper describes a computer based credit union simulation case that has been used successfully for educating credit union managers in the use of financial forecasts. The case helps educate managers in the use of forecasts for 1) analyzing the actual performance of a credit union 2) identifying key financial factors for decision-making and 3) making decisions affecting future earnings, growth, liquidity, and reserves. The impact of the decisions is shown through financial reports. Performance is evaluated with a score and ranking for each of the participants. Thus, managers can learn how to use forecasts without the real-world time or costs.

"STATIC AND DYNAMIC FORECASTING OF MONEY BALANCES WITH A WEEKLY DEMAND FOR MONEY MODEL"

Simos, E.O., Yenigan, D., University of New Hampshire, McConnell Hall, Durham, New Hampshire, 03824, USA

Static and dynamic out-of-sample quarterly simulations of the demand for money have indicated a considerable degree of instability creating the so-called "missing money puzzle". Because of the importance that the weekly money supply has on the financial markets, in this study a weekly demand for money model for the U.S. is estimated and both static and dynamic forecasts are generated and evaluated. The functional form is similar to that of the conventional models with an income constraint created from weekly production and labor market statistics in the form of a weekly coincident indicator.

"FORECASTING CORPORATE PERFORMANCE: MANAGEMENT PRACTICES AND POLICIES VERSUS FINANCIAL MEASURES"

Gillingham, D.W., Zinger, T., School of Commerce and Administration, Laurentian University, Sudbury, Ontario, P3E 2C6, CANADA

This paper will present preliminary results from a study of thirty-four Canadian companies. Some traditional financial measures will be compared to a set of managerial attributes to determine whether the latter can provide better insights into corporate financial performance and improved forecasts. Partial managerial attribute profiles will be provided together with key financial ratios. The methodology will be based on earlier pilot studies conducted in the United Kingdom and Canada.

"NEW TOOLS FOR MANAGING PRICE RISK"

Kawaller, Ira G., Chicago Mercantile Exchange, 67 Wall Street, New York, New York, 10005, USA

1984 marked an important transition year for financial managers dealing with any of the following: interest rate exposure, risk of foreign exchange rate fluctuations, and uncertainty of equity values. During that year, new hedging and speculative instruments were introduced by a variety of futures and option exchanges - instruments that give financial managers tools that afford greater flexibility and opportunity in the problem of managing financial risk. This paper exames one of the newest of these options - the option on the eurodollar futures contract, trading at the Chicago Mercantile Exchange. The discussion explains how these contracts can be used to offset the interest rate risk faced by financial managers. These tools allow managers to hedge this exposure or, alternatively, to assume risk for the purpose of generating profits (hopefully). In addition, the article will clarify the distinction between futures and option contracts and compare and contrast the two related instruments.

ETUDE

BUSINESS STRATEGY, VISION OR MANOEUVRABILITY

Chair: Fitzgerald, Paddy, Dept. of Business Management, Brighton Polytechnic, Moulsecoomb Brighton BN2 4AT, ENGLAND

"STREAM SESSION: BUSINESS STRATEGY, VISION OR MANOEUVRABILITY"
Fitzgerald, Paddy, Dept. of Business Management, Brighton Polytechnic, Mousecoomb Brighton BN24AY, ENGLAND

While this may seem a mere restatement of the debate between forecasting accuracy and forecasting horizon on the one hand, and methods designed to obviate such needs, there is an extra dimension created by the increasing rate of change and the interaction of this with the response time of an organization. Placing this in the context of business strategy points up the issues to be explored and the orientation required.

"MONITORING FINANCIAL RESULTS: VAGARIES IN INTERNAL FUNDING AND R & D MANAGEMENT"
Wilson, Timothy L., Donaldson Brown Professor of Business, Lynchburg College, Lynchburg, Virginia, 24501, USA

The production of U.S. industrial goods tend to be cyclical, and sales cycle analysis has been useful in not only gearing suppliers' production and inventory into users' business cycles, but also in guiding plant expansion and personnel management. R&D management, however, has not been impacted by cycle analysis, other than to target new product introductions, because inadequate information exists to forecast the cycles of new products. Nevertheless, cycle analysis can play a role in R&D management. The availability of internal funding, which supports much of U.S. industrial development, is associated with the overall business performance of the firm. Because the business cycle reflects performance, use of the cycle as a forecasting tool is warranted and can be used to direct personnel deployment and program strategies. Applications during the six stages of the cycle are discussed.

"CONSULTING TO MINORITY BUSINESS"
Spain, Michelle Ingram, Case Western Reserve University, Euclid Avenue, Cleveland, Ohio, 44105, USA

This paper describes a dilemma with which the owners and operators of many minority businesses are currently struggling and some of the factors affecting their choice behavior as they endeavor to choose the best direction for their business. The minority entrepreneurs who will be described have an opportunity to grow and expand by using various programs created by government agencies and majority businesses to aid minority businesses. The dilemma which they face is the choice between utilizing these external sources for rapid growth and expansion or bypassing these particular options and going through more conventional patterns of growth.

"FORECASTING NEW ORDERS AND PROFITS FOR HIGH TECHNOLOGY FIRMS: TECHNIQUES AND PROBLEMS"
O'Clock, George D., Anderson, Jim, Dept. of Physics and Engineering, Mankato State University, Mankato Minnesota, 56001, USA
Desai, Nainesh, Dept. of Business Administration, Mankato State University, Mankato, Minnesota, 56001, USA

One of the most difficult problems involved in forecasting performance for many business firms is to break their habit of basing the forecast on need rather than actual economic conditions, the marketplace and competitive posture. Management may have difficulties accepting the fact that the firm's performance is highly dependent upon the external business and economic climate. This may seem to indicate a lack of control. However, if this premise is acceptable, a simple weighted average forecasting technique that combines business and economic indicators, past performance and business base can provide fairly accurate near-term forecasting for certain corporate performance parameters.

VILLE MARIE

DEMOGRAPHIC AND SOCIAL FORECASTING

Chair: George, M.V., Demography Division, Statistics Canada, Ottawa, Ontario, K1A 0T6, CANADA

"SOCIAL FORECASTING: ITS IMPORTANCE TO STRATEGIC PLANNING"
Boshoff, Hentie, Potchefstroom University, Institute for Future Studies, Potchefstroom 2520, SOUTH AFRICA

Many forecasters view economic or technological forecasting in isolation from social change. The dynamics of social change today make such an approach impossible. This search for self-fulfilment discards many of the traditional rules of human conduct. My paper will deal in the first place with business examples in this respect. The second (and major) part will deal with a developed model 1) that relates random social change to different mindsets of people, 2) how this can be used in social forecasting and its interaction with economic change, and 3) how this concept can be integrated into strategic planning.

"MONTE CARLO METHODS IN POPULATION FORECASTING"
Pflaumer, Peter, Universitat Dortmund Abteilung Statistik, Postfach 500500, D-4600 DORTMUND 50 F.R.G.

A simulation model for projecting human population is considered. This model includes the idea that the elements of the transition (Leslie) matrices are random variables. Monte Carlo methods are used to estimate expected values, variances and confidence intervals for future populations by empirical procedures rather than by theoretical analysis. In order to carry out the projections, subjective distributions for the input variables (fertility, mortality and migration rates) have to be specified. Using data of the United States, confidence intervals of total populations from 1990 to 2050 are presented.

"SYSTEM APPROACH TO CONTINUOUS FORECASTING ACTIVITY AS AN INTEGRAL PART OF NATIONAL SCIENCE-POLICY MAKING"
Sulc, Ota, Head Dept. of Forecasting, Ceskoslovenska Adademie Ved Ustar Pro Filosofii a Sociologii, Jelska 1 110 00 Praha, 1 CZECHOSLOVAKIA

The national science-policy making process can be considered as a system if its elements are interrelated in time and if their pattern is integrated into a coherent whole through some basic, general criterion. Complex social economic objectives of basic national needs constitute the criterion optimizing the behaviour of science-policy system. In the cybernetic model of national R and D systems recommended to all UN member countries by UNESCO the main links between Science and Technology complex and national development are represented by a simple feed-back loop between national R and D objectives. The purpose of this paper is to review this model.

"CROSS-VALIDATION TECHNIQUES TO ESTABLISH EXTENT OF CONCURRENT VALIDITY FOR DISCRIMINANT MARKETING-RESEARCH SURVEYS"
Smith, Alan D., Robert Morris College, Coraopolis, PA, 18108, USA

Concurrent validity is an important component in determining criterion-related validity for surveys. Many disciplines such as geography and other social sciences, derive much data from survey research and validity measures of this research are needed in order to correctly infer from the survey results. A common problem in most marketing surveys is missing or incomplete items on questionnaires and the initial and resultant selection bias in the distribution of the questionaires. Cross-validation techniques in this study were applied to respondents and nonrespondents. Sixteen demographic and product related independent variables were initially used to determine the sampling from the marketing research survey. Multiple linear regression (MLR) techniques to complete hypothesis -testing procedures between survey nonrespondents and respondents on: 1) the total sample, 2) two separate randomized subsamples and 3) cross-validation through the regression equation determined in the first subsample applied to members of the second subsample. The results of the cross-validation procedure allowed the author to conclude a general lack of concurrent validity based on the instability of the regression weights, as indicated by the discrepancy in R2 values among the models.

HOSPITALITY

EXCHANGE RATE FORECASTING III

Chair: Alexander, Don, Citibank, N.A., 399 Park Avenue, New York, New York, 10043, USA
Baille, Richard T., Univ. of Birmingham, Dept. of Economics, P.O. Box 363, Birmingham, UK B15 2TT

"EFFICIENCY TESTS IN THE FOREIGN EXCHANGE MARKET"
Adams, Charles, Boyer, Russell S., University of Western Ontario, Dept. of Economics, Social Science Center, London, Ontario N6A 5C2

This paper presents a simple monetary model of exchange rate determination. Since the model has no intrinsic dynamics, the intertemporal behavior of exchange rates, spot and forward, depends entirely upon the time processes of the exogenous variables. For typical values of interest elasticities of money demand, only if all shocks are permanent do exchange rates follow random walks. This suggests that a simple monetary model is an inappropriate specification of aset markets. Instead models which focus on the choice of currency of denomination deserve greater attention.

"THE REAL INTEREST RATE DIFFERENTIAL THEORY RE-EXAMINED"
Amsler, Christine, Michigan State University, Dept. of Economics, Marshall Hall, East Lansing, Michigan, USA 48824

Abstract to be supplied

"DOLLAR DEPRECIATION AND LDC TERM OF TRADE, THREE SCENARIOS"
Mann, Catherine, Division of Internal Finance, Board of Governors of the Federal Reserve System, Washington, D.C., USA 20551

Abstract to be supplied

"DEUTSCHEMARK-DOLLAR EXCHANGE RATE: AN EMPIRICAL INVESTIGATION 1974-1984"
Ormerod, Paul, Hoggarth, Glenn, The Henley Center for Forecasting, 2 Tudor Street, Blackfriars, London EC4 Y0AA

Abstract to be supplied

GALERIE 2

UNCERTAINTY IN FORECASTING WITH ECONOMETRIC MODELS

Chair: Calzolari, Giorgio, Centro Scientifico IBM, Via S. Maria 67, 56100 Pisa, Pisa ITALY

"MEASURING FORECAST UNCERTAINTY IN A MACRO MODEL OF THE FRENCH ECONOMY"

Calzolari, Giorgio, Bianchi, Carlo, Centro Scientifico IBM, Via S. Maria 67, 56100 Pisa, Pisa ITALY
Brillet, Jean-Louis, Service des Programmes, INSEE, 19 Boul. Adolphe Pinard, 75675 Paris Cedex 14, FRANCE

Bootstrap, analytic simulation on coefficients, Monte Carlo on coefficients, parametric stochastic simulation and re-estimation: four alternative techniques have been applied to measure the degree of uncertainty associated with the forecasts produced by a macro-model of the French economy, the Mini-DMS developed at INSEE. Due to the complexity and to the size of the model (more than 200 equations), several technical problems had to be solved. The remarkable convergence of results which has been obtained for all the main endogenous variables suggests that forecast confidence intervals are likely to be quite reliable for this model.

"MULTIVARIATE PREDICTIONS FROM STRUCTURAL ECONOMETRIC MODELS WITH COVARIANCE RESTRICTIONS"

Friedman, Ralph, University of Bielefeld, Faculty of Economics, P.O. Box 8640, D-4800 Bielefeld, Fed. Rep. of GERMANY

Reduced form estimation and conditional prediction of the values of the endogenous variables of a linear simultaneous econometric model is studied, where some or all of the covariances of the structural disturbances are restricted to zero. The paper presents an instrumental variable estimator of the structural parameters and the corresponding derived reduced form estimator. Applying Monte Carlo simulation the predictive performance of the proposed instrumental variable estimator is compared with the method of 2SLS, 3SLS, and the simple regression of the endogenous variables on the exogenous variables.

"ON THE PREDICTIVE EFFICIENCY IN SIMULTANEOUS EQUATION MODELS: A SIMULATION STUDY"

Naini, Abbas, Dept. of Economics, Energy Resources Conservation Board, 640 Fifth Avenue S.W., Calgary, Alberta, T2P 3G4, CANADA

The purpose of this paper is to address the question of choice between the reduced form and structural equations for the purpose of prediction in simultaneous equation models. With respect to the fact that we usually prefer predictions with smaller variances, we propose a simple empirical way of estimating the variances of prediction errors resulting from these two alternatives, using dummy variables. Accordingly, these estimated variances can be used as appropriate criteria to answer the question of whether the reduced-form equations or the structural equations would be more appropriate for prediction.

"EIGENVALUE ANALYSIS IN DYNAMIC ECONOMETRIC MODELS"

Schoonbeek, Lambert, Institute of Econometrics, University of Groningen, P.O. Box 800, 9700 AV Groningen, THE NETHERLANDS

In this paper we examine techniques which can be helpful in the evaluation of the inherent dynamic properties of a simultaneous dynamic econometric model. As is known, such dynamics depend on the solution of an eigenvalue problem associated to the model. Particularly, we discuss the related questions whether we can i) attached an economically meaningful interpretation to essential eigenvalues and eigenvectors ii) simplify a model dynamically by deleting a number of variables. As an example we evaluate the Grecon-model, a Dutch forecasting model. We succeed in identifying a submodel, pertaining to essential eigenvalues, that can be interpreted in terms of a price-wage spiral.

GALERIE 3

FORECASTING BUSINESS FAILURES

Chair: Betts, J. Faculty of Business Admin, Memorial University, St. John's, Newfoundland, A1B 3X5 CANADA

"FINANCIAL RATIOS DISCRIMINANT ANALYSIS APPLIED TO FORECASTING INSOLVENCY AND INTERNAL/OPERATIONAL AUDITING USING AN INTERACTIVE ONLINE MICROCOMPUTER SOFTWARE SYSTEM"

Rushinek, Abi, University of Miami, School of Business Administration, Dept. of Accounting, P.O. Box 248031, Coral Cables, Florida, 33124, USA

The purpose of this study is to explore the feasability of using financial ratios as an analytical technique, in order to predict financial insolvency, within a 3 year period of time. A brief review of the development of traditional ratio analysis as a technique for investigating company performance is presented. The results of this study revealed that 80% of the cases were correctly predicted by this model. Moreover, this study explores the application of financial ratios discriminant analysis not only to forecasting insolvency, but also to internal/-operational auditing of existing loan portfolio and their loan officers by using a microcomputer.

"CORPORATE FAILURE FORECAST WITH SINGAPORE DATA"

Phong, Ta Huu, National University of Singapore, School of Management, Kent Ridge 0511, SINGAPORE
Huang, Seah Lee, City Securities, SINGAPORE

The aims of the paper are to construct a failure prediction model for corporate enterprises in Singapore, and to test the predictive ability of their financial statement information, using the Altman's framework. The implications and applications of the model for providing signals to possible financial problems in firms are very useful for investors and creditors. This is especially true for a small open economy. Results of forecast of up to two years are reported.

"MODELS OF PREDICTING FAILING SAVINGS AND LOANS IN THE UNITED STATES"

Cassidy, Henry J., King, Thomas, Wang, George H.K., Federal Home Loan Mortgage Corporation and Federal Home Loan Bank Board, Washington, D.C., 20552, USA

In the volatile financial environment of 1980s, the number of failures of savings and loans has reached an alarming rate. The purpose of this paper is to develop an early warning system to detect the "potential failures" of S&L's from six months to one-year lead time. Both multinomial logit and linear probability models are used to estimate the models. Financial ratios from semiannual balance sheets and income statements are used as selected independent variables.

"SOME PROBLEMS IN THE BEHAVIOR OF MODELS USED TO IDENTIFY COMPANIES IN DANGER OF FINANCIAL FAILURE

Betts, J., Faculty of Business Admin., Memorial University of Newfoundland, St. John's, Newfoundland, A1B 3X5, CANADA
Belhoul, D., School of Industrial Technology, Unviersity of Bradford, ENGLAND

Models have been developed to identify companies in danger of financial failure. They have been constructed by applying multiple discriminant analysis to financial variables which have been computed from historical accounting data of a set of failed companies and a set of going concerns. Usually these models have performed excellently in classifying companies whose data has been used in their construction, but less well when applied to validation sets.

GALERIE 4

MODELLING AND PREDICTION OF TIME SERIES

Chair: Ljung, Greta M, School of Management, Boston University, 704 Commonwealth Avenue, Boston, Massachusetts, 02215 USA

"DETERMINING A MODEL PORTFOLIO IN LINEAR TIME SERIES"

Poskitt, D.S., Tremayne, A.R., Dept. of Economics and Related Studies, University of York, Heslington, York YO1 5DD

The paper discusses a means of applying selection criteria to the problem of order determination in linear time series models in a less mechanistic fashion than is often found currently. This is achieved through a consideration of posterior odds ratios and by applying concepts of grades of evidence advanced by Jeffreys. It is shown how alternative specifications may be compared with one another and this leads to the development of a practical method for determining a portfolio of different models, each of which may be regarded as reasonable for the data set at hand. To complement the theory, some simulation experiments are reported to illustrate the practical efficacy of the procedure.

"SEASONAL ECONOMIC TIME SERIES FORECASTING USING PERIODIC CORRELATION"

McLeod, A. Ian, Dept. of Statistical and Actuarial Sciences, The University of Western Ontario, London, Ontario CANADA
Hipel, Keith W., Dept. of Systems Design Engineering, University of Waterloo, Waterloo, Ontario, CANADA

Periodic autocorrelation can often be detected in the residuals of seasonal ARIMA models fitted to monthly economic time series. Modelling these residuals using periodic autoregression results in improved forecasts for certain months. A case study using the monthly Canadian CPI is presented to illustrate the methodology.

"A FACTOR DECOMPOSITION OF VECTOR ARMA PROCESSES"

Pena, Daniel, Universided Politecnica de Madrid, SPAIN

This paper shows how to decompose a vector ARMA process in its components. The number of factors is identified and a canonical transformation is presented to recover such factors. The advantage of the proposed decomposition to understand the dynamic structure and to forecast a multivariate ARMA process is stressed. Several examples will be given.

"A COMPARATIVE STUDY OF SOME DIAGNOSTIC TESTS FOR ARIMA MODELS"

Ljung, Greta, School of Management, Boston University, 704 Commonwealth Avenue, Boston, Massachusetts, 02215, USA

This paper examines by simulation the properties of some test procedures commonly used for checking the adequacy of a fitted ARIMA model. The tests considered include tests based on the autocorrelations of the residuals and the score or Lagrange multiplier procedure. Attention is given to the performance of the tests for short time series and for time series with non-normal error terms.

DULUTH

SCENARIO ANALYSIS AS A FORECASTING AND PLANNING TOOL

Chair: Schnaars, Steven P., Dept. of Marketing, Baruch College, 17 Lexington Avenue, New York, New York, 10010, USA

"AN EMPIRICAL TEST OF THE RELATIVE MERITS OF SCENARIOS"

Schnaars, Steven P., Dept. of Marketing, Baruch College, 17 Lexington Avenue, New York, New York, 10010, USA
Topol, Martin T., Lubin Graduate School of Business, Pace University, New York, New York, 10038, USA

The purported advantages of scenarios are that they enable the forecaster and planner to consider events that have no historical precedent and further, that scenarios promote contingency planning. An empirical study will be presented comparing the outcomes of judgmental forecasts based upon quantitative, historical data with forecasts based upon a set of qualitative, forward-looking scenarios developed from the same historical data. As such, this tests whether the advantages noted above are realized. Respondents' reactions to the difference between their forecast and the actual outcomes will be discussed. Finally, an up-to-date, partially annotated bibliography on scenarios supplements this research report.

"SCENARIO CONSTRUCTION: BEHAVIORAL AND METHODOLOGICAL ASPECTS"

Schoemaker, Paul J.H., Graduate School of Business, University of Chicago, Chicago, Illinois, 60637, USA

How do scenarios affect our thinking, especially our beliefs? Does it matter if they are self-constructed or developed by others? Does it help to construct scenarios by imaging oneself as being in the future and looking back? If so, why? This presentation attempts to answer the above questions by examining some recent empirical evidence as well as insights from cognitive psychology. Some new hypotheses will be advanced based on the limited understanding gained so far. Finally, some implications will be discussed regarding the construction of scenarios. The methodological part will concern both cognitive and organizational issues.

"USING SCENARIOS FOR STRATEGIC DECISION MAKING AND PLANNING"

Klein, Harold E., Linneman, Robert E., Temple University, Philadelphia, Pennsylvania, 19122, USA

The scenario approach has emerged as the most widely used vehicle for futures forecasting after trend extrapolation and brainstorming. The rapid acceptance over the last decade of this conjectural/judgemental approach is undoubtedly related to the turbulence of the corporate environment. no one scenario generating technique or methodology has emerged as particularly favored over others; nor has there been much success generally in integrating the approach into corporate planning processes. The appropriate type of environmental scenario to be generated should be related to the decision/planning task and company structure - if it to be used effectively. A classification of scenario types along with their relevance for different planning situations is presented. Some key results are presented of an international study of corporate experience with environmental scenarios for planning along with recommendations for scenario generated procedures to improve their utility.

"GENERATING SCENARIO STRUCTURES WITH DIRECT RELEVANCE FOR STRATEGIC DECISION MAKING"

Klein, Harold E., Temple University, Philadelphia, Pennsylvania 19122, USA

Scenario writers and futurists generally have concentrated on the development of sophisticated (often exotic) scenario-generating procedures and on elaborating dramatic "futures", not paying much attention to why their efforts were commissioned in the first place. The "relevance" of scenarios for strategic decision-making is often obscure, necessitating a "selling job" by forecasters/planners to line management. A procedure is described for specifying compelx scenario-structures by their impacts on strategic decision issues. A technique for "environmental partitioning" is employed for segmenting subsystems of environmental variables and interrelationships according to their common impacts on sets of corporate strategic issues (themselves clustered according to teh similarity of their relevant environment). The resulting environmental structures are evoked through visual block flow diagrams easily understood by management. These serve as guides for subsequent scenario-writing.

SAINT-CHARLES

TRAVEL DEMAND FORECASTING

Chair: Cheung, Hym-Kwai, Statistic & Forecast Branch, Air Administration, Transport Canada, Place de Ville, Ottawa, Ontario, K1A ON8, CANADA

"FORECASTING VEHICLE HOLDINGS AND USAGE: A CASE STUDY"

Berkowitz, M.K., Galline, Nancy T., Miller Eric J., Department of Economics, University of Toronto, Ontario CANADA

Wolfe, Robert A., Dept. of Civil Engineering, University of Toronto, Toronto, Ontario, M5S 1A4, CANADA

A wide range of issues exist with respect to the use of disaggregate travel demand models to generate policy-relevant forecasts. These issues include: the generation of the explanatory variables required as "input" in the model; the treatment of uncertainty within the forecasting process; the treatment of time over the forecast period; the aggregation procedure to be used; and the presentation of the forecast in a form which is readily usable by decision-makers. The proposed paper deals with each of these issues in both theoretical and practical terms.

"INTERCITY PASSENGER TRAVEL MARKET SHARES"

Wills, Michael, Canadian Marine Transportation Center, Dalhousie University, Halifax, Nova Scotia, B3H 3G5, CANADA

We consider the problem of forecasting intercity passenger travel market shares by mode of travel. In its most general form, the problem may involve multiple time-series and cross-sections for each of observed market shares and explanatory variables where the series are systematically interrelated. This paper examines a structural market share model which allows for an extensive variety of reasonable market responses. It may be estimated on time-series and/or cross-sectional data and allows for the calculation of own- and cross-elasticities.

"A MODEL FOR FORECASTING AIR PASSENGER AGGREGATE DEMAND"

Cheung, Hym K., Statistics and Forecasts Branch, Air Admin., Transport Canada, Ottawa, Ontario, K1A ON8 CANADA

This paper presents an econometric model for forecasting the total enplaned and deplaned air passengers for the Top 30 airports in Canada. Using the ratio of gross national product to airline yield and consumer expectation of the economy as regressors, the author was able to find an excellent fit to the historical data. The model has been applied successfully in a major forecasting exercise.

"FORECASTING THE IMPACT OF HIGH SPEED RAIL SERVICES IN THE WINDSOR-QUEBEC CITY CORRIDOR - THE SIGNALS MODEL"

Brocklebank, Peter, Consultant, Transmark, P.O. Box 8116, Station A, Montreal, Quebec, H3N 3N3, CANADA

This paper describes the forecasting procedure adapted by TRANSMARK, as consultants to Via Rail Canada to estimate the impact upon rail demand of five investment options ranging from a modest improvement to existing services to the most advance system foreseeable, MAGLEV. SIGNALS is a disaggregate, multi-modal inter-city demand forecasting model calibrated on a 1980 cross-sectional database.

MATAPEDIA

FORECASTING IN MARKETING I

Chair: Darmon, Rene Y., Faculty of Management, Samuel Bronfman Building, McGill University, Montreal, Quebec, H3A 1G5 CANADA

"A SIMPLE APPROACH TO FORECASTING MARKET SHARES FOLLOWING ECONOMIC SHOCKS"
Laroche, Michel, Concordia University, Montreal, Quebec, CANADA

This paper reports a simple method developed by the author for the Canadian bedsheet market and explaining the market share behaviour of the two principal firms, Dominion Textiles and Wabasco. The objective of the study was to estimate the effects on market shares of negative publicity about one of the competitor's sheets and to take into account major economic shocks such as strikes and fire. It was found that a simple exponential function satisfactorily explained the behaviour of market shares right after the economic shocks occurred.

"COMPETITIVENESS ANALYSIS FOR MARKETING STRATEGY FORMULATING"
Oral, Muhittin, Faculte des Sciences de l'Administration, Universite Laval, Ste Foy, Quebec, G1K 7P4, CANADA

An industrial competitiveness model is employed to study the market position of the firm vis-a-vis its competitors. Two types of analysis, market oriented and competitor-oriented, are performed in order to identify the firm's relative strengths and weaknesses. Based on this evaluation, global strategies as to the (i) priorities to be given to each market, (ii) degree of attention to be paid to each important competitor, (iii) levels of cost leadership and product differentiation to be sought for. Also discussed is the linkage between marketing strategy and manufacturing strategy in terms of long range planning.

"SHORT TERM FORECASTING OF SERVICES DEMAND"
Calantone, R., University of Central Florida, Florida, USA

This paper will evaluate various forecasting methods available for the case of demand for various perishable service facilities. The most notable cases are those of athletic events, hotel rooms and tourist attractions. Simple guessing has often rivalled very sophisticated methods with respect to forecast accuracy. Furthermore, last minute marketing efforts such as advertising, coupon or a price cutting as well as natural obstacles such as snow storms etc. can make these forecasts perilous. Several examples will be examined.

"FORECASTING CUSTOMER NEEDS FOR TELECOMMUNICATIONS SERVICES"
Bourgeois, Jacques, Currie, Coopers & Lybrand, 630 Dorchester West, Montreal, Quebec, H3B 1W5, CANADA

This study is concerned with forecasting customer needs for telephone and television services. A methodology and findings are produced which yield an optimal service attribute mix. Further analysis reveals two turning points as to potential alternative service mixes beyond which services can be categorized into low risk undertakings.

CHAUDIERE

LONG-RANGE NATIONAL MANPOWER

Chair: Reisman, Arnold, Operations Research, Case Western Reserve University, Cleveland, Ohio, 44106, USA

"SOME COMMENTS ON MANPOWER FORECASTING: CAN 20/20 HINDSIGHT REGARDING PROJECTIONS OF PH.D PRODUCTION IN THE 1970'S HELP US IN FUTURE EFFORTS"

Pollack-Johnson, Bruce, Oberlin College, Oberlin, Ohio, 44074, USA

In the early 1970's, a number of studies were undertaken to project the production of Ph.D. degrees in the United States for the period 1971-1980. Knowing the actual statistics now, an interesting pattern stands out; all of the projections exceeded the true value. In this paper, we examine some possible reasons for this consistent bias, and make suggestions about how we might be able to improve manpower forecasting in the future by trying to avoid some of the mistakes made in the studies examined in a way that is general enough to apply to other time periods and manpower categories.

"SCENARIOS OF ONTARIO'S SCHOOL SYSTEM TWENTY YEARS HENCE"

Kruss, Peeter, Technology, Society, Environment Studies, Carleton University, Ottawa, Ontario, K1S 5B6, CANADA

The aims, methodologies used and results of a forecasting study done for the Ontario Ministry of Education will be discussed. The project involved developing five scenarios of Ontario's school system in the year 2003 based on different societal, economic and technical trends: (i) current trends, (ii) specialization, (iii) diversification, (iv) polarization, (v) a Swedish model.

"ON THE VOIDS IN U.S. NATIONAL EDUCATION STATISTICS"

Reisman, A., Ritchken, P.H., Pollack-Johnson, B., Dean, B.V., Escueta, E.S., Li, G., Operations Research, Case Western Reserve University, Cleveland, Ohio, 44106, USA

Forecasting the supply and demand of highly trained human resources at the national level must recognize people flows through a pipeline which starts at the kindergarten and ends in higher education. The "upper" reaches of this pipeline exhibit many branches and even some feedback loops. Network models used in such forecasting require people flow data in addition to many socioeconomic and political considerations. This paper, using a system approach, points out the voids in the U.S. national educational statistics.

"FORECASTING FLOWS IN AN EDUCATIONAL NETWORK: PUSH VS. PULL MODELS"

Reisman, A., Ritchken, P.H., Pollack-Johnson, B., Dean, B.V., Cherikh, Moula, Operations Research, Case Western University, Cleveland, Ohio, 44106, USA

In many network flow models, the lower echelons can be modeled by push (Markovian) methods, while the upper levels require pull (Renewal) methods. The distinction between push and pull flows is often not clear-cut. In view of daa limitations, regressions based models are often used for predicting the outputs at particular nodes. This paper discusses forecasting models which estimate flow at a variety of nodes.

MACKENZIE

FORECASTING WITH LEADING INDICTORS

Chair: Holmes, Richard A., Simon Fraser University, Faculty of Business Administration, Burnaby, B.C. V5A 1S6, CANADA

"SIX AND TWELVE MONTH FORECASTS OF BRITISH COLUMBIA INDUSTRIAL EMPLOYMENT"

Holmes, Richard A., Simon Fraser University, Faculty of Business Administration, Burnaby, B.C. V5A 1S6, CANADA

This paper proposes the use of an employment forecasting model using a leading indicator tailored to the series being forecast in transfer function and decomposition models. The idea of tailoring the leading indicator to the series being forecast is new and our methodology for doing so is described in detail. Our results show that the optimal weighing scheme for the leading indicator varies with the length of the forecast. The leading indicators obtained are employed in decomposition and transfer function models and the methodology is illustrated with some real-world applications. Comparisons of accuracy are made between the tailored leading indicators and a national leading indicator and between the decomposition and transfer function models.

"A PLANNING STRATEGY FOR TELECOMMUNICATIONS DEMAND-THE APPLICATION OF AN INDEX OF ECONOMIC LEADING INDICATORS"

Defris, Lorraine V., Manager, Demand Forecasting, Planning Branch, OTC Australia, 32-36 Martin Place, P.O. Box 7000, Sydney, Australia, 2001

Layton, Allan P., Zehnwirth, Ben, Macquarie University, School of Economic & Financial Study, North Ryde, New South Wales 2113

The purpose of this paper is to determine an index of leading indicators of telecommunications traffic with a view to providing management with early warning of imminent turning points in demand and revenue. A feature of telecommunications traffic is that it is cyclical and responds to local and international economic fluctuations. Traffic series under consideration are: Outgoing business telephones, social telephones, and telex. The data consists of monthly observations spanning the period 1965-1984. An index of economic leading indicators using the NBER method has been constructed for the Australian economy. The response of the telecommunications traffic to this index is analysed using cross-spectral techniques. This approach is particularly useful in this case since the strength of the association between the traffic series and the index may be expected to vary across cycle lengths. This methodology does not appear to have been previously applied to the telecommunications field.

"A CROSS SPECTRAL AND CAUSALITY ANALYSIS OF AUSTRALIA'S GROWTH CYCLE USING AN INDEX OF LEADING INDICATORS"

Layton, Allan P., Macquarie University, School of Economic and Financial Studies, New South Wales 2113

Using the methodology of the National Bureau of Economic Research, Boehm and Moore have recently constructed leading and coincident indexes of Australian cyclical economic growth and carried out a non-statistical evaluation of the reliability of the leading index in anticipating turning points in the coincident series. The present paper extends this work by investigating the coherence between these two measures of economic activity at different cycle-lengths using the technique of cross-spectral analysis. Additionally, a dynamic regression model, reading the leading index as input, was identified, estimated and diagnostically checked following the procedures of Haugh and Box. Finally, a Granger causality analysis supported the existence of unidirectional causality from the leading to the coincident index. The lag involved was found to be five months. These findings provide further, more exhaustive evidence that the constructed index of leading indicators systematically anticipates future fluctuations in aggregate Australian economic activity.

SAGUENAY

APPLICATIONS OF KALMAN FILTER

Chair: **Meade, Nigel**, Dept. of Management Science, Imperial College, University of London, Exhibition Road, London, SW7 2BX, U.K.

"FORECASTING AN IRREGULARLY OBSERVED FLOW SERIES - A STUDY IN FORECASTING APPLIED TO PHYSICAL DISTRIBUTION"
Meade, Nigel, Dept. of Management Science, Imperial College, University of London, Exhibition Road, London, SW7 2BX, U.K.

Customers consume a product stored at their location in a tank, the supplier's objective is to visit the customer as infrequently as possible subject to a satisfactory level of service. The objective of this exercise is to forecast the average daily usage of the product by the customer. The data available are the amounts used over a series of irregular intervals obtained at each delivery. A number of approaches are examined using the Kalman filter and a Bayesian method. The yardstick for success is to significantly outperform the current practice of a four delivery simple moving average.

"A STOCHASTIC FILTERING APPROACH FOR SEASONAL TIME SERIES FORECASTING"
Sastri, T., Texas A & M University, Industrial Engineering Dept., College Station, Texas, 77843, USA

This paper presents a practical application of the Kalman filter to forecasting of seasonal time series. The stochastic model for which the recursive forecast is optimal, is a member of a class of seasonal ARIMA processes. A state-space counterpart of the model, the corresponding filtering algorithm, and a proposed method for starting up the filter are given. The transient and steady-state characteristics of the filter are discussed. Forecasting performances of the recursive filter are demonstrated by means of an empirical analysis. The results clearly show the exceptional ability of the filter to produce unbiased forecast values and white-noise residuals, which are comparable to the Box-Jenkins' results. Other advantages of the filtering approach are the ease of initializing the filter, and its being relatively insensitive to variations in the algorithmic starting values.

"DETECTION OF EPIDEMICS AND ESTIMATION OF THE IMPACT ON INFLUENZA MORTALITY"
Crawford, Melba, University of Texas at Austin, College of Engineering, Dept. of Mechanical Engineering, Austin, Texas, 78712, USA

A Kalman filter is utilized to track influenza mortality series and estimate changes in level associated with epidemics. A two-stage bootstrap estimation procedure is utilized to determine the unknown elements of the state transition matrix while adaptive filtering is employed to estimate the covariance of the random inputs. A generalized likelihood ratio test is investigated as a means of detecting the onset and end of epidemics. Results are presented both for simulated process data and weekly data from several cities in the U.S.

"SELECTION OF FORECASTING MODELS FOR A MILITARY ENLISTMENT EARLY WARNING SYSTEM"
Goldberg, Lawrence, Greenston, Peter, Hermansen, Sigurd,, Economic Research Laboratory, 1914 Association Drive, Reston, Virginia, 22091, USA

REWS is a recruitment early warning system that runs on a standard microcomputer. Updated monthly, it monitors and forecasts enlistments into the U.S. Armed Forces, and generates a comprehensive report analyzing the status of recruiting over the next 12 months. As forecasts of enlistments are a critical component of the system, several approaches - univariate time series, ARMA regression, vector autoregressive models, and experimentation with Kalman filter techniques - were tested during the development process. This paper discusses the estimation and validation procedures used in selecting reliable forecasting models for the REWS.

YAMASKA

ADVANCED TIME SERIES METHODOLOGY

Chair: Pierre LeFrancois, Universite de Quebec a Chicoutimi, 555. boul de l'Universite, Chicoutimi, Quebec G7H 2B1, CANADA

"SOME ISSUES OF STRUCTURAL SHIFTS IN TIME SERIES AND THEIR IMPLICATIONS TO FORECASTING"

Hsu, Der-Ann, University of Wisconsin, School of Business Administration, Milwaukee, Wisconsin, 53201, USA

In this paper we discuss several important types of structural shifts in time series models and the related issues in model identification, estimation, and data selection. We further explore hints about the causes of structural shifts in relation to underlying economic or business environments using several interesting historical examples. The impacts of failing to observe and understand structural movements in time series on the reliability, trustworthiness, and quality of forecasts are illustrated using some empirical data. We conclude the paper by stressing the necessity of a broader, dynamic framework for time series analysis and forecasting in practical applications.

"ARIMA TIME SERIES MODELS: SOME ALTERNATIVE ESTIMATIONS"

McDonald, James B., Brigham Young Unviersity, Provo, Utah, 84601, USA

Maximum likelihood estimators of parameters in statistical models have desirable asymptotic properties under rather general regularity conditions. The form of the MLE of the parameters depends upon the underlying distribution. The optimality of Box-Jenkins (least squares) estimators of time series models implicitly assumes normality. An estimation technique is proposed which automatically adjusts to take account of the nature of the underlying variables and includes least squares, MAD and Lp estimators and other techniques as special cases and is MLE for a very general class of distributions. Applications will be considered.

"OPTIMAL USE OF PROVISIONAL DATA IN FORECASTING WITH DYNAMIC MODELS"

Bordignon, Silvano, Trivellato, Ugo, Dipartimento di Scienze Statistiche, Universita di Padova, Via S. Francesco, 33, Padova, 35121, ITALY

A general approach to the efficient use of data affected by measurement errors in dynamic models is given by the state space methodology and the Kalman Filter. The problem of provisional data errors is dealt with within this framework (for previous work in this area, see e.g. Howrey, 1978, and Harvey et. al, 1983). Suitable adaptations are introduced that chiefly involve the measurement equations of state space models. A fairly general observation model is specified. Some applications are finally presented, concerning: a) the monthly index of industrial production for Italy, 1973.1 - 1981.9, b) a small annual macro-economic model of the Italian economy, for the period 1961-79.

STUDIO

FINANCIAL FORECASTING II

Chair: Cheng, Thomas, McGill University, Faculty of Management, 1001 Sherbrooke St. West, Montreal, Quebec, H3A 1G5 CANADA

"FORECASTING EXPECTED RETURNS OF CANADIAN CORPORATE BONDS"

Burnie, David A., Barnes, Thomas H., Faculty of Business Administration, University of Windsor Windsor, Ontario, N9B 3P4, CANADA

The use of historical data to directly forecast expected bond returns is inappropriate due to maturity bias because of the limited life. Two methods will be used to forecast the returns; Box-Jenkins ARIMA method and GLS with correction for autocorrelation. The sample data is drawn from Canadian corporate bonds traded quarterly over the period 1978-1984. The ARIMA estimates use univariate data and the GLS uses 3 the MYW (McLeod Young Weir) Bond indeces. The autocorrelation coefficient will be estimated and the bond returns will be transformed for OLS estimation. The predicted returns will be compared against actual results using Theil's U-statistic.

"A STATISTICAL ANALYSIS OF MORTGAGE PREPAYMENT RATE"

Nguyen, Chu, The Federal Home Loan Bank of Cincinnati, 2000 Atrium Two, P.O. Box 598, Cincinnati, Ohio, 45201, USA

The prepayment rate of a pool of mortgages originated by a group of savings and loan associations in 1975-1980 is estimated, and the relationship between the prepayment rate and the characteristics of the mortgages is analyzed. The parameter of a lifetime model with time dependent hazard rate as proposed by Goldin were estimated. This estimated model is issued to forecast the cash flows from mortgage currently held by saving and loans in their portfolios.

"SELECTION AN INVESTMENT USING THE ANALYTICAL HIERARCHY PROCESS"

Bahmani, Nick, Yomoah, David, Sherman, Herbert, Bosseer, P., Montclair State College, Dept. of Finance & Quantitative Methods, Valley Road, Upper Montclair, New Jersey, USA

The purpose of the paper is to apply the Analytical Hierarchy Process model in investment selection process taking into consideration a set of investment characteristics: Liquidity, Preservation of Principle, Interest Rate, Growth Potential, Management of Funds, Tax Advantages and a set of investment alternatives: Money Market Fund, Municipal Bond Fund, Government Security Fund, Corporate Bond Fund, Balanced Fund (Blue Chips & Corp.), Blue Chip Stock, Growth Stock Fund, Speculative Stock Fund. This model employs pairwise comparisons using the subjective scale developed by Saaty for analyzing hierarchies in general. The AHP is one of several methods which can be used by decision makers to make decisions in a dynamic complex environment.

"FORECASTING WITH BIPLOT - A STATISTICAL TOOL TO DESCRIBE MARKET DYNAMICS"

Geva, David, Bankers Examiners' Department, Research Section, Bank of Israel, Jerusalem, ISRAEL

The paper analyses application of the statistical method called bi-plot to describe market dynamics. Possible markets for anlysis are the deposit money market, where the firms involved are the commercial banks, or the 'national budget market', where the agents involved are budget sectors (government ministries) and private consumers. Market dynamics analysis is important for policy makers, since it describes direction of market developments and main market competitors. The proposed method uses a data matrix, whose rows are observations over time and whose columns are market shares of the various agents. We use a two-dimensional matrix approximation, describing the market dynamics graphically. Under certain assumptions regarding (statistical) distribution of the data, the method can be used to forecast future market developments.

ETUDE

MULTIVARIATE TIME SERIES FORECASTING

Chair: Souza, Robert C., Pontificia Universidade, Dep. de Engenharia Electrica, Ruo Marques de Sao Vincente 225 Rio de Janeiro, BRASIL

"SLOW MOVING ITEMS DEMAND FORECASTING VIA BEF METHOD"

Souza, R.C., Pontificia Universidade, Dep. de Engenharia Electrica, Rue Marques de Sao Vincente 225, Rio de Janeiro, BRASIL

The problem of mean demand estimation and demand forecast for slow moving items has received very little attention in the literature. The main difficulty is related to the fact that the data is characterized by strings of zeroes followed by some sparse values for the demand. In this case, the use of conventional forecasting models which make use of the normality assumption is no longer valid. In this paper we show the use of a new method, called Bayesian Entropy Forecasting (BEF for short) for modelling the above mentioned problem. The BEF assumes that the demand follows a Geometric Poisson process while the mean demand is modelled by a Gamma process.

"FORECASTING VECTOR AUTOREGRESSIONS WITH BAYESIAN PRIORS"

Kling, John L., McIntyre School of Commerce, University of Virginia, Monroe Hall, Charlottesville, Virginia, 22903, USA

Recent evidence (Doan, Litterman, and Sims, 1984; Kling and Bessler, 1984) has shown that out-of-sample forecasts can be improved for VAR models when estimation is subject to priors on the means and standard deviations of the coefficients. The selection of priors, however, is not at all obvious and can be unmanageable unless a systematic procedure is followed. The procedure usually employed involves a grid search over a few parameters, treating each equation identically with lags on dependent variables treated symmetrically. This procedure does not seem appropriate when the different variables impact each other differently. We propose to investigate alternative ways for choosing the prior distribution and test the results out of sample with the data sets used in Kling and Bessler's previous analysis.

"THE INTEGRATION OF FORECASTING TECHNIQUES TO MANAGERIAL CONTROL AND STRATEGIC DECISION MAKING. A METHODOLOGICAL DEVELOPMENT"

Ramirez, Gabriel A., University of the Americas, Apartado Postal 457, U.D.L.A., Cholula, Pulbla, 72820, MEXICO

The paper argues that the integration of forecasting techniques to managerial control and strategic decision making can be systematically approached with the use of Dynamic Modelling and supported by the Theory of Viability. It shows that the behavior of variables that can be monitored with the help of short term techniques is dynamically linked to a set of parameters whose behavior can be observed and anticipated using long term methods. It includes a step by step methodology for the integration process.

"FORECASTING VIA SINGULAR PENCIL MODELS"

Neto, J.J. Farias, Grupo de Sistemas, Dept. Engenharia Electrica, Pontificia Universidade Catolica, R. Marques de Sao Vicente, 225 Rio de Janeiro, BRAZIL

Besides the two common representations used in time series modelling, namely ARMA and state space, there is another one, not yet much explored; the singular pencil representation. Introduced by Salut (1976) and later developped by Aplevich (1980), it has some attractive features, like: the parameters of its canonical form are the same that appear in the canonical ARMA, the estimation method is a sequential one and the dynamical parameters can be estimated by the extended Kalman Filter without tricks like linearization or state and parameter interchanging. In this paper the methodology is presented, together with simulations results. Akaikes (1976) results are used for structural identification.

VILLE MARIE

FORECASTING APPLICATIONS IN FINANCE

Chair: Huot, Guy,, Statistics Canada, Time Series Research & Analysis Division, 13-K R.H. Coats Building, Ottawa, Ontario, K1A 0T6, CANADA

"COMPARISON OF DEUTSCHE MARK EXCHANGE RATE FORECASTS"

Triantis, John E., AT&T Communications, 201 Littleton Rd, Morris Plains, New Jersey, 07950, USA
Yenigun, Demirhan, Simos, Evangelos, University of New Hampshire, Durham, NH, 03824, USA

Recent empirical studies of monetary models of exchange rate determination have shown a collapse in their explanatory power. These studies have usually attributed this phenomenon to possible structural changes in the demand for money functions which determine the long-run relative price of the countries. In this paper we investigate the forecast performance of a monetary model of exchange rate determination using several estimation techniques. That is, we compare the ex-post forecast performance of the model using ordinary least squares, varying parameters, vector autoregression, state space forecasting, and univariate Box-Jenkins.

"THE PREDICTIVE ACCURACY OF ANALYSTS VS. TIME SERIES MODELS IN FORECASTING EPS AND SALES REVENUES"

El-Sheshai, Kamal M., George State University, University Plaza, Atlanta, Georgia, 30303, USA

This paper examines the hypothesis of the superiority of analysts' forecats vs. forecasts produced by sophisticated time series models. Quarterly forecasts of sales revenues simultaneously with earnings per share for a sample of 56 publicity held firms are examined over a six year forecast horizon. The paper also examines the effect of differences in industry classification on the forecast accuracy produced by the two sources of prediction.

"UNCERTAINTY IN FORECASTING EXTENDS TO FINANCIAL STATEMENTS"

Oakford, Robert V., Stanford University, Industrial Engineering & Mgmt, Stanford, California, 94305, USA

The uncertainty that is inherent in forecasting the real value of future cash flows extends to decisions about investments in long-term assets and to financial statement evaluation of the capital invested in those assets. Financial statement expected values of long-term assets computed by historical cost and present value methods of financial accounting are compared when cash flows and inflation rates are random variables. Monte Carlo simulation was used to assess the uncertainty about the expected values. The techniques used suggest a method for evaluating uncertainty about financial statement values in actual firms.

"FURTHER EVIDENCE ON THE DIFFICULTY OF FORECASTING EARNINGS FOR CERTAIN INDUSTRIES"

Fried, Clarence E., University of Arkansas, College of Business Administration, Dept of Accounting, Fayetteville, Arkansas, 72701, USA

More than a decade ago, research evidence suggested that the forecastability of entity earnigs is industry-related. Since that time, little effort has been devoted to the search for models of industry earnings. A comparative analysis of parsimoniously-structured, industry-specific models and leading premiere models in the literature provides some weak support for the earlier research findings. However, the restrictive nature of the Standard Industrial Classification Codes suggests the need for an alternative means of classifying industries.

GALERIE 2

JUDGEMENT IN IMPLEMENTATION

Chair: Lockett, A.G., Manchester Business School, University of Manchester, Booth Street West, Manchester M15 6PB U.K.

"FORECASTING AND THE USE OF MODELS"

Lockett, A.G., Manchester Business School, University of Manchester, Booth Street West, Manchester, M15 6PB U.K.

This paper presents some detailed cases of attempts to forecast. The results indicate the complex nature of the problem, and to what purposes forecasts are put within the organizations. In most of the studies it is seen that a forecasting model would be extemely helpful if it were very accurate. However, in general this is not the case, and factors such as market changes, sales promotion activites which are difficult to quantify have to be taken into account. The investigations indicate that this is a crucial part of 'forecasting', with mathematical models relegated to a lesser role. An overall model of the total process is of great benefit.

"FORECASTING IN ITS ORGANISATIONAL SETTING"

Parkinson, Dr. Stephen, Senior Staff Tutor in Marketing, Henley-The Management College and Brunel University

This paper is concerned less with the technology of forecasting than with the practical difficulties of identifying an organisation's forecasting requirements, and developing and introducing a forecasting system(s) to meet these requirements. it is based on the author's experience over a two year period with one organisation in gradually introducing appropriate forecasting methods into a relatively unsophisticated setting.
This organisation employs more than 1300 people and has a sales turnover of approximately 30 million pounds. The company has more than 950 individual product items for which individual forecasts are required. Responsibility for forecasting rests with the company's product managers.The paper describes how an audit was conducted of management's forecasting needs, and how the first definition of the necessary system was arrived at. It comments on the problems of establishing these requirements in an organisation which found great difficulty in distinguishing forecasting from planning goals. it also looks at the barriers to change in current procedures which existed in the organisation, and how these made it difficult to develop and implement appropriate forecasting approaches rapidly, even where there were clear economic advantages apparent to the outside party involved.
The paper concludes by suggesting strategy to facilitate the introduction of more structured approaches to forecasting in organisations where these have previously not existed.

"SUBJECTIVITY IN DECISION ANALYSIS"

Thomas, Howard, University of Illinois at Urbana-Champaign, Dept. of Bus. Admin., 1206 South 6th Street, Champaign, Illinois, 61820, USA

Recent writing in decision analysis has emphasized that some adaptations and modifications of the basic paradigm are required for it to be effectively applied to strategic decision situations. In particular, the paper advances the idea of a decision analysis dialogue paradigm which has a problem structuring focus. In this paradigm decision analysis is viewed as a vehicle for generating dialoque about problem assumptions, formulation and available options, rather than as a means for the determination of an optimal strategy. Some recent examples of this modified policy dialogue paradigm are presented with particular emphasis on the subjectivity inherent in assessing both structural and event uncertainty.

GALERIE 3

EXCHANGE RATE FORECASTING IV

Chair: Alexander, Don, Citibank, N.A., 399 Park Avenue, New York, New York, 10043, USA
Baille, Richard T., Univ. of Birmingham, Dept. of Economics, P.O. Box 363, Birmingham, UK B15 2TT

"THE USES OF PERPETUAL CURRENCY OPTIONS"

Garman, Mark B., Dept. of Business Administration, Unviersity of California, Berkeley, California, 94720, USA

Perpetual currency options are not traded in any market at the time of the present writing. Nonetheless, they have several interesting uses in both theoretical and trading environments. As American-stype options, perpetual options provide useful boundary conditions as the limiting cases of short-lived traded options. They possess the theoretical advantage that their valuation equations, implied volatility, and realted quantities may be written down, in contrast to their shorter-term American currency option counterparts. Perpetual currency options may even have trading advantages, since they require no differentiation by maturity, as ordinary options do.

"OPTIMAL CURRENCY BASKETS: A THEORETICAL ANALYSIS WITH APPLICATION TO THE NORDIC COUNTRIES"

Edison, J. Hali, Division of International Finance, Board of Governors of the Federal Reserve System, Washington, D.C. 20551, USA
Verdal, Erling, University of Bergen, Economics Institute, Bergan, Norway

One characteristic of the world economy since the beginning of the nineteen seventies has been the floating of major currencies. Several smaller countries, both developed and less developed, have chosen not to let their currencies float vis a vis all other currencies. The question of exchange rate policy for on of these smaller countries is not simply resolved by pegging its currency to another currency, for example the currency of its major trading partner, rather than floating. It is necessary for such a country to decide either to peg to a single currency (and which one) or to a based of currencies. The focus of this paper is on choosing the optimal exchange rate policy for a country facing this decision. The theoretical results that are derived here are then applied to the Nordic countries, Finland, Norway and Sweden.

"CONCURRENT AND LAGGED RELATIONSHIPS AMONG FOREIGN EXCHANGE RATES"

Jones, Kenneth J., Florence Heller School for Advanced Studies in Social Welfare, Brandeis University, Waltham, Massachusetts, 02154, USA

A total population of reasonably varying foreign exchange rates were assembled at a weekly frequency, and subjected to factor analytic procedures. Results for zero lag time domain analyses are compared to lagged frequency domain analyses. The findings indicate that world currencies variation is a function of world wide trading relationships with the U.S. dollar as the major force, but with small significant other factors.

"TESTING THE INDEPENDENCE OF FORECAST ERRORS IN THE FORWARD FOREIGN EXCHANGE MARKET USING MARKOV CHAINS: A CROSS-COUNTRY ECOMPARISON"

Gregory, Allan, Sampson, Michael, Department of Economics, University of Western Ontario, London, Ontario, Canada

In this paper we apply the theory of finite state Markov chains to test the cross-country and temporal independence of forecast errors in the forward foreign exchange. Specifically we consider the month-end-thirty data foreign exchange data for Canada, France, Italy, Japan, United Kingdon and West Germany.

TUESDAY
4:00-5:30

GALERIE 4

UNIVARIATE AND MULTIVARIATE TIME SERIES FORECASTING

Chair: de Gooijer, Jan G., Dept. of Economic Statistics, University of Amsterdam, Jodenbreestraat 23, 1011 NH Amsterdam, The Netherlands

"FORECASTING METHODS FOR HEAVY-TAILED PROCESSES"

Jensen, D.R., Foutz, R.V., Virginia Polychnical Institute and State University, Blacksburg, Virginia, 24061, USA

A class of generalized spherically invariant processes not necessarily having moments is investigated. Properties of this class are studied, with emphasis on representations and the linear spaces generated by such processes. Time series analyses are undertaken in both the time and frequency domains, including spectral analysis. Solutions of forecasting problems are found having the property that errors of the optimal forecasts are stochastically most concentrated about zero. These developments are proposed for use with certain heavy-tailed processes arising in economics and elsewhere.

"A SPECIFICATION STRATEGY FOR ORDER DETERMINATION IN ARMA MODELS"

de Gooijer, Jan G., Dept. of Economic Statistics, University of Amsterdam, Jodenbreestraat 23, 1011 NH Amsterdam, The Netherlands

A specification strategy is proposed for the determination of the order in both seasonal and non-seasonal ARMA models. The strategy is based on two newly defined concepts; the q-conditioned partial AR function and the p-conditioned partial MA function. The specification is performed by using sequential Wald type tests. These tests use critical values which increase with the sample size at an appropriate rate. It is proved that asymptotically the estimation of unidentified models will not occur and that the strategy is consistent. Three examples are given for illustrative purpose. It is shown that this new approach to order determination is much more insightful than the selection of a model by merely determining the minimum value of a particular loss function.

"LOSS-COST FUNCTIONS FOR MEASURING THE ACCURACY OF SALES FORECASTING METHODS"

Mahmoud, Essam, Dept. of Management, College of Business and Economics, West Virginia University, P.O. Box 6025, Morgantown, West Virginia, 26505, USA
Goyal, Suresh, Concordia University, Montreal, Quebec, CANADA

In this paper we develop loss-cost functions to measure the accuracy of forecasting techniques in terms of dollars. The various functions are derived using different managerial objectives concerning production and inventory schedules for a single product.

"ECONOMETRIC METHODS IN MICRO FORECASTING: PROBLEMS AND TRAPS"

Chen, Mu-Tsai-Thomas, Senior Vice President, City Bank of Taipei, 12th Floor 50 Sec. 2, Chung-Shan N. Rd. Taipei, Taiwan, R.O.C.

The use of eonometrics is still controversial, despite its rapid evolution since the 1930's. Some recognized it as gaining increasing respect and acceptance in quantitative research. They even claimed that it can be rigorously applied to an area of financial life from which we may all profit. On the other, some asserted that the problems in econometrics are so serious that econometric models are usually ineffective. They doubt that traditional econometric methods for forecasting, such as assumptions of a model and interpretation of results.

DULUTH

ECONOMIC FORECASTING RELATED TO JAPAN'S PROBLEMS

Chair: Obi, Keichiro, Associate Director, Keio Economic Observatory, Keio University, No. 45, 15-Ban, 2-Chome, Minato-Ku, Tokyo, JAPAN

"ECONOMIC FORECASTING AND THE THEORY OF COMPLEMENTARITY - A CASE OF BEEF IMPORT LIBERALIZATION"

Tsuzuki, Sakiko, Keio University, 2-15-45 Mija Minatoku, Tokyo, JAPAN

The import liberalization of beef has been one of the crucial issues of Japan's economy policy in recent years. In this connection, to persuade the general public, it seemed to be more useful to show them some concrete figures concerning the merits of import liberalization rather than merely reiterating the abstract theory of free trade. To that end, I made several kinds of conditional predictions, based on Japanese FIES data, derived from estimating (1) simple statistical regression equations (2) a linear expenditure system, and (3) a demand equation system following from the quadratic utility function. Comparing those results has led me to reconsider the theory of complementarity.

"INTERNATIONAL POLICY COORDINATION IN 1985-86 - A POLICY SIMULATION EXERCISE WITH THE EPA WORLD ECONOMIC MODEL"

Tsurucka, Yoshiaki, Chief Economist, Economic Planning Agency, Government of Japan, Tokyo, JAPAN

The purpose of this exercise is to examine hypothetical policy-mixes in order to maintain stable growth of the world economy. The main conclusions are as follows: (i) if each country maintains present economic policies, high interest rates will persistently suppress domestic demand everywhere, (ii) if a new policy-mix is introduced in the US to cut the budget deficit drastically and expand the money supply, while other countries adopt expansionary monetary and fiscal policies, the results indicate lower interest rates and higher growth rates, (iii) if the countries resort to trade-restrictive measures, trade will decrease and recession will occur.

"PREDICTION OF LABOR PARTICIPATION RATIOS - AN EXPERIMENT WITH JAPANESE PANEL DATA"

Obi, Keichiro, Keio University, No. 45, 15-Ban 2-Chome, Minato-Ku, Tokyo, JAPAN

In order to predict labor participation ratios (probabilities) a model of households' labor supply is needed. Modeling of the Japanese households' labor supply, however, is complicated since there are many self-employed workers as well as employees. Hence, I constructed a model, based on households' income-leisure preference function, describing households' members' choices among (1) regular employment, (2) self employment, (3) combination of (1) and (2), (4) leisure. Applying this model to Japanese panel data, (1) mean values and variances of the preference parameters distributed among households' were estimated, and (2) estimated participation probabilities were compared with observed probabilities.

"ANALYSIS OF A MODEL FOR THE LABOR SUPPLY OF MARRIED FEMALES FACING MULTIPLE EMPLOYMENT OPPORTUNITIES AND FORMULATION OF A POLYTOMOUS PROFIT MODEL"

Matsuno, Kazuhiko, Chuo University, Tokyo, JAPAN

We set forth a model for the labor supply of wives. Based on the income-leisure preference theory, the model describes the behavior of wives to whom multiple employment opportunities are open. It is assumed that each of the employment opportunities offered to the wives has a fixed wage rate and fixed working hours. The model is thus discrete as one of multiple opportunities is chosen. The analysis shows that the model reduced statistically to an ordered polytomous profit model where the choice set autonomously changes itself. Properties of the choice probability are considered.

SAINT CHARLES

ELECTRICITY DEMAND FORECASTING

Chair: Barron, Wallace L., Director, Load Forecasting, Florida Power Corp., 3201 34th Street S (C2A) St. Petersburg, Florida USA 33711

"THE LONG TERM FORECAST METHODS FOR ELECTRICITY DEMAND IN FRANCE"

Heraud, Marc, Electricite de France, 2 rue Louis Murat, 45008 Paris 8e, FRANCE

The long term forecast methods for electricity demand in France, essentially econometric and often coarse at the beginning, have greatly evolved since ten years, after the oil crisis. This paper presents an outline of the present methods of forecast. At the present time, methods used to elaborate forecasts are essentially analytical, according to the available data; it is realized by distinguishing different sectors of activity and also different uses of electricity. This approach of the problem is very detailed in residential sector where potential markets are well estimated; it is more global in the sector of services. In industry, the method is mostly econometric, but it is going to evolve soon in the same way.

"ENERGY COMPETITION AND DEMAND FORECASTING MODEL M.E.R.: MULTIENERGIES-RESIDENTIAL"

Roux, Jacques, Electricite de France, 2 rue Louis Murat, 45008 Paris 8e, FRANCE

Final energy markets having evolved, from a justaposition of specific areas to a global inter-energy competition, it is necessary to use an analytic description of the residential sector to estimate and consumption's forecastings, by energy and by use. The model is built on a description of the demographic move, in rour flows (new buildings, putting to another purpose, first equipments, substitutuions), of the building's stocks (structured by type of building, level of thermal conservation, heating equipment's type). Are included upside a description of the behavior of consumers related to energy prices and technico-economic parameters of use, and down-side the use of unit consumption for each element of the nomenclature.

"A DYNAMIC MODELLING APPROACH TO FORECASTING MICRO-TERM ELECTRIC DEMAND"

Cody, Eric P., Pastuszek, Lydia M., New England Power Service Company, 25 Research Drive, Westborough, Massachusetts, 01581, USA

Economy transactions involving short term power sales and purchases between electric utilities are becoming increasingly important as generation reserves dwindle in many areas. Few forecasting models are presently available for accurately predicting electric demand on an hourly basis, and there are almost exclusively based on autoregressive, time series concepts. This paper reports on a promising, new cross-sectional method for forecasting hourly electric loads, developed by the New England Electric System companies. Sample tests indicate that this approach may reduce absolute forecast error inherent in traditional, heuristic hourly forecasts by as much as fifty percent. Corollary benefits to the forecasters include superior estimates of weather effects on demand, which are useful in other predictive models.

"FORECASTING OF DAILY PEAK SUBSTATION LOADS IN A POWER SYSTEM"

Goh, T.N., Ong, H.L., Industrial & Systems Engineering Department, National University of Singapore, Republic of Singapore

The suitability and reliability of the stochastic time series modeling and forecasting approach to load management are examined through actual applications to not only aggregate system load but also a variety of load types at the 66/22 kV level representing electricity demands in areas of several km. Daily peak demand forecasts with an accuracy comparable to that of telemetering values have been found to be attainable irrespective of load type, thus establishing the practicality and usefulness of the method to operations management and network planning.

MATAPEDIA

LIFECYCLE FORECASTING OF TOURISM SITES

Chair: Calantone, Roger J., Dept. of Marketing, College of Business, University of Central Florida, P.O. Box 25000 Orlando, Florida, 32816, USA

"A REVIEW OF TOURISM FORECASTING WITH ATTENTION TO THE LIFECYCLE"

Calantone, Rojer J., Dept. of Marketing, College of Business, University of Central Florida, P.O. Box 25000, Orlando, Florida, 32816, USA

This presentation reviews the literature in tourism forecasting over the last 25 years and analyzes the various topics which have interested tourism forecasters. Furthermore, the concept of lifecycle forecasting of tourist sites is put in perspective of the literature as well as current commercial and government practice.

"DYNAMIC MODEL OF REGIONAL TOURISM SITE DEVELOPMENT"

Fritz, Richard, Dept. of Economics, University of Central Flordia, Orlando, Florida, 32816, USA

Historically, tourism development studies have focused on the economic impact, neglecting the non-economic effects. Adverse social, cultural and political effects can undermine the beneficial economic impact; thus there needs to be an evaluation of the middle ground between the pecuniary and non-pecuniary effects. These cause and effect considerations form a continuous chain that influences the evaluation of the system over time. The system dynamics model uses non-linear feedback relationships to interrelate observed data and descriptive information to understand the internal linkages among competing forces in a society. This research follows the dynamics of the commodity production cycles through the non-linear technique of system dynamics. The resulting simulation aids policy makers in achieving a balanced management of the positive and negative impacts of the industry.

"TRACKING A PRODUCT LIFE CYCLE EXTENSION: CYPRESS GARDENS"

di Benedetto, C. Anthony, Dept. of Business and Economics, University of Kentucky, Lexington, Kentucky, 40506 USA

Many examples exist of products whose life cycles have been extended by finding new users or new applications, or by product modification. Cypress Gardens in Florida is given as an example of a product in its maturity stage which experienced a period of renewed growth during the 1970's, when the Central Florida tourist trade expanded due to the introduction of attractions like Disney World and Sea World. The growth, "first" maturity, revitalization and "second" maturity of attendance at Cypress Gardens are modelled using a step-logarithmic form, modified to account for seasonality, expansion and environmental circumstances such as fuel shortages.

CHAUDIERE

FORECASTING SYSTEMS FOR OPERATIONS MANAGEMENT

Chair: Mabert, Vincent A., Indiana University, School of Business, Bloomington, Indiana, 47405, USA

"THE USE OF ROLLING FORECASTS IN THE AGGREGATE (PRODUCTION) PLANNING DECISIONS"
Nathan, Jay, University of Scranton, Pennsylvania, 18510, USA
Cicilioni, Yaron, University of Scranton, Pennsylvania, 18510, USA

Production plans are developed based on the forecasts for a chosen planning horizon. Companies often select a plan which is consistent with their objectives on the inventory levels, work-force size, and other factors in meeting demands for their products. This paper illustrates the use of "rolling" forecasts as and when new orders are received, and its relevance in controlling the production costs. The revised forecasts provide further insights to the aggregates planning decisions including the production rates, inventory levels, and work-force-size. The "rolling" forecasts not only serves to update production plans, but also updates the materials requirements plans.

THE USE OF COST FUNCTIONS IN THE MEASUREMENT OF FORECASTING ACCURACY"
Flores, Benito E., Dept. of Business Analysis and Research, Texas A & M University, College Station, Texas, 77843, USA

During the last few years, research in the forecasting area has tried to answer the question of which method of forecasting is best. One of the better known efforts is the M-competition coordinated by Makridakis. The statistics used are the classical ones (MAPE, MSE, etc). Management would like to know, through, not which method yields the lowest MSE but which one costs the least to use. The cost metric should be a total cost. In this paper a cost function is utilized to select the best forecasting method in an aggregate planning example. Results are discussed showing some advantages and limitations of the methodology.

"A COMPARISON OF TWO COMPLETE FORECASTING SYSTEMS ON ACTUAL COMPANY DATA"
McLeavey, Dennis M., Ageloff, Roy,, College of Business Admin., University of Rhode Island, Kingston, RI, 02281, USA
Coleman, Howard, Savin Corporation, 9 West Broad Street, Stamford, CT 06904, USA

This paper compares two forecasting systems on a month by month basis for Jan-Feb-Mar 1985. Both systems are based on Winters' Model. One approach uses forcing techniques while the other uses direct item forecasts. Percentage errors are reported for approximately 200 line items and summary statistics are also given.

"SHORT INTERVAL FORECASTING OF EMERGENCY PHONE CALL WORK LOADS"
Mabert, Vincent A., School of Business, Indiana University, Bloomington, Indiana, 47405, USA

This paper presents a comparison of six short-range forecasting models for predicting the number of daily emergency calls (911 telephone exchange) using data from the Indianapolis Police Department (IPD). Improved predictions of call work loads provide better information for communications staffing, where significant daily and monthly work load variations exist. Daily forecasts are generated for a five month period and compared against actual loads using error measures of the residual standard deviation, mean absolute percent error (MAPE) and bias. Statistical analyses are conducted to evaluate the six described approaches.

MACKENZIE

SEASONALITY AND SEASONAL ADJUSTMENT METHODS

Chair: Huot, Guy, Time Series Research & Analysis Division, Statistics Canada, 13-I, R.H. Coats Building, Ottawa Ontario, K1A 0T6, CANADA

"ANALYSIS OF REVISIONS IN THE SEASONAL ADJUSTMENT OF DATA USING X-II ARIMA MODEL-BASED FILTERS

Huot, Guy, Chiu, K., Higginson, J., Time Series Research & Analysis Division, Statistics Canada, 13-I, R.H Coats Building, Ottawa, Ontario, K1A 0T6, CANADA
Gait, N., Dept. of Statistics, University of Sao Paulo, P.O. Box 20570, Sao Paulo, BRAZIL

Concurrent seasonally adjusted values are subject to revision when more data become available. This study attempts to analyze the total revision associated with the concurrent seasonal filter for the X-II ARIMA seasonal adjustment method. The total revision is defined as the difference between the mean-squared frequency response functions of the central and concurrent filters at certain frequencies. Four ARIMA models are considered which are used in the construction of the filter weights. We determine total revision for different forecast horizons and different ARIMA parameter values. Then we evaluate for different forecast horizons the sensitivity of total revision to change in model parameter values.

"SOME PRACTICAL CONSIDERATIONS IN IDENTIFICATION OF SEASONAL TIME SERIES MODELS"

Nazem, Sufi M., University of Nebraska at Omaha, 60th and Dodge Street, Omaha, Nebraska, 68182, USA

Identification of complex seasonal models from time series data often present a formidable task for the inexperienced and less experienced user. In this paper, a systematic, practical approach has been outlined to assist the beginning user in the process of model identification. Several examples of seasonal models are included to help illustrate the procedure.

"SEASONAL ADJUSTMENT BY USING RECURSIVE FILTERS"

Stier, W., Hochschule St. Gallen, Fur Wirtschafts und Sozialwissenschaften, Bodanstrasse 1, 9000 ST-GALLEN

As it is well know, most procedures for adjusting time series can be classified broadly as being based on either ratio-to-moving-average methods or on regression methods. Both approaches depend upon the classical decomposition of economic time series into components such as trend-cycle, seasonal, irregular and so on. The approach to be discussed here is a completely different one. It is a purely filter-theoretical one, realizing a transfer function which shows that only the seasonal frequencies are affected while the remaining ones are unaltered.

"USING MONITORING MODELS TO DETECT THE TIMING OF A CHANGE IN SEASON"

McLeod, G., Borghers, E. Gwilym Jenkins & Partners Ltd., Parkfield, Greaves Road, Lancaster LA1 4TZ ENGLAND

In order to cope with a transfer function noise model context with the nonlinear effect of climatological influences (solar radiation or temperature) one can build 1) two single season models, i.e. a separate model for each of the two main seasons, each model with the appropriate climatological inputs, 2) a double season model, i.e. one model in which each of the climatological inputs is split up into two parts, one for each of the two main seasons. Under these circumstances forecasting the output is not so simple not only because one has to forecast the climatological inputs but also because one has to define that point in time at which the season will change. This paper investigates the analytical possibility of using monitoring models to detect this point in time at which the change in season takes place.

SAGUENAY

STATE SPACE MODELS

Chair: Fildes, Robert, Manchester Business School, Manchester, ENGLAND M15 6PB

"A NEW CLASS OF STATE SPACE FILTER FORECASTING MODELS AND ITS APPLICATION"

Waage, Frenck, AT&T Technologies, Inc., Forecasting and Techniques Department, Gateway Two, Newark, New Jersey, 07102, USA

This paper reports a new forecasting method and its application to the applied problem of forecasting total market sales and brand market shares of that total. The new method is motivated by the following problem. To correctly forecast market shares (which are concentrated on (0,1) and sales (which are positive integers) using few observations (5 to 10 observations to estimate a model form), when the model has non-normal residuals. The new model is a state space model whose forecasting equations are governed by the Dirichlet p.d.f. (and not by a Normal process) and whose oberservation equations are governed by Multinomial processes (and not Normal processes). This model generates its own filter equations, and they are different from the widely known Kalman filter and behave differently.

DYNAMIC REGRESION ANALYSIS AND FORECASTING WITH MICROCOMPUTERS: CLASSICAL AND STATE SPACE METHODS"

Vishwakarma, Keshav P., School of Economics, La Trobe University, Melbourne, Australia, 3083

State-of-the-art statistical analysis and forecasting can now be performed with modern microcomputers. Software has been developed for dynamic regression (cause-effect) and time series calculations. Classical as well as state space methods are included. Single and multiple time series can be analyzed with them. Regression equations with distributed-lag, simple-lag, and autocorrelated (coloured noise patterns are permitted). Detection of cyclical patterns is also provided. Several practical examples are given. They illustrate that the interactive, menu-driven computer programs are easy to use.

"A GENERALIZATION OF THE KALMAN FILTER BASED ON EITHER GAUSS-MARKOV OR LINEAR BAYES THEORIES"

Zehnwirth, Ben, MacQuarie University, School of Economics and Finance, North Ryde, New South Wales 2113, Australia

The Kalman Filter is generalized to cover a wide class of processes including those where the observational error variance depends on the state, as may be the case when sampling from a Poisson distribution with changing intensity. The generalized filter is exactly the same as the usual Kalman filter except that a mean value is substituted for this variance. In parallel with the usual Kalman filter the generalized filter may be justified by either linear-Bayes or Gauss-Markov theories. Moreover, the recursions yield linear minimum mean-square error estimators and associated error covariance matrices.

"FORECASTING STOCK PRICES"

Aksu, Celal, School of Management, Syracuse University, Syracuse, New York, 13210, USA
Gunay, Erdal, Faculty of Business Administration, University of Windsor, 401 Sunset Avenue, Windsor, Ontario N6B 3P4, CANADA

This study attempts to determine the ability of changes in short interest to forecast stock-price changes. The sign and the direction of the relationship between the two variables is not unambiguous a priori. For example, although an increasing volume of short interest may reflect a rising pessimism among market participants leading to declining overall stock-prices, there is also an opposing and upward pressure on prices due to the necessity to eventually cover the short positions. The state space methodology is used to build univariate and multivariate models to obtain post-sample forecasts of stock-prices.

YAMASKA

ENERGY FORECASTING

Chair: Hamilton, K., Structural Analysis Division, Statistics, Canada, Ottawa, Ontario, K1A 0T6, CANADA

"FORECASTING METHODS FOR ENERGY DEVELOPMENT PROJECTS, RESOURCES REQUIREMENTS, AND ECONOMIC IMPACTS IN THE UNITED STATES"

Paik, Soon, Construction Resources Analysis, University of Tennessee, GBA-9, Knoxville, Tennessee, 37996, USA

Forecast new energy products (54 types) are based on projected equilibrium energy supply by using capacity utilization, facility, retirements, existing capacity, etc. During 1984-95, new energy projects show a constant trend except powerplants. New energy projects are translated into time-phased construction resources requirements flows by apply+ing technical coefficient profiles. 432,000 on-site jobs and $83 billion (1981 dollar) capital costs are annually required during 1984-1990. The additional off-site earnings and employments due to new energy development are estimated by utilizing Regional Industrial Multiplier System. 1.7 million off-site jobs and $30 billion (1981 dollar) earnings are annually created during 1984-1990.

"THE RELATIONSHIP BETWEEN COMMERCIAL SECTOR ENERGY DEMAND AND ECONOMIC GROWTH IN THE 1984 GRI BASELINE PROJECTION"

Holtberg, Paul, Gas Research Institute, 8600 West Bryn Mawr Avenue, Chicago, Illinois, 60631, USA

As a result of limited available data, economy-wide energy demand models generally model the commercial sector in a simplified fashion by either grouping the commercial sector with the residential sector or by modeling commercial sector energy demand as solely a function of aggregate growth in commercial square footage. This is an inadequate treatment of the commercial sector. Economic growth in the commercial sector during the remainder of the 1980's and during the 1990's is expected to be more rapid than the general economy. Thus, to adequately project the potential for natural gas consumption in the commercial sector it is necessary to understand and model the growth in specific commercial activities. The 1984 GRI Baseline Projection has been enhanced to include the impact on energy demand of growth in specific commercial activities (e.g. health care, office facilities, etc.) This paper will discuss the results of this effort.

"UNBALANCED RECOVERY IN ENERGY RELATED MARKETS: GROWTH RETARDING IMPLICATIONS FOR 1985"

Santini, Danilo J., Argonne National Laboratory, 9700 South Cass Ave, Argonne, Illinois, 60439, USA

Santini has argued that depressions involve a several-year transition among energy intensive technologies (1983a,b,1985). During the transition it is difficult to achieve an equilibrium in energy-producing and energy-consuming markets. Santini's historical research indicates that a secondary contraction can occur if these markets fail to come to equilibrium. The causes of this recession in the midst of a depression (or stagnation) are examined. The nature of such recessions is contrasted to those occurring during the periods of relatively steady growth. Santini's Fall 1984 inference that such a recession could be imminent is discussed in light of first half 1985 macroeconomic behavior.

"A FRAMEWORK FOR FORECASTING ENERGY POLICY"

Huff, Richard, Public Affairs Dept., Gulf Canada, 800 Bay St Toronto, Ontario, M5S 1Y8, Canada

This paper examines a total system framework for forecasting energy issues and decisions in general and environmental issues relating to energy use in particular. A number of models are utilized in order to identify emerging energy concerns and an expected utility model of the decision-making process is used to forecast the outcome of specific issues.

STUDIO

ISSUES WITH EXCHANGE RATE FORECASTING

Chair: Yalovsky, Morty, McGill University, 1001 Sherbrooke St. West, Montreal, Quebec, H3A 1G5, CANADA

"TESTING THE STABILITY OF MONETARY EXCHANGE RATE EQUATIONS"

Richardson, David H., Dept. of Economics, St. Lawrence University, Canton, New York, 13617, USA
Wu, Mickey T.C., Dept. of Economics, Coe College, Cedar Rapids, Iowa, 52402, USA

The purpose of this paper is to test the structural stability of monetary exchange rate functions in the United Kingdom and West Germany over the January 1974 - June 1982 period. For our purposes, stability is defined in terms of the constancy of regression parameters over time. The question of the stability of the exchange rate function is crucial since a stable relationship is necessary for forecasting the effect of changes in the explanatory variables on the exchange rate. The paper will employ a range of stability tests.

"A FORECASTING MODEL FOR EXCHANGE RATES"

Wharton, R.M., Larrain, M.R., Fordham University, 301 Bellevue Avenue, Langhorne, Pennsylvania, 19047, USA

This paper presents a model which forecasts the daily exchange rate for the United States Dollar versus various foreign currencies. The model incorporates both econometric and time series methodology. Econometric models are used to forecast quarterly values for exchange rates which provide overall direction. Time series methods are used to capture the auto-regressive character of the daily exchange rate fluctuations. The effectiveness of this model will be demonstrated using extensive computations for the Deutschemark.

"METHODOLOGICAL COMPARISON OF FORECASTS AMONG EXCHANGE RATE, PRICE AND STOCK PRICES"

Hsieh, Hsih-Chia, No. 75 Chang-Shing Street, Chung-Hua Institute for Economic Research, Taipei, Taiwan, R.O.C

This study compares the differences among forecasting methodologies of foreign exchange rates, commodity prices, and common stock prices. The primary difference is that forecasts of foreign exchange rates rely heavily on the growth rates of money supply, the productivity, and difference between domestic and foreign interest rates. Its future market is not efficient under the intervention of Central Banks. Forecasts of gold and silver prices depends more on the expected inflation rates; and forecasts of common stock prices are related to themarket sysematic risk and vary inversely with the prices of gold and silver. Examples of econometric modelling are provided.

"THE NEW INTERNATIONAL MONETARY SYSTEM MECHANICS AND FORECASTING ECONOMIC OUTCOMES"

Townsend, David, Dept. of Economics and Busi. Analysis, Sam Houston State Univ, Huntsville, Texas, 77341, USA

Macro-economic forecasts of business fluctuations in an interdependent world economy are strongly influenced by the working or trading mechanics of contemporary international monetary arrangements. Micro-economic forecasts of exchange rate movements are also a partial function of contemporary monetary system mechanics. A principal contention here is that many recent forecasts of exchange rate movements and business fluctuations have been inaccurate because of widespread failure to recognize fundamental changes in international money mechanics which took place after 1971, when the various systems which had produced fixed or stable exchange rates were replaced by the contemporary system of freely flexible exchange rates.

"REVIEW OF PERFORMANCE CRITERIA FOR EXCHANGE RATE FORECASTING"

Lothian, J., Morry, M., Statistics Canada, Ottawa, Ontario, K1A 0T6

The authors review seven years of articles published in Euromoney that deals with performance evaluation of foreign exchange rate forecasting services. The appropriateness of the measuring instruments used in the article is analyzed. The authors recommend a revised set of measures to assist in a more consistent assessment of the quality of the forecasting services.

ETUDE

TOPICS IN FORECASTING

Chair: Parkan, Celik, Faculty of Management, University of Calgary, 2500 University Drive N.W., Calgary, Alberta, T2N 1N4, CANADA

"FORECASTING RESIDENTIAL ELECTRICITY DEMAND FOR UTILITY PLANNING"
Braithwait, Steven D., Electric Power Research Institute, 3412 Hillview Ave., P.O Box 10412, Palo, Alta, California, 94303, USA

Electric utilities are placing increasing demands on their forecasting methods as they attempt to integrate the impact of various demand-side activities into the forecast. Incorporating the effects of utility conservation or marketing programs requires a structurally detailed forecasting model. This paper describes a microsimulation model of residential energy demand developed for the Electric Power Research Institute (EPRI) that is currently being used for forecasting and demand-side analysis by a number of utilities. The model focuses on household choice and utilization of eight major electric end uses. The paper presents alternative twenty-year forecasts of residential electricity demand in the U.S.

"DETERMINATION OF TREND, A COMPARISON OF THE LEAST SQUARE ERROR CRITERION AND THE ABSOLUTE ERROR CRITERION"
Ou, Chau Song, St. John's University, Jamaica, New York, USA

The Least Square Error Criterion is much more often used for determining the trend of a time series than the absolute error criterion. The reason is not because the former provides better estimate of the trend but because it is easier to minimize the square errors than to minimize the absolute errors. In this paper we will introduce a computer algorithm for minimizing the absolute errors. The accuracy of the estimators based on the two different criteria will be compared by the monte carlo method.

"ASSESSING THE RELIABILITY OF LONG-RANGE HIGHWAY LOAD FORECASTS"
Benson, P. George, University of Minnesota, School of Management, 271 19th Ave. South, Minneapolis, Minnesota, 55455, USA

In designing new highways and planning for the reconstruction of existing highways, design engineers require forecasts of the cumulative traffic load a highway would be expected to bear over its 20 to 35 year life. Because of the crucial role played by these forecasts, and the inability of currently employed forecasting procedures to permit forecasters to express their uncertainty about the forecasting model and its parameters, forecasters tend to bias their load forecasts upward. To help alleviate this problem and at the same time provide management with a measure of forecast reliability, this paper recommends that a subjective predictive distribution be developed using Monte Carlo methods.

"THE APPLICATION OF MONTE CARLO TECHNIQUES IN A FUZZY ENVIRONMENT"
Li, H.C., Olinsky, Alan, Bryant College, Dept. of Finance, Smithfield, Rhode Island, 02917, USA

It is assumed that a forecaster who uses the Monte Carlo technique has sufficient information on the probability distributions of the variables included in his model. Otherwise, subjective probabilities should be assigned. However, there has been no effort to distinguish randomness from fuzziness. The newly developed fuzzy set theory indicates that there is a need to combine probability measure with fuzzy measure in a fuzzy environment. This allows us to assign probabilities to fuzzy events. The purpose of this paper is to apply the Dempster rule to construct probability distribution for fuzzy variables. A comparison of a model using one traditional Monte Carlo technique with one employing fuzzy distributions reveals that the latter is a better forecasting tool.

GALERIE 2

MACROECONOMIC FORECASTING

Chair: Oller, Lars-Erik, Ministry of Finance, Economics Department, P.O. Box 295, SF-00171, Helsinki 17, FINLAND

"A MULTIVARIATE APPROACH TO FORECASTING COINCIDENT INDICATORS USING LEADING INDICATORS"

Cholette, Pierre A., Statistics Canada, R.H. Coats, 13th Floor J, Ottawa, Ontario, K1A 0T6, CANADA
Lamy, Robert, Dept. of Finance, 160 Elgin, 27th Floor, Ottawa, Ontario, K1A 0G5, CANADA

The paper shows how smoothing filters can be built into multi-variate ARIMA models. The technique can be useful for time series with sizable irregular fluctuations. These tend to blurr the relationships between the series and to introduce instability in the parameter estimates of the model. The approach proposed circumvents these problems. It is illustrated by joint ARIMA forecasting of the Canadian Composite leading indicator and the index of Industrial Production.

"SOME COMMENTS ON THE FINE-TUNING OF ECONOMETRIC FORECASTING MODELS"

Eero, Pylkkanen, Sanoma Corporation, P.O. Box 240, 01001 Helsinki, FINLAND
Pentti, Vartia, The Research Institute of the Finnish Economy, Lonnrotinkatu 4B, 00120 Helsinki, FINLAND

Various "fine-tuning" techniques are commonly employed when preparing model-based economic forecasts: methods for adjusting the constant or residual term of a behavioral equation, methods for adjusting other structural coefficients and methods for exogenizing initially endogenous variables. The paper discusses the connections between alternative manipulating techniques, their interpretations and their use in actual forecasting situations. The same model solution can be equivalently achieved by using any of the above mentioned methods. This proves useful when, e.g., the original model structure is restored in the course of consecutive forecasting rounds. Finally, the effects of fine-tuning on forecasting errors are evaluated.

"FAST LINEAR ESTIMATION METHODS FOR VECTOR AUTOREGRESSIVE MOVING AVERAGE MODELS"

Koreisha, Sergio G., Graduate School of Management, University of Oregon, Eugene, Oregon, 97403, USA
Pukkila, Tarmo, Dept. of Mathematical Sciences, University of Tampere, FINLAND

Procedures for estimating parameter values in vector autoregressive moving average models (VARMA) vary considerably in computational time and accuracy. In this study we present two linear estimation methods which reduce parameter estimation times by factors of 30-40 when compared to the exact maximum likelihood procedure (EML). In addition, the precision in which parameter values are estimated is comparable to the EML method. When we combined standard error calculations for the parameter values, these procedures can also be used to identify the nonzero elements in the ARMA polynomial matrices. Furthermore, because of the great speed associated with parameter value calculations, these methods can also be employed in process order identification. Simulation as well as economic data are used to illustrate the capabilities of the methods introduced here.

"INTEGRATED, INTERCONNECTED MODELS FOR MORE EFFECTIVE FORECASTING"

Weaver, Roger, Bureau of Economic and Business Research, University of Utah, Salt Lake City, Utah, 84112, USA

In order to appropriately plan for changing service demands, public and rivate agencies need reliable forecast information. Projection data requirements vary greatly among and within agencies, depending upon the specific applications for which forecasts are developed. This paper reviews the work of the University of Utah, Bureau of Economic and Bureau Research in developing an integrated, interconnected modeling program for state - and local-level governments in Utah.

GALERIE 3

CORPORATE STRATEGIC PLANNING AND FORECASTING

Chair: DeRoeck, Richard, General Motors Corporation, 767 Fifth Avenue, New York, New York, 10153, USA

"WHEN AND WHY ENVIRONMENTAL ANALYSIS/FORECASTING IS INEFFECTIVE IN THE CORPORATE STRATEGIC PLANNING PROCESS"

Klein, Harold E., Linneman, Robert E., Temple University, School of Business Administration, Philadelphia, Pennsylvania, 19122, USA

Environmental Analysis (EA) and forecasting is the least elaborated step in formal planning processes. Forecasters are preoccupied with how to forecast as opposed to understanding the role of their task in a planning context. Managers often don't know how to integrate forecast results into strategic decision-making situations-and consequently, find EA results irrelevant. Functional differentiation between 'planners' and 'forecasters' further exascerbates the situation. Lack of concern for appropriate vehicles and formats for presenting forecasting results leads to communication difficulties with line management. These practices along with others will be delineated, along with some practical prescriptives for improving the EA/forecasting step in planning processes.

"THE USE OF MULTIPLE SCENARIO PLANNING IN AN UNCERTAIN OIL AND GAS ENVIRONMENT"

Jones, Scott T., Atlantic Richfield Company, Corporate Planning, 515 South Flower Street, Los Angeles, California, 90071, USA

Multiple scenario planning has been generally ignored by major energy and resource companies as a tool for long range planning. Until recently, steadily rising oil and resource prices meant issues like short-term cash management worried executives more than the long-range planning process. Now, with stable or falling prices the focus has sharpened on longer-term objectives. The uses and benefits of a multiple scenario approach to planning are 1) the process allows the decision-makers to reach beyond the limits and error bounds of econometric (trend) analysis, 2) multiple scenarios offer a chance to test fundamental beliefs (sacred cows) against a wide range of environments, 3) force the executive to change his preconception about which variables are most important and how key variables interrelate, 4) allows management to develop an understanding of less familiar environmental dimensions that are the source of leveraging problems and opportunities, 5) everyone gets a better picture of the bounds to uncertainty and the potential for change. We developed a total of four scenarios that fit the period 1985-2005. Two emerged from a view of the world we called 'global accommodation', where consensus dominates conflict and economies tend to evolve smoothly from familiar trends. Those two scenarios were named 'muddling through and 'economic renaissance'. The other two scenarios emerge from a long-run view of the world characterized as a 'volatile passage'. These scenarios 'reinflation' and 'stagnation-rebirth' contain violent cyclical trends, uncertainty in almost every sector of the economy as well as social/political disunity.

"INTEGRATING THE INTERNATIONAL ENVIRONMENT INTO CORPORATE STRATEGY"

Gerra, Martin J., Manager of International Economics, IBM Corporation, Armonk, N.Y

An important ingredient for developing corporate strategy is the assessment and projection of the economic environment. This paper will review the planning cycle at the IBM corporation, describe how the economic environment is integrated into the planning cycle, and outline the econometric tools and information system used. The development and use of contingency planning will also be discussed.

GALERIE 4

FORECASTING MARKET SHARE IN THE AUTOMOTIVE INDUSTRY

Chair: Stein, Martin M., Director, Transportation Research, Abt Associates Inc., 55 Wheeler Street, Cambridge, MA 02138, USA

"COMPARISON OF ECONOMETRIC AND COHORT-BASED METHODOLOGIES TO PROJECT LONG-RANGE AUTOMOTIVE INDUSTRY SEGMENT MARKET SHARES"

Beauregard, Marianne, Sinclair, Stuart W., Abt Associates Inc., 55 Wheeler Street, Cambridge, MA, 02138, USA

The authors compare two methodologies to project long-range automotive industry segment shares - a time series econometric model and a cohort-based approach. The econometric model is estimated using quarterly data from 1973 to the present and includes both economic and socio-demographic variables. Likewise, the cohort-based model, which is calibrated using 1983 data, assumes that new car purchases are explained by both economic trends and sociodemographic characteristics of the population, lifestyles and travel patterns. The authors suggest that the use of both lifecycle and lifestyle effects in the cohort-based model make it more appropriate for long-range projections.

"REMOVAL OF JAPAN'S AUTO RESTRAINTS: ESTIMATING THE MARKET IMPACTS"

Sullivan, Edward J., Data Resources Inc., 29 Hartwell Avenue, Lexington, Massachusetts, 02173, USA

How far can Japanese imports penetrate the U.S. market and how quickly can this penetration occur if current automobile trade restraints are allowed to expire? These are some of the most frequent questions automotive forecasters are asked. Unfortunately, traditional econometric tools alone cannot provide answers to these questions because relevant historical relationships necessary to conduct the analysis reflect Japanese performance under trade restraints are removed. Data Resources Inc. has developed an approach to these questions for its clients by combining use of its automotive model, where appropriate, with analysis of the economic and political structural factors influencing individual Japanese automakers' strategies for the U.S. market. DRI's approach to this issue will be presented.

"ANALYZING THE U.S. LUXURY CAR SEGMENT"

Luckey, Michael M., Manager, Automotive Services, Merrill Lynch Economics, New York, New York, USA

The maturing of the baby boom generation has resulted in high expectations for luxury new car sales over the next several years. This presentation analyses the potential for luxury new car sales in the U.S. from a demographic and purchase probability perspective. First, age/income projections are developed, with particular emphasis on the upper income groups. Then, purchase probabilities, obtained from market research data, are applied to the various age/income celles to generate volume forecasts for the luxury car segment. Finally, alternative scenarios are considered, based on different purchase probability assumptions.

Discussants and Commentators:

Brad Southworth
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DULUTH

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Dr. Robert Fildes is Senior Lecturer in Business Forecasting at the Manchester Business School and has held teaching and research appointments at the University of California and the University of British Columbia. He has published papers in applied probability and forecasting, most recently in Economics, J. Operational Research Society and the Journal of Money, Credit and Banking. His book, "Forecasting for Business Methods and Applications", was published by Longmans in 1976. A book of readings, "Forecasting and Planning", was published by Teakfield in 1978 and a bibliography on Forecasting by Gower in 1981. He is an editor of the Journal of Forecasting.

"GAINS IN SELECTING A UNIVARIATE FORECASTING MODEL"

Much recent research has concentrated on evaluating various methods of univariate forecasting, in particular the Makridakis competition. However the major use of such models lies in inventory and production control applications. The conventional wisdom in this context is that there is not much to be gained by using the (slightly) more accurate forecasting procedures which have 'won' such competitions. This paper will examine what gains, if any can be made from model selection procedures when used for inventory control.

Chair: Robert Winkler, Professor of Statistics, Graduate School of Business, Duke University, Durham, North Carolina, USA 27706

SAINT-CHARLES

THE CENTRAL ROLE OF SALES FORECASTING IN MANUFACTURING PLANNING

Chair: Davidson, Timothy A., Temple, Barker & Sloane Inc., Applied Decision Systems, 33 Hayden Avenue, Lexington Massachusetts, 02173, USA

"BUSINESS PLANNING FOR MANUFACTURERS"

Jacobson, Jack, Temple, Barker & Sloane Inc., Management Consultants, 33 Hayden Avenue, Lexington, Massachusetts, 02173, USA

This paper reviews the process for developing and implementing effective operating plans and the central role of the forecast in the process. It considers practical models for defining product volumes and financial results, and for assessing risk and contingency alternatives in the context of different forecasts and competitive market postures. Also discussed are time frames and planning cycles, performance measurement and criteria for modifying the plan. Roles, responsabilities and procedures for ensuring effective participation and commitment of the appropriate organizations and people are described. The paper concludes with a discussion of the relationship between the operating plan and the day-to-day production plans.

"MANUFACTURING DECISION SUPPORT SYSTEMS"

Davidson, Timothy A., Temple, Barker & Sloane Inc., 33 Hayden Avenue, Lexington, Massachusetts, 02173, USA

In the past decade, many manufacturers have introduced computer-based record keeping systems for production planning and materials management. Rarely do new MRP software products or custom made systems include sensible sales/demand forecasting models. Even fewer allow the operations planner the liberty to evaluate alternative line schedules or replenish scenarios to support the decision he makes each day. The value of employing quantitative forecasting models routinely as a base line estimate of demand will be identified. The presentation will conclude with a survey of design features found important in sales forecasting software and in manufacturing decision support systems.

"FORECASTING EXPERIENCE IN BUSINESS"

Fagan, Mark L., Temple, Barker & Sloane Inc., 33 Hayden Avenue, Lexington, Massachusetts, 02173, USA

Setting forecasting theory aside, this paper identifies the pitfalls of forecasting applications in business. Case studies of three companies will illustrate how forecasts are used, misused or ignored and the resulting impact on operations and profits. Cases include: why the material management staff of a commuter railroad convinced senior management that its requirements could not be forecasted; how inaccurate forecasts affected the production planning of a food product manufacturer; why accurate forecasts of a metal products manufacturer were often overlooked by production scheduling. A checklist for successful implementation of forecasting systems based on lessons learned will conclude this presentation.

CHAUDIERE

TOURISM FORECASTING TECHNIQUES

Chair: Var, Turgut, School of Travel Industry Management, University of Hawaii, 2404 Maile Way, Honolulu, Hawaii 96822, USA

"APPLICATION OF THE BOX-JENKINS TRANSFER FUNCTIONS TO FORECASTING DOMESTIC TOURISM IN CANADA"

Chau, P., Head, Research and Interpretation, Regional Industrial Expansion, Ottawa, Ontario, K1A 1G2, CANADA

This paper will discuss the characteristics of various domestic travel market segments (i.e. inter-provincial, intra-provincial, short duration, overnight travel, etc.) and the procedure for fitting the B-J function to the selected data series. Finally, forecasting results will be reviewed.

"LAND USE FORECASTING AND TOURISM"

Fagence, Michael, Faculty of Architecture and Planning, University of Queensland, St-Lucia, Queensland AUSTRALIA 4067

Conventional land use planning methodologies and techniques are illfitted to cope with the dynamics of changing demand for tourism development. Land use planning is primarly conducted at the local level where the sophistication of grandiose mathematical models and impact assessments exceed the operational capability of parochial decision-making systems. Additionally, the information appetite of such models can scarecely be satisfied. This paper, by means of an Australian case study, examines the current shortfall sophistication and comments critically on those dimensions of forecasting tourism land use which may be amendable to improved levels of systematic and scientific rigour.

"PARK USE FORECASTING PROCEDURE"

Beaman, Jay, Socio-Economic Branch, Parks Canada, Ottawa, Ontario, K1A 1G2, CANADA

This paper presents a low cost forecasting approach that is claimed to be robust in the face of the data considerations cited above. The linkage of forecasts to the database in terms of updates, arrangement of data and report generation are covered briefly because they relate to cost effective operations of the database. The database strategy adopted allows storage of a variety of forecasts for data for different base years. It allows all forecasts made to be kept from year to year and to be easily used for comparison, evaluation and other purposes. In particular there is discussion on accuracy, cost-effectiveness and verification of forecasts.

"FORECASTING VACATION TRAVEL DEMAND: A RICHER MODEL"

Fujii, Edwin, Mak, James, Dept. of Economics, Porteus Hall, 2424 Maile Way, Honolulu, Hawaii, 96822

Conventional vacation travel demand models used in forecasting have typically employed as arguments airfares to the destination and per capita income from the source area. Missing in the specification are costs (i.e. prices) of vacation goods at the destination as well as costs of travel to alternative destinations. In this paper, we employ a richer model that includes both left out factors to forecast U.S. visitor travel to Hawaii. We compare the forecast precision of our model vis-a-vis more Spartan models. The models are estimated using ridge regression techniques to overcome measurement problems stemming from multicollineanty.

MACKENZIE

SOCIAL FORECASTING

Chair: Linstone, Harold A., Portland State University, Future Research Institute, Portland, Oregon, 97207, USA

"FORECASTING: NOT ALWAYS THE RIGHT GOAL"
Linstone, Harold A., Portland State University, Futures Research Institute, Portland, Oregon, 97297, USA

Social/political/environmental forecasting has proven far more difficult than technological forecasting. The relative sparseness of forecasting methodology in dealing with complex, ill-defined systems is evident. This paper suggests that in such cases forecasting per se remains a less appropriate objective than learning-based adaptability. Probability and social indicator calculations are not nearly as useful as multiple perspectives and safe-fail concepts. The work of Ascher, Enzer, Holling and Linstone is brought together in this discussion.

"UNFIT 'MISTCASTS' - AND WHAT CAN BE DONE"
Kasper, Egon F., Advisor, Luxemburger Str. 124/1712, D-5000 Koln 41

Prognosis is held, by several experts, to be basically impossible in the conext of the social sciences. Others, however, do see the possibility of rendering 'correct' forecasts under some specific, partly restricting conditions. A survey of the empirical sphere discovers in fact several cases of 'miscasts' of unsuccessful and failed forecasts, even wash-outs. Then an effect is made to classify the causes of these 'miscasts' and, consequently, to determine some basic conditions for 'good' forecasts, making necessarily use of the similarities and differences to the analogous forecasting problems of other sciences. Outlines of appropriate 'sophisticated' methods and of suitable ways of realizing them will close the paper.

"SOCIAL FORECASTING: ITS IMPORTANCE TO STRATEGIC PLANNING"
Boshoff, Hentie, Potchefstroom University, Institute for Future Studies, Potchefstroom 2520, SOUTH AFRICA

Many forecasters view economic or technological forecasting in isolation from social change. The dynamics of social change today make such an approach impossible. The first reason is the shift away from the materialistic paradigm as the driving force behind human activity: Elements of the quality of life paradigm is tempering the material advancement paradigm. The growth in individualism and self-fulfilment forms the second reason, tempering the economic paradigm as the sole driving force behind the consumer, worker, investor, etc. This search for self-fulfilment discards many of the traditional rules of human conduct. My paper will deal in the first place with business examples in this respect. The second (and major) part will deal with a developed model (i) that relate random social change to different mindsets of people, (ii) how this can be used in social forecasting and its interaction with economic change and, (iii) how this concept can be integrated into strategic planning.

"THE WORLD IN THE NINETIES"
Afheldt, Heik, Prognos Ag, Steinengraben 42, CH-4011, Basel, SWITZERLAND

The estimation procedure used in this paper is based on a semi-econometric model if Interactive System Analysis and Projection (ISAP). This programme is the result of continuing research into the specification,e stimation and analysis of long-term forecasting system. A comparison with most fully econometric approaches is given.

SAGUENAY

FORECASTING IN HYDROLOGY, OCEANOLOGY AND METEOROLOGY

Chair: McLeod, Ian A., Dept. of Statistical and Actuarial Sciences, The University of Western Ontario, London, Ontario, N6A 5B9, CANADA

"CONTEMPORANEOUS ARMA MODELLING WITH APPLICATIONS TO HYDROLOGY"

Camacho, Fernando, Faculty of Business, The University of Alberta, Edmonton, Alberta, T2G 2E1, CANADA
McLeod, Ian A., Dept. of Statistical and Actuarial Sciences, The University of Western Ontario, London, Ontario, N6A 5B9, CANADA
Hipel, Keith W., Dept. of Systems Design Engineering, University of Waterloo, Waterloo, Ontario, N2L 3G1, CANADA

The CARMA model may be viewed as a specialization of the general vector ARMA model when the only causal relationship between the endogeneous variables is that of instantaneous only causality. From basic considerations, many geophysical time series seem to be adequately characterized by this relationship. In particular, in the case of modelling two-station riverflows, when the stations are located on separate rivers, then physical restrictions of the system imply the CARMA model is adequate. In this paper a comprehensive approach to model building with CARMA models is presented and illustrated using hydrological data.

"ANALYSIS OF CAUSALITY BETWEEN THE RAINFALL AT FORTALEZA, BRAZIL, AND MEAN SEA LEVEL"

Gait, N., Mesquita, A.R., Morettin, P.A., University of Sao Paulo, P.O. Box 20,570, Sao Paulo, BRAZIL

The series of atmospheric precipitation at Fortaleza, Cera, Brazil, has attracted great interest in connection with the severe drought that afflicts the Brazilian northeast. In this paper a causality analysis is performed between the rainfall series and mean sea level series of San Francisco and Balboa in order to search for possible relationships between oceanic variables and atmospheric precipitation. It was found that mean sea level series lead the rainfall series, with a lag of six years and this may be useful in building dynamic models with forecasting purposes.

"FORECASTING THE RAINFALL SERIES AT FORTALEZA, BRAZIL"

Mesquita, A.R., Morettin, P.A., Toloi, C.M.C., University of Sao Paulo, P.O. Box 20,570, Sao Paulo, BRAZIL

Recently several works have dealt with the problem of trying to forecast period of drought in the Brazilian northeast throughout the analysis of the series of rainfalls at Fortaleza, Ceara. In the paper we apply several time series forecasting procedures to 131 annual observations of that series and compare their efficiency.

YAMASKA

COMPUTER SOFTWARE IN FORECASTING

Chair: Kuiper, John, Dept. of Economics, University of Ottawa, Ottawa, Ontario, CANADA

"AN EVALUATION OF MICRO-COMPUTER SOFTWARE FOR FORECASTING: AN UPDATE"

Jarrett, Jeffrey,, University of Rhode Island, Dept. of Management Sciences, Kingston, Rhode Island, 02881, USA

The purpose of this presentation is to indicate the ease by which serious business forecasters can produce good and highly accomplished forecasts with the aid of personal business computers (PC). Software packages for the PC are evaluated in terms of their capabilities in handling various forecasting techniques, programming efficiency, input/output formatting, documentation and costs. A wide variety of software is available to enable the PC user to have a complete workstation for business forecasting. Examples of output of various software will be presented.

"FORECASTING SIMULATOR (FORECASTING COMPUTERS BY CUSTOMER SIMULATIONS)"

Mueller, D.L, Control Data Corp., 8100 34th Ave South, P.O. Box O, Minneapolis, Minnesota, 55440, USA

Control Data develops very long-term forecasts (10 years) for its computer systems business. To facilitate this process, a computer model was implemented that simulates the decisions made by customers for general purpose computer systems. The model uses Monte Carlo techniques common in simulation models. The forecasters sets the parameters to the model based on forecast assumptions and using past trends and future judgements in the process. The model develops unit acceptances by the customer, purchase or lease of the unit, purchase conversion of leased units, and returns of leased units. The model is based on the fact that this is a mature market where 70 per cent of the sales are to existing customers.

"FORECASTING WITH A MODELING LANGUAGE"

Brandon, Charles, Crummer Grad. School of Business, Rollins College, Winter Park, Florida, 32789, USA

There has been a significant change in the type and quality of software that is available for forecasters. Much of this software is menu driven so that the user is constrained by the methods and utilities in the package. The approach discussed in this paper permits more interaction to enhance user control. The approach is based on a modelling language (in the case ISPS) together with an optimization package to accomplish the following objectives: 1) to customize models 2) asssess the impact on key variables when assumptions are changed. In addition to the wide variety of application afforded by this approach it provides a valuable tool for teaching underlying model characteristics.

"COMPUTER GRAPHICS: BASIC CONCEPTS APPLIED TO BUSINESS AND TRANSPORTATION MODELING/FORECASTING"

Smith, Alan, Robert Morris College, Coraopolis, PA, 15108, USA

There are increasing number of commercially available computer-graphic packages, both in terms of hardware and software, that can be utilized by instructors, practitioners, and students of marketing. With the proliferation of low-cost graphic terminals, time-sharing capabilities, and recent advances in mini and micro computers, computer graphics and associated applications have been practical, reliable, cost-effective, and available at a host of working, user-oriented levels.

STUDIO

LONG RANGE FORECASTING AND PLANNING IN UNIVERSITIES

Chair: Thomas, Urs P., UQUAM, P.O. Box 8888, Station A, Montreal, Quebec H3L 3P8 CANADA

"THE CONCORDIA UNIVERSITY MISSION STUDY"

Thomas, Urs P., UQUAM, P.O. Box 8888 Station A, Montreal, Quebec H3L 3P8 CANADA

The paper presents a case study of a major strategic planning exercise in the para-public sector. This Montreal University of well over 20,000 students has used the pressures caused by a 1981 budget cut as a catalyst for the definition of its mission. I will concentrate here on the deliberations in the 1982/83 university senate which resulted in the mission report. Containing 9 key elements, its purpose was to serve as a guideline for the board of govenor's planning function.

"TOWARD A STRATEGY FOR LONG RANGE FORECASTING AND PLANNING FOR UNIVERSITIES"

Palmer, Stuart, Dean, College of Liberal Arts, University of New Hampshire, Durham, New Hampshire, 03824, USA

Universities are on the cutting edge of social change. New social trends, e.g. the feminist movement, anti-nuclear protest, tend to be "tried out" in university settings. And the universities are the breeding grounds of most social and physical inventions, mainly in the form of new knowledge; examples are quantum physics, gene manipulation, psychology and many areas of technology. The future of societies and the future of universities are, then, inextricably and reprically intertwined. Unlike most other institutions, new social phenomena which develop within universities are themselves the predictors of how the universities will function decades into the future. This paper traces the major processes and substantive areas involved with the aim of developing a comprehensive strategy for university long range planning.

"STRATEGIC PLANNING PROGRAM FOR ENTREPRENEURS"

Hoffman, Randy, Ripley, Louise, Becker, Dirk, Atkinson College, York University, 4700 Keele Street, Downsview, Ontario, M3J 2R7, CANADA

Employing the results of a prior survey of small businesses to identify weaknesses in the strategic planning process, the authors have developed a unique instructional software package that enables entrepreneurs both to implement a planning process and to forecast and visualize the entire range of results. The latter component is performed by an economic scenario forecast in a probabalistic format that does not require analytical skills beyond the range of the average small to medium business owner, but focuses attention on the crucial dimension of risk. The paper will present both the program and case histories of its impact upon users.

"FORECASTING DEMAND FOR UNIVERSITY COMPUTER SYSTEMS"

Elicano, R.V., Management Center, University of Toledo, Toledo, Ohio, 43606, USA

This paper describes a project to develop a system for forecasting the demand for centralized computer resources at the University of Toledo. Historically, the Computer Services Department would try to stimulate computer usage until capacity was saturated, then ask for the highest upgrade that it thought it could sell, and settle for the something inbetween that the administration would approve. Forecasting complications included, changes in computer hardware and software, changes in the cost charge-back system, down-time from hardware changeovers, random occurrences of computer-consuming research projects, increases in remote terminals, proliferation of microcomputers, implementation of on-line administrative systems, computerization of courses, etc.

ETUDE

FINANCIAL FORECASTING III

Chair: Cheng, Thomas, McGill University, Faculty of Management, 1001 Sherbrooke St. West, Montreal, Quebec, H3A 1G5

"FORECASTING INTEREST RATES: AN INTRODUCTION TO THE K-CLASS CYCLICAL INDEXING ANALOGY METHOD"

Pourian, Heydar, Asst. Prof. of Finance, Western Carolina University, School of Business, Cullowhee, North Carolina, 28723, USA

It is known in economics and finance that cyclical patterns do occur. In application, however, various smoothing methods are utilized to study, fit, simulate, and forecast these patterns. The main problem with the application of these methods to time series variables, which behave cyclically, is that the resultant smoothed projection into the future does not have any cyclical property! It is the suggestion of this paper that these smoothing methods should be combined with cyclical indexing in order to preserve the cyclical properties of the forecast series.

"LONG TERM PERSISTENCE IN GOLD PRICES"

Chen, Shaw K., University of Windsor, Faculty of Business, Windsor, Ontario, N9B 3P4, CANADA

This paper is designed to investigate the long term persistence (long model as described in Lawrance and Kottegoda (1977) as well as the short term periodic behavior (short model as in Lawrance and Kottegoda (1977) of gold prices. The fractional differencing seasonal model (FDSM), as in Chen (1985), will be employed for the statistical analysis. In Section I, both the data and the methodology are discussed. Section II shows the results from the analysis. A discussion and conclusions are presented in Section III.

"A DYNAMIC EXCHANGE RATE MODEL"

Ancot, J.P., Erasmus Universiteit Rotterdam, Faculteit Der Economische Wetenschappen, P.O. Box 1738, 3000 Dr Rotterdam, THE NETHERLANDS

The aim of this paper is to reintroduce the use of structural models by i) advocating more general models of exchange-rate determination, and ii) correcting the misspecified exchange-rate dynamics of existing models due to the inconsistency between the high-frequency observation of exchange rates and the differentiated time response of short, medium and long run macroeconomic relationship.

"A STRUCTURAL FORECASTING MODEL OF EXCHANGE RATES"

Buttler, H.J., Schweizerische National Bank, 8022 Zurich, Switzerland
Schips, Bernd, University of St. Gallen (HSG) 9000 ST. GAllen, Switzerland

The purpose of this paper is to show how a forecasting system of exchange rates for the U.S. Dollar, D-Mark, and Swiss Franc can be modelled. Each country consists of three markets: The market for domestically produced goods, the government bond market, and the market for high-powered money. Demand for goods, portfolio and cash balances are derived by considering the appropriate wealth constraint. The dynamics of the system takes into account the wealth accumulation through domestic private investment, government budget deficit, and current account surplus. Expectations of exchange rates are rational in the sense that spot rates in the long run are expected to be equal to equilibrium exchange rates which are generated within the framework of the model.

VILLE-MARIE

FORECASTING TOPICS

Chair: Ouellet, Roch, Ecole H.E.C., 5255 Decelles, Montreal, Quebec, H3T 1V6

"FORECASTING REVENUE FOR A RADIOLOGY LAB"
Hanke, John, Eastern Washington University, Cheney, Washington, 99004, USA

A radiology lab was developing a medical imaging center more complete and technologically (Nuclear Magnetic Resonance Imaging (MRI) equipment) advanced than any currently located in the area. The purpose of the study was to forecast revenue for the next five years for the proposed medical imaging center. A forecast was developed for each procedure done at the proposed center based on past experience, industry rates, census data, and reasonable assumptions.

"CRITICAL ISSUES IN FORECASTING IN THE PHARMACEUTICAL INDUSTRY"
Lowenhar, Jeffrey A., Temple University, Assoc. Prof. of Marketing, Philadelphia, Pennsylvania, 19122, USA
Cashion, Nora, Smith Kline & French Labs, 1917 Mt. Vernon St., Philadelphia, Pennsylvania, 19130, USA

Approaches used to forecast marketing environmental issues in the pharmaceutical industry are discussed. Strategic considerations deriving from societal and regulatory climates, technology breakthroughs, and demographic changes are examined. How such issues must be integrated into market research activities and how they ultimately affect competitive choices for industry sectors are reviewed. The examination of such trends as emerging health care delivery system, intensified hospital cost-containment policies, and more knowledgeable and involved patient-consumers illustrates the importance of flexibility in developing forecasts. Particular attention is given to changing mortality and morbidity patterns, and the effect which the exploding elderly population will have on the pharmaceutical industry. Techniques employed for evaluating projected events or trends vis-a-vis corporate strategic goals, and integrating these projections to effectively modify business plans are reviewed.

"FORECASTING CANADIAN INDUSTRIAL ENERGY DEMAND INCLUDING INDIRECT INPUTS"
Wright, David J., Faculty of Administrtaion, University of Ottawa, Ottawa, Ontario, Canada K1N 6N5

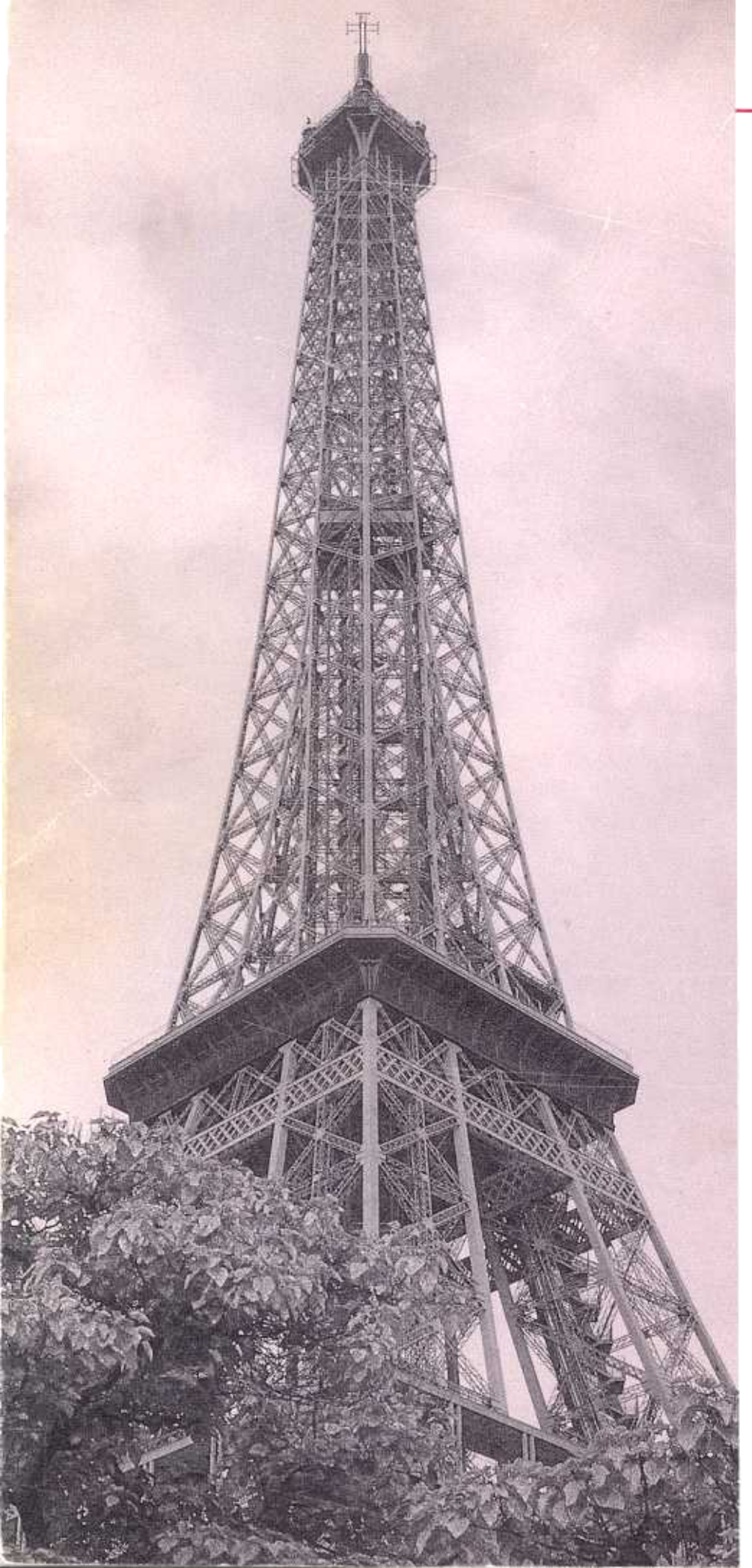
An input-output approach is applied to investigate trends in physical energy usage per dollar of output for major industrial groups over a ten year history. The importance of indirect energy inputs is quantified and a methodology for forecasting the trends is described.

"DERIVED REDUCED FORM FORECASTS"
Foote, Paul Sheldon, New York University, 417 Tisch Hall, New York, New York, 10003, USA

In over identified systems of simultaneous equations, the derived reduced form based on 3SLS (or FIML, but not 2SLS) structural estimates, is asymptotically efficient relative to the OLS estimate of the reduced form. An evaluation of the forecasting literature reveals whether the use of derived reduced form forecasts yields superior forecasts.

LIST OF CHAIRPERSONS, SPEAKERS AND DISCUSSANTS

GUNA Erda
GUY Charles



THE SIXTH INTERNATIONAL SYMPOSIUM ON FORECASTING

THEME:
"ENLARGING THE SCOPE AND UTILIZATION OF FORECASTING"

Paris, France
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